

A Half-Century of Changes in Monetary Policy

John B. Taylor
Under Secretary of Treasury for International Affairs

Written Version of Remarks Delivered at the
Conference in Honor of Milton Friedman
University of Chicago
November 8, 2002

It is a real pleasure for me to participate in this conference in honor of Milton Friedman. I have been asked to review changes in monetary policy since the end of World War II, or during the half-century or more since Milton Friedman first began writing on monetary economics.

Monetary policy changes during this period have been truly dramatic, not only in the United States, but also throughout the world. As every monetary economist knows, Milton Friedman's monetary research and policy advice—on monetary policy rules, on flexible exchange rates, on money growth, on the natural rate of unemployment, on the flaws in the Phillips curve, and on the real interest rate—had an enormous influence on these changes.

In the United States, the first big post-war change in monetary policy came in 1951 when the famous Accord was reached between the Treasury and the Federal Reserve. By freeing the Fed from the obligation to peg interest rates, that Accord allowed the Fed to make its own decisions about the instruments of monetary policy and to focus on key price stability goals. At nearly the same time, William McChesney Martin—who played an important role in negotiating the Accord—moved from the Treasury to the Fed and began implementing these goals. Since then we have seen many more changes in U.S. monetary policy, including a major transformation in how the instruments of policy are adjusted.

Similarly, but later on, the end of the Bretton Woods fixed exchange rate system freed central banks in the rest of the world to set their own instruments of monetary policy. And the changes have continued since then. Now the Bundesbank and other central banks of Europe are joined in a single central bank for all of Euroland with a single money supply and a single overnight interest rate. The international monetary system has been transformed into a system with a wide variety of monetary policies: (1) inflation targeting with a flexible exchange rate and a procedure for setting the policy instrument—usually the short-term interest rate, as in New Zealand, Chile, the United Kingdom, Sweden and Korea, (2) monetary unions—in western and central Africa and the eastern Caribbean as well as in western Europe, (3) dollarization—where the term refers both to the official use of Euros, as in Montenegro, and to the official use of dollars, as in El Salvador, (4) currency boards—as in Bulgaria or Bosnia, and (5) managed pegs—as in Singapore. One of the jobs of the International Affairs staff at the U.S. Treasury is to monitor monetary policy changes in other countries. I can attest that there have been a lot of changes to track.

For the most part these changes have resulted in better economic performance. There is greater monetary transparency and accountability in many countries, with explicit

announcements of changes in policy instruments and published inflation and monetary policy reports. But unfortunately, not all has been good. In the midst of these positive changes, money mischief—to use the title of Milton Friedman’s 1994 book—has continued, from hyperinflations in the early years of transition in the former Soviet bloc countries to multiple currencies in Afghanistan.

Three Broad Historical Developments

Clearly it is impossible to cover all these changes in one talk. But there are three broad historical developments during this period that provide a convenient organizing framework for reviewing the key monetary policy changes.

One development is the significant *rise and fall of inflation* during the post-World War II period. In the United States we went from price stability in the 1950s through the mid 1960s, to inflation from the late 1960s to the early 1980s, to disinflation in the early 1980s, to price stability in much of the period since then. Thus, the monetary history of this period consists of the Great Inflation flanked by two periods of relative price stability.

Another development—closely related to the first—concerns the procedures used at central banks for setting the instruments of monetary policy. The main change here is that decisions about the instruments of policy—frequently the overnight interest rate—are being approached and analyzed in a *more rule-like or systematic* fashion both in research and in practice. And when viewed in this more systemic fashion, one can detect a change in the responsiveness of the instruments of policy to inflation and to the real economy. In other words, the estimated coefficients in monetary policy rules have changed significantly.

A third development is the *diffusion of ideas and experience* about monetary policy around the world. The Great Inflation is frequently discussed as if it were solely an American inflation. But this same general pattern can be found in many countries and regions of the world. In recent years the diffusion of ideas and experience is found in the increasing number of central banks emphasizing targets for inflation, transparency, and independence in setting the instruments of policy.

Most changes in post-war monetary theory, history, and policy are best understood in the context these three historical developments. I’ll now consider each in turn.

The Rise and Fall of Inflation

Figure 1 documents the rise and fall of inflation in the United States. Inflation began to rise in the late 1960s and fluctuated in a generally rising pattern until the start of the disinflation in the late 1970s. By the mid 1980s inflation had been reduced substantially and a period of relative price stability began. That period of price stability has continued ever since with relatively small fluctuations.

Figures 2 through 4 show that a similar pattern of inflation occurred in the United Kingdom, Australia, and Canada, although the inflation ended somewhat earlier in the United States. Of course, not every single country in the world experienced precisely the same timing. Japan, for example, dealt with the inflation problem much earlier than the United States, and with the current deflation it has gone too far in reducing inflation. Nevertheless, there is a general global pattern, and Figure 5 endeavors to summarize the global pattern. It shows the median inflation rate over 5-year intervals in the major regions of the world. In each case we see a rise and fall of inflation. Not shown in Figure 5 is the experience of the transition economies that emerged from the Soviet bloc. These countries also experienced a rise and fall in inflation, but it was larger—reaching hyperinflation levels—and shorter—starting and ending in the 1990s.

What caused the Great Inflation? I will take as a given that inflation is a monetary phenomenon. Milton Friedman and Anna Schwartz provided convincing evidence of this long ago in their monetary history. In Figure 6, scatterplots of countries' money growth rate and inflation rate show that inflation is still a monetary phenomenon. There is a remarkably close association over time between inflation and money growth. The question is why central banks increased money growth during the period of high inflation. Monetary economists have offered a number of explanations.

Exogenous Oil Price Shocks and Monetary Accommodation

Long before the Great Inflation was over and long before it acquired its current name, people began focussing on “oil price shocks” as the cause of the rise in inflation. Alan Blinder, for example, stressed the importance of oil shocks in raising the rate of inflation. According to this explanation the shock-induced increase in inflation forced policymakers to accommodate the shock by raising money growth; the accommodation would prevent a decline in real money balances and avoid an increase in unemployment. If the shock were not accommodated, then unemployment would increase.

The passage of time and later experiences with oil shocks under different monetary regimes have raised questions about this view. Writing from the vantage point of 1997, Brad DeLong noted that the inflation was already underway in the late 1960s in the United States, well before 1972 when the oil price shocks began. Moreover, the experiences with later oil shocks in the United States and other countries were much different from the first shocks; these experiences suggest that a less accommodative monetary policy could prevent price shocks from getting imbedded in inflation without significant unemployment effects. Oil price shocks in the late 1970s had very small effects in Japan when a much less accommodative monetary policy was in place.

Historical Bias: Lessons from the Great Depression

In rejecting the price shock view, Brad DeLong provided another explanation for the Great Inflation. According to this explanation, the memory of very high unemployment in the Great Depression caused policymakers to err on the side of higher inflation. They were fearful

of a return to high unemployment. He argues that policymakers and the public were willing to let inflation rise because, having recently experienced the high unemployment of the 1930s, they worried that maintaining price stability would lead to greater unemployment.

However, if the experience of the Great Depression caused the rise in inflation in the late 1960s and 1970s, then why did monetary policy leave the price level so nearly stable during the William McChesney Martin years of the 1950s and 1960s—a period much closer in time to the Great Depression? Shouldn't we have seen the inflation rate rise much earlier if the Great Depression had created such a bias in monetary policy?

Time-Inconsistency Bias: Expectations Traps

The time-inconsistency problem of Finn Kydland and Edward Prescott has also been frequently cited as a possible reason for the rise and fall of inflation. One version of the time-inconsistency explanation is due to Michael Parkin using the model of Robert Barro and David Gordon. In the basic time-inconsistency model of inflation and unemployment there are economic benefits from actual inflation being higher than expected inflation and there are economic costs from inflation itself. The model predicts that policymakers—who are unable to fully commit to policies—will eventually find themselves in a sub-optimal equilibrium. The unemployment rate is always equal to the natural unemployment rate in this equilibrium, no matter what the inflation rate is. The equilibrium is sub-optimal because, if policymakers could commit, it would be possible for them to achieve a lower inflation rate with the same rate of unemployment. Thus, time-inconsistency causes an inflationary bias in monetary policy.

This sub-optimal equilibrium has the property that the higher is the natural rate of unemployment, the higher is the equilibrium inflation rate. This property yields a possible explanation for the Great Inflation in the United States because the natural rate of unemployment rose in the 1970s. As the post-World War II baby boom generation entered the workforce, the fraction of young people, who typically have higher unemployment rates, rose. This caused the natural rate of unemployment to rise. Then, as the baby boom generation grew older in the 1980s, the natural rate of unemployment declined. Thus, with a rising and then falling natural rate of unemployment, the time-inconsistency model implies that the inflation rate should have risen and then fallen as well.

I have questioned whether policymakers—who are assumed in this story to be well aware of the time-inconsistency problem—could have dealt with it long ago. Wouldn't they have seen the sub-optimality of the equilibrium and dealt with it? In any case, even if Parkin's explanation applies here, it cannot explain the rise and fall of inflation in Europe and other parts of the world—see Figure 5—where the natural rate of unemployment did not follow the same pattern.

V.V. Chari, Lawrence Christiano, and Martin Eichenbaum developed another version of the time-inconsistency model that can be offered as an explanation of the Great Inflation. As described by Christiano and Christopher Gust the model is based on rational expectations with sticky prices rather than the imperfect information used by Kydland and Prescott. In this model a rise in people's expectations of inflation forces a choice on the central bank: either accommodate

the increase in inflationary expectations by an increase in money growth, or do not accommodate the increase and let unemployment rise. Their version of the time-inconsistency problem is similar to the price shock explanation in the sense that the central bank is “forced” into increasing money growth in order to avoid a decline in real money balances and an increase in unemployment. To complete this explanation, Christiano and Gust note that expectations of inflation did rise in the late 1960s along with the increase in actual inflation. For this model to explain the *end* of the Great Inflation, however, more is needed—perhaps a sudden recognition by policymakers that this time-inconsistency problem exists.

Poor Data: Overestimating Potential GDP

Athanasios Orphanides argues that an overestimate of potential GDP and a corresponding underestimate of the full-employment unemployment rate were factors that led monetary policymakers to provide too much monetary stimulus and cause the Great Inflation. His analysis is based on estimates of the actual data that existed in the 1970s. He feeds this data into standard monetary policy rules and finds that the setting of the interest rate is similar to the actual interest rates, which—certainly based on what we know today—were way too low and would be expected to lead to inflation, as they did.

Orphanides’ work is a very useful reminder of the dangers that uncertainty about potential GDP can create for monetary policy procedures that use potential GDP. However, his estimates of real-time potential GDP have their own problems. In my view they exaggerate the size of the policy error that could be attributed to an overestimate of potential GDP. Most important is that the potential GDP series used by Orphanides was recognized at the time by monetary policy and business cycle experts to be flawed. In fact, plans were in place at the Council of Economic Advisers to publish a more realistic series for potential GDP. In any case, I doubt that an expert historian of the business cycle such as Federal Reserve Chairman Arthur Burns would have been confused by this estimate of potential GDP.

Ideas: The Development of Models of Inflation

The development of new economic ideas and the adoption of these ideas by policymakers and their staffs can obviously have an impact on economic policy. But not all new economic ideas are correct. In my view the idea—developed in the 1960s—that there was a long-run tradeoff between inflation and unemployment contributed greatly to the Great Inflation. Moreover, the discovery of flaws in those models by Milton Friedman and the development of new models by Friedman, Edmund Phelps, Robert Lucas, and others in the 1970s and 1980s helped create the rationale for the disinflation and for the more recent period of price stability.

A.W. Phillips’ paper was published in 1958, and by the mid 1960s the idea of a long-run Phillips curve tradeoff between inflation and unemployment regularly appeared in the *Economic Report of the President*. It appeared in textbooks and was widely discussed by the media. Of course, the monetary policy implication of the Phillips curve tradeoff was that unemployment could be permanently reduced if the central bank increased money growth and created a higher

rate of inflation. The idea clearly had an impact on fiscal and monetary policy. Recent historical work by Christina Romer and David Romer finds evidence of this in the records of policymakers at the time. As the idea of a long-run Phillips curve gained acceptance, it led politicians to be less concerned about using monetary policy to overstimulate the economy.

As early as 1966 Milton Friedman was pointing out the theoretical flaws in the Phillips curve argument. He showed using basic economic theory that there could be no long-run tradeoff; excessive monetary expansion, which temporarily brought unemployment below the natural rate, would lead to accelerating inflation as people began to expect higher inflation. He put his natural rate theory before the whole American Economic Association in his presidential address in 1967. His model was very controversial at the time, but as the Great Inflation picked up steam and the inflation-unemployment facts started rolling in, the model was proven to be right on the mark. Soon his natural rate idea was being incorporated into econometric models used at the Fed and elsewhere.

Thomas Sargent's recent work on learning describes how the estimated econometric models of the Philips curve equations changed as the Great Inflation started and continued. With price stability in the 1950s and early 1960s, expectations of inflation were low and the expectations term in the Philips curve was small (certainly less than one). But as inflation picked up so did the coefficient on the expectations term, leading to confirmation of the Friedman model. One implication of Sargent's work is that now that the Great Inflation is over, the expectations term will decline again (which it has) and could again lead economists to think that there is a long-run tradeoff. That is why it is so important not to blindly run regressions, but rather to ground empirical work on good economic theory as Milton Friedman did.

At least in the early years of the Great Inflation, the Friedman model did not appear to have had a practical influence in leading to less inflationary monetary policies. The Great Inflation started and it continued. But the model did change the nature of the monetary policy debate in a profound way. Rather than arguing that higher inflation would lead to lower unemployment (the facts were not supporting such an argument), people started arguing that there would be great costs of *reducing* inflation. Such an argument was supported by the Friedman model when *combined* with slowly adaptive expectations—the so called “expectations augmented” Philips curve. If the Fed tried to reduce inflation, people argued, expectations of inflation would come down very slowly, and the gap between expected and actual inflation would raise unemployment. Thus the model was used to justify a policy of avoiding disinflation; such a reduction would be too costly. For example, George Perry calculated that it would require a reduction of 10 percent of GDP to reduce inflation by 1 percentage point. To the extent that such estimates were incorporated into policymakers' thinking, they delayed the disinflation and kept the Great Inflation going.

The 1974 White House *Economists Conference on Inflation* is indicative of mainstream economic thinking at the time. Many distinguished economists attended the event. Virtually all of them stressed the high costs of disinflation. Walter Heller said “in bringing inflation to its knees, we will put the economy flat on its back.” Paul Samuelson said we do not need a Winston Churchill-like “blood, sweat, and tears” program to reduce inflation. Among all these distinguished economists, only Milton Friedman argued unequivocally for inflation reduction.

He said the “strength [of the U.S. economy] is currently being eroded by the disease of inflation. If that disease is not checked it will take a heavy toll including, in my opinion, the very likely destruction of our personal, political and economic freedoms....I heartily applaud, also, the expressed determination of the Federal Reserve to slow monetary growth...despite the cries of anguish about this table and elsewhere about tight money, the slowing has so far lasted two or three months so we cannot yet be sure the Fed has really departed from the ever more inflationary path it has been following for the past decade”.

So once again Milton Friedman was the exception. The more common view among economists throughout the 1970s was that it was not worth the costs to reduce inflation. This common view was based on the expectations-augmented Phillips curve, not on the original Phillips curve.

What started to shift economists’ thinking about disinflation, in my view, was the “rational expectations” revolution, and, in particular, the replacement of adaptive expectations with rational expectations in the “expectations-augmented” Phillips curve. Robert Lucas’s 1972 paper laid out the basic theory. Thomas Sargent and Neil Wallace drew out the policy implications: the costs of disinflation were essentially zero for a credible policy of disinflation. Of course, these striking findings required the extreme assumption that prices and wages were perfectly flexible, but they certainly got people to think about alternative views.

At about the same time, models with staggered wage and price setting and rational expectations that preserved the long-run neutrality that Friedman required were also being developed. In these new sticky wage and price setting models the costs of disinflation also appeared to be much lower than previously thought. Using estimated econometric models that combined staggered price setting (rather than perfectly flexible prices) with rational expectations, I calculated in the late 1970s the disinflation costs: they were not zero but they were much smaller than those found using conventional models.

Changes in Leadership

So far the explanations I have mentioned focus on economic models, on shocks, on biases, and on data errors. Another explanation of the Great Inflation and its demise can be found in changes in economic and political leadership. Here, once again, Milton Friedman’s insights are valuable. He argues that the Great Inflation occurred because of the political and economic officials who were in charge at the time that it started. And the Great Inflation ended because of the people who were in charge at the time that it ended. In fact, he places more importance on changes in leadership than on changes in knowledge. He notes the lack of economic leadership in the late 1960s and early 1970s and the re-emergence of leadership during the disinflation period in the early 1980s.

I can do no better than to quote Milton Friedman on the topic of leadership using excerpts from an interview I recently conducted.

Taylor: Why did inflation start to rise in the late 1960s and 1970s in the United States?

Friedman: Yes, the Great Inflation, the explanation for that is fundamentally political, not economic....I believe that Arthur Burns deserves a lot of blame, and he deserves the blame because he knew better. He testified before Congress that, if the money supply grew by more than 6 or 7 percent per year, we'd have inflation, and during his regime it grew by more than that. He believed in the quantity theory of money but he wasn't a strict monetarist at any time....

Taylor: Do you think Burns was part of the culture of the times in that he put less emphasis on inflation, or that he was willing to risk some inflation to keep unemployment low, based on the Philips curve?

Friedman: Not at all. You read all of Arthur's writings up to that point and one of his strongest points was the avoidance of inflation. He was not part of that Keynesian group at all....

Taylor: Another thing that people say now is that Burns was as confused as other people were about potential GDP, and that he thought the economy was either below capacity or that it was capable of growing more rapidly than it was. Do you think that was much of a factor?

Friedman: I don't think that was a major factor. I think it may have been a factor.

Taylor: What about the end of the Great Inflation?...

Friedman: Well, there's no doubt what ended it. What ended it was Ronald Reagan. If you recall the details, the election was in 1980. In October of 1979, Paul Volcker came back from a meeting in Belgrade, in which the U.S. had been criticized, and he announced that the Fed would shift from using interest rates as its operating instrument to using bank reserves or base money....Reagan was elected and Reagan was determined to stop the inflation and willing to take risks. In 1981, we go into a severe recession. Reagan's public opinion ratings went down, way down. I believe that no other president in the post-war period would have accepted that without bringing pressure on the Fed to reverse course. That's the one key step: Reagan did not. The recession went on in 1981 and 1982. In 1982 Volcker turned around and started to raise the money supply and at that point the recession came to an end.

The Evolution of Monetary Policy Rules

A second important strand in post-World War II monetary history is the change in the way the instruments of policy are set. To describe this change I need to first focus on what the instrument of monetary policy is. The choice is between the interest rate and the monetary base. (There is also the related question, which I am not addressing here, about whether there should be an intermediate target for a broader monetary aggregate or simply an inflation target.) There has been an increased focus on the interest rate in recent years. To some extent this has been a matter of increased transparency; in the past many central banks had been implicitly setting interest rate targets. In 1994 the Federal Open Market Committee (FOMC) began issuing public

statements about its federal funds rate decisions. The FOMC now directs the Trading Desk in New York to buy and sell securities so that conditions in the federal funds market are consistent with an average funds rate near its stated target. Similar developments occurred at other central banks with the overnight interest rate typically being determined by stated borrowing and lending rates as in New Zealand, Canada, and the European Central Bank.

Now, with the focus increasingly on the overnight interest rate as the instrument, there has been a shift in how monetary economists analyze central bank decisions. Rather than evaluate each decision as an isolated one-time adjustment, the evaluation is about the overall dynamic strategy for setting the instrument. In other words, policy analysis places greater emphasis on the coefficients of monetary policy rules. This change in emphasis is quite profound. It grew out of early work on monetary policy rules by Milton Friedman; the recent resurgence was motivated in part by endeavors to incorporate anticipatory behavior in markets into policy evaluation. Following Lucas, such forward-looking behavior has frequently been modeled by assuming rational expectations. In a rational expectations environment one cannot even evaluate monetary policy without thinking of a policy rule that lays out future contingencies. These were some of the motivations for the policy rule research that I was engaged in during the 1970s and 1980s and which resulted in the normative proposal in my 1993 “Rules versus Discretion in Practice” paper.

This change in thinking about monetary policy is observed both inside and outside of central banks. When economists evaluate monetary policy, they simulate models with policy rules inserted in them rather than simply simulating one-time changes in the instruments. When financial market analysts try to determine what a central bank should or should not do, they usually consider a monetary policy rule. And central banks frequently use policy rules as an input to their actual decisions.

An unexpected benefit of the monetary policy rule approach is that it has revealed changes in the decisionmaking processes at central banks. One important change is in how the federal funds rate has responded to events in the economy. The response can be measured by the coefficient in the policy rule. John Judd and Glenn Rudebusch discovered such a change for Federal Reserve policy by empirically estimating a policy rule for the federal funds rate. They found that the response of the federal funds rate to the inflation rate has increased over time. During the late 1960s and 1970s the coefficient was less than one; during the period since the mid 1980s the coefficient has been greater than one.

The difference in the estimates in the two time periods is illustrated in Figure 7; note how the slope of the interest rate response line has increased, holding the response to other variables constant. A more dramatic illustration of the change is shown in Figures 8 through 11 where the interest rate is shown at two different points in time. In the United States when the inflation rate approached four percent in 1968, the federal funds rate was about five percent. When the inflation rate approached four percent in 1989, the federal funds rate was about ten percent, clearly a much larger response. The same phenomenon is seen for the United Kingdom, Canada and Australia in Figures 9-11.

Whether the coefficient is greater than one or not is important. With the coefficient greater than one, the response of the nominal interest rate is of a large enough magnitude that the *real* interest rises when inflation rises. This interest rate response reduces inflationary pressures and brings inflation back down. With the coefficient less than one, an increase in inflation is not countered by an increase in the real interest rate; in this case monetary policy is very accommodative and this leads to less price stability. It is not enough simply to raise the overnight interest rate when inflation rises. It is necessary to increase the interest rate by the right amount. Economic theory and model simulations both show that if a central bank is to use an interest rate instrument, it needs to respond appropriately if it is to achieve price stability. It is thus no coincidence that the low (less than one) coefficient describes the years of price instability during the Great Inflation, while the higher (greater than one) coefficient describes the years of price stability that followed. Monetary history confirms what theory and econometrics predict.

I have always stressed that monetary policy rules are only a guide or approximation to central bank decisions. Real world monetary policy decisionmaking requires judgement and leadership, but policy rules can be helpful. Now let me consider how the Fed came to change the interest rate responses in the direction suggested by Judd and Rudebusch. The evolution of an estimated monetary policy rule is, in my view, best understood as a gradual process of central banks learning how to conduct monetary policy. This learning occurs through research by the central bank, through the criticism by monetary economists outside the central bank, through observation of central bank behavior in other countries, and through direct practical policy experience of central bankers themselves. Discussions of how policy should respond are probably as old as central banks. For example, there were discussions of the idea of “leaning against the wind” early in the Fed’s history. The 1923 annual report stated “it is the business of the [Federal] Reserve system to work against extremes either of deflation or inflation and not merely to adapt itself passively to the ups and downs of business” (quoted in Friedman and Schwartz). But there was no agreement about how much leaning against the wind there should be. Leaning against the wind would result in a policy rule, but the parameters of the policy rule could be far from optimal.

Consider the period after the 1951 Accord when the Fed had to decide what to do with the interest rate. One recommendation was to lean against the wind, raising the interest rate when the economy grew more rapidly or inflation started to pick up. Leaning against the wind seemed to have the directions of interest rate adjustments right, but it had nothing to say about the size of the adjustments. What is the wind? How do you measure it? What do you lean with and by how much? There were many important, but unanswered, questions. Leaning against the wind—as articulated by William McChesney Martin—became a guideline for decisions. But the idea was still very vague. As stated by Friedman and Schwartz, “There was essentially no discussion of how to determine which way the relevant wind was blowing....Neither was there any discussion of when to start leaning against the wind....There was more comment, but hardly any of it specific, about how hard to lean against the wind.”

I have found other commentary that indicates that monetary policymakers still had much to learn about how to react. James Meigs at the St. Louis Fed described the situation in the 1950s, “...The Manager [of the open market account] generally tried to keep free or net borrowed reserves...at a level, he thought would satisfy FOMC members’ desires for a little

more, or a little less, or about the same degree of restraint.” But the degree of restraint was not quantitatively defined and the impact of changes in the degree of restraint was uncertain. “We were as uncertain about how monetary policy worked as were our colleagues at the other Reserve Banks and the Board.” A similar accounting comes ten years later in the mid 1960s from then new board member Sherman Maisel. According to Maisel, “After being on the Board for eight months and attending twelve open market meetings, I began to realize how far I was from understanding the theory the Fed used to make monetary policy....Nowhere did I find an account of how monetary policy was made or how it operated....Money market conditions cannot measure the degree to which markets should be tightened or for how long restraint should be retained.” And when referring to a decision to raise the short-term interest rate in 1965, he states, “It became increasingly clear that an inflationary boom was getting underway and that monetary policy should have been working to curb it.” He argued that the actions taken to raise interest rates were insufficient to curb the inflation. He was correct. Interest rates did not go high enough. This is perhaps not surprising in the absence of a quantitative measure of how high interest rates should go.

The importance of having a quantitative guide for policy became even more important when the Bretton Woods system fell apart in the early 1970s. Until then the long-run constraints on monetary policy were similar to those of the international gold standard. If the Fed did not lean hard enough against the wind, the higher inflation rate would start to put pressure on the exchange rate and the Fed would have to raise interest rates to defend the dollar. Without the dollar to defend, this constraint on monetary policy was lost. After Bretton Woods ended there was an even greater need for the Fed to develop a monetary policy rule that was sufficient to contain inflation without the external constraint.

The research program undertaken by monetarists—Milton Friedman, Homer Jones, Allan Meltzer—helped change this situation. By measuring money and by examining the demand for money, they helped policymakers see how a policy rule—in this case a rule for the money supply—might work. The research was also essential in helping policymakers distinguish between real interest rates and nominal interest rates. A lack of understanding of the real interest rate was one reason why the interest rate reaction was too small. Of course, there were other factors that led to the change in monetary policy, including the change in the macro framework that I discussed earlier. But the increased emphasis on money growth in the 1970s played a very useful role in clarifying the serious problems of interest rate setting without any quantitative guidelines. In my view, by the 1980s this learning process resulted in a recognition that changes in interest rates had to be larger and quicker if inflation was to be tamed and kept low once it was tamed.

Changes in the Business Cycle

How did this change in monetary policy affect the economy? We know that the inflation rate came down and there has been greater price stability. What about the real economy? Just as the natural rate theory predicted, the lower inflation rate has not increased the unemployment rate. Indeed the natural rate of unemployment declined in the United States in the 1990s.

What is perhaps most surprising, however, is that the volatility of the business cycle has been much lower during the period of price stability. This improvement in output stability is shown in Figures 12 through 15 for the United States and the other countries whose inflation rates are shown in Figures 2 through 4. Thomas Dalsgaard and others have shown that this improvement exists for most OECD countries.

For the United States, the 1980s and the 1990s expansions were the second and first longest in peacetime history. The recession of 1990-91 was short and mild as was the 2001 recession. In a Homer Jones lecture in 1998 I referred to the period of these long expansions as the Long Boom. I have argued that the change in monetary policy was responsible for this macroeconomic improvement. Others have suggested other explanations—better inventory management, a more services-oriented economy—but the reduction in the “boom-bust” cycle due to greater price stability provides the simplest and most complete explanation in my view. The changes in inventory management and in services are long-term trends and do not coincide with the changes in Figures 12 through 15.

The Diffusion of Monetary Policy Ideas

Much of my discussion about the rise and fall of inflation and about changes in monetary policy has focussed on the United States. But, as I indicated, the same broad developments have occurred in many other countries around the world. Inflation rose and fell in other countries and price stability is now much more common, as I showed in Figures 2 through 5. There is also more transparency about interest rate decisions.

What is the reason for this correlation? Could some of the same factors driving the policy changes have been at work in other countries? In my view the answer is yes. Clearly the ideas about the Phillips curve inflation-unemployment tradeoff were discussed widely in many countries. The ideas appeared at the OECD as much as the CEA. The natural rate hypothesis and the rational expectations calculations that the costs of disinflation were not so large, especially in comparison with the cost of inflation itself, may have caught on more slowly in other countries; but eventually they did catch on and would have the same impact on policy as in the United States.

The inflation targeting movement also helped spread the ideas about the cost/benefit calculations of achieving and maintaining price stability. Inflation targeting has been helpful in the disinflation process in the 1990s, especially for countries that started with very high inflation rates such as Brazil. New Zealand adopted inflation targeting as part of a public management reform movement where each government agency was made accountable for achieving measurable results. In New Zealand the measurable result for the central bank was an explicit numerical target for inflation. The experience in New Zealand and extensive writings by Lars Svensson and others helped spread the idea of inflation targeting to Sweden and other countries.

The use of monetary policy rules for analyzing monetary policy has also spread to other countries. The experience of other countries and the extensive research by Bennett McCallum and others on policy rules have been a significant factor in the diffusion process. There are many ways for policymakers in different countries to share experiences about what is helpful and what

is not. The activities of the Bank for International Settlements and the International Monetary Fund provide opportunities for many such exchanges. The web pages provided by central banks and monetary economists outside of central banks also help in the diffusion process.

There is another favorable development in the last few years. More countries have chosen to abandon pegged exchange rates and, instead, have chosen either to use a monetary policy based on flexible exchange rate or to permanently connect monetary policy to other countries through monetary union, dollarization, or a currency board. By our count at the U.S. Treasury, 47 countries operate a monetary policy with a flexible exchange rate and 50 countries are either dollarized, in monetary unions, or using currency boards. The number with fixed or heavily managed exchange rates is falling and is now at 75. Fortunately, there are only 7 countries with multiple exchange rates.

In sum, there are now 97 countries that have dollarized, joined a currency union, created a currency board, or floated their exchange rate. There is a common feature in all 97 countries. They are endeavoring to benefit from the progress made in the practice of monetary policy. They are either tying to a central bank with good price stability goals and instrument setting procedures, or they are trying to pursue an independent monetary policy using those goals and procedures themselves.

Conclusion

Before I finish this historical review I need to remind everyone about the many practical monetary problems that are still left in the world. For example:

Among the industrial nations, a serious monetary problem is the deflation in Japan. It has continued for seven years and appears to have become persistent. The Bank of Japan ran a good monetary policy based on price stability for much of the 1970s and 1980s. It was a policy based on keeping the growth rate of money steady. But declines in money growth in the 1990s led to deflation, which now needs to be addressed by increasing money growth and reforming the banking sector.

Among the emerging market countries, the currency mismatch problem—where banks, governments, and non-financial firms have liabilities in dollars and assets or income streams in local currencies—is a potential cause of instability. Without an adequate supply of dollar reserves central banks cannot provide lender of last resort facility for dollar deposits at banks.

And among the poor developing economies many still have yet to introduce transparent monetary policies aimed at price stability.

Nevertheless, as I have tried to emphasize in this review, great progress has been made in monetary economics and policy. I hope it is clear from all the references to Milton Friedman that he has made an enormous contribution to this progress. He is an inspiration for us all, but especially for those who work in the areas of monetary economics and policy.

References

- Barro, Robert, and David B. Gordon (1983), "Rules, Discretion, and Reputation in a Model of Monetary Policy," *Journal of Monetary Economics*.
- Blinder, Alan (1982), "The Anatomy of Double-Digit Inflation in the 1970s," in Robert.E. Hall (Ed.), *Inflation: Causes and Effects*, Chicago: University of Chicago Press.
- Chari, V.V., Lawrence Christiano, and Martin Eichenbaum (1998), "Expectation Traps and Discretion," *Journal of Economic Theory*.
- Christiano, Lawrence and Christopher Gust (2000), "The Expectations Trap Hypothesis," *Economic Perspectives*, Second Quarter.
- Dalsgaard, Thomas, Jorgen Elmeskov, and Cyn-Young Park (2002), "Ongoing Changes in the Business Cycle-Evidence and Causes," OECD Economics Department Working Paper 315.
- DeLong, J. Bradford (1997), "America's Peacetime Inflation: The 1970s" in C. Romer and D. Romer (Eds.), *Reducing Inflation: Motivation and Strategy*, Chicago: University of Chicago Press.
- Economists Conference on Inflation* (1974), Report Volume 1, Washington D.C., September 5.
- Friedman, Milton (1948), "A Monetary and Fiscal Framework for Economic Stability," *American Economic Review*.
- Friedman, Milton (1966), "Comments on the "Case against the Case against the Guideposts" in G.P. Shultz and R. Aliber (Eds.) *Guidelines Informal Controls and the Market Place*, Chicago: University of Chicago Press.
- Friedman, Milton (1968), "The Role of Monetary Policy." Presidential Address at the American Economic Association Annual Meeting on December 29, 1967, *American Economic Review*.
- Friedman, Milton (1994) *Money Mischief: Episodes in History*, Harcourt: New York.
- Friedman, Milton (2001), "An Interview with Milton Friedman," *Macroeconomic Dynamics*.
- Friedman, Milton, and Anna Schwartz (1963), *A Monetary History of the United States, 1867-1960*, Princeton N.J.: Princeton University Press.
- Judd, John and Glenn Rudebusch (1998), "Taylor's Rule and the Fed, 1970-1997" *Economic Review*, Federal Reserve Bank of San Francisco.
- Kydland, Finn, and Edward Prescott (1977), "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy*.

Lucas, Robert E., Jr. (1972), "Expectations and the Neutrality of Money," *Journal of Economic Theory*.

Maisel, Sherman J. (1973), *Managing the Dollar*, W.W. Norton, New York.

McCallum, Bennett (1999), "Recent Developments in the Analysis of Monetary Policy Rules," *Review*, Federal Reserve Bank of St. Louis.

Meigs, A. James (1976), "Campaigning for Monetary Reform: The Federal Reserve Bank of St. Louis in 1959 and 1960," *Journal of Monetary Economics*.

Meltzer, Allan (1963), "The Demand for Money: The Evidence from Time Series," *Journal of Political Economy*.

Orphanides, Athanasios (1999), "The Quest for Prosperity without Inflation," Federal Reserve Board.

Parkin, Michael (1993), "Inflation in North America," in K. Shigehara (Ed.), *Price Stabilization in the 1990s*, London: MacMillan.

Perry, George (1978), "Slowing the Wage-Price Spiral: The Macroeconomic View," *Brookings Papers on Economic Activity*.

Phelps, Edmund (1968), "Money-Wage Dynamics and Labor-Market Equilibrium," *Journal of Political Economy*.

Phillips, A.W. (1958), "The Relationship Between the Unemployment Rate and the Rate of Change in Money Wage Rates in the United Kingdom, 1861-1957," *Economica*.

Romer, Christina and David Romer (2002), "The Evolution of Economic Understanding and Postwar Stabilizing Policy Perspective," in *Rethinking Stabilization Policy*, Federal Reserve Bank of Kansas City.

Sargent, Thomas (1999), *The Conquest of American Inflation*, Princeton, N.J.: Princeton University Press.

Sargent, Thomas, and Neil Wallace (1975), "'Rational' Expectations, the Optimal Monetary Instrument and the Optimal Money Supply Rule," *Journal of Political Economy*.

Svensson, Lars (2002), "Monetary Policy and Real Stabilization," in *Rethinking Stabilization Policy*, Federal Reserve Bank of Kansas City.

Taylor, John B. (1979), "Estimation and Control of a Macroeconomic Model with Rational Expectations," *Econometrica*.

Taylor, John B. (1993), "Rules versus Discretion in Practice," *Carnegie-Rochester Series on Public Policy*.

Taylor, John B. (1998), "Monetary Policy and the Long Boom: The Homer Jones Lecture," *Review*, Federal Reserve Bank of St. Louis.