

Confidence and Central Banking

Fain Lecture in Celebration of George Borts's Fiftieth Year as a
Professor of Economics at Brown University
Brown University
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It is an honor for me to return to Brown University to participate in this celebration of George Borts and his 50 years as a professor of economics at Brown. George has been a wonderful friend to me over the years. He is a fine economist and one of a handful of key university leaders on the Brown faculty. He has shaped Brown and the economics department in ways visible and not so visible.

We are going to eat, drink, and be merry a little later, and that is certainly appropriate for this event. But no celebration of George would be complete without a serious economics discussion. During my 24 years at Brown, George and I had numerous conversations about economic issues—usually policy issues, for those were the ones we were most involved in with our own work. Many of these conversations were over lunch at the Ivy Room or the Faculty Club, most often with colleagues from economics and other departments around the table. So I think it fitting that I discuss a monetary policy issue that is important not only to economists but also to every member of our society.

Before proceeding, I want to emphasize that the views I express here are mine and do not necessarily reflect official positions of the Federal Reserve System. I especially thank my St. Louis Fed colleague, Bill Gavin, for his extensive assistance in preparing this lecture. However, I retain full responsibility for errors.

My topic is familiar to all economists and many noneconomists. We know that successful market economies depend on stable and predictable economic policies. When it comes to monetary policy, the key issue is the responsibility of the central bank to maintain the public's confidence in the purchasing power of money.

I'm going to discuss the topic, however, in a novel way by tying together confidence in the large with confidence in the small. The large issue concerns stability of the purchasing power of money in the long run. The small issue concerns the ability of the market to predict the central bank's policy actions. By "small" I do not mean "unimportant" but rather small in time. As we'll see in a moment, in the United States today the market is quite adept—amazingly so, I think—at predicting what the Federal Open Market Committee (FOMC) is going to do at its policy meetings. The two topics—the large one and the small one—are connected. For market participants to believe that the central bank is committed to the price stability objective, they must also believe that the central bank has the knowledge and will to achieve that objective. The fact that the market can predict Fed policy actions FOMC meeting by meeting suggests that market participants understand how the Fed evaluates the complex set of information upon which policy decisions are based.¹ Market understanding of why the Fed does what it does is essential to the markets hav-

¹ For research underlying this theme in the lecture, see Poole, William and Rasche, Robert H. "Perfecting the Market's Knowledge of Monetary Policy." *Journal of Financial Services Research*, December 2000, 18(2/3), pp. 255-98.

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ing confidence that the Fed will be successful in maintaining price stability.

Before diving into my topic, it is worth emphasizing that U.S. prosperity has the characteristics of a three-legged stool and that all legs are needed for the stool to stand. One leg is the entrepreneurial drive and inventiveness of the private sector. The second leg is the stability of government finances and the regulatory environment. The third is confidence in the financial environment, characterized by sustained low and stable inflation. It is this third leg I am discussing tonight, but everyone should understand that the other two legs are just as important.

FORECASTING FED POLICY DECISIONS

Let's begin by looking at some recent events in financial markets. I'll examine these events by using several figures, which appear at the end of the text and in a handout everyone should have.

A little background first. The FOMC, the Fed's main monetary policy body, implements monetary policy by setting a target level for the federal funds interest rate. The Fed calls this target the "intended rate." Federal funds are simply bank reserves held on deposit at the Federal Reserve banks. Commercial banks borrow and lend these funds to each other on an overnight basis. The Federal Reserve can control the interest rate in this market—the federal funds rate—by adding or draining bank reserves.

Many observers attribute to the Fed the ability to control *all* interest rates. In fact, the Fed's control over market interest rates other than the fed funds rate is indirect and operates through market expectations about policy objectives and future policy actions. The interest rate on, say, a Treasury bill with a 1-month maturity is set in a competitive market with no direct Federal Reserve intervention. The 1-month rate depends importantly on market expectations about the average fed funds rate over the next 30 days. A 1-year rate depends on expectations about the next 12 1-month rates,

and the 30-year Treasury bond rate depends on expectations about the next 30 1-year rates.

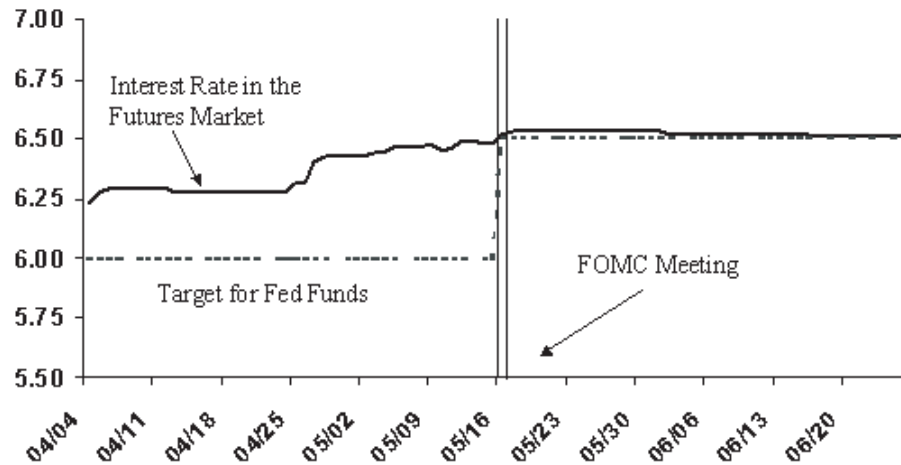
Expectations about all of these future interest rates depend on expectations about Fed actions to change, or not to change, the intended rate. And those expectations in turn depend on expectations about events and new information that may lead the Fed to alter the intended rate. The main effect of monetary policy, therefore, operates through these expectations about future policy and events that will drive future policy. We know, for example, that changes in the home mortgage rate can have large effects on housing sales and construction. The mortgage rate today is tied closely to other long-term rates in the capital markets, and all these rates are tied to expectations about future Fed policy.

Now look at Figure 1, which reports daily data from the futures market for federal funds. The futures interest rate shown here is the market's best guess about the average fed funds rate for June 2000. The figure also shows the level of the Fed's target for the federal funds rate. On May 16, the FOMC raised the intended rate from 6 percent to 6½ percent. This figure shows the interest rate from trading in the futures market for the 30 days before and the 30 days after the meeting.

The interesting thing about this figure is the accuracy of the market's forecast despite the fact that a fed policy action to change the intended rate by 50 basis points is a rare event. The first trading day shown on the figure is April 4. On this day, the intended rate was 6 percent. The June fed funds futures contract price reflected a market expectation that the average fed funds rate in June would be 6¼ percent. When the Fed changes the intended rate, the change is usually 25 basis points, and that is what the futures market was expecting. The June futures rate was steady until the last week of April when it jumped pretty quickly in a couple days. Then it continued to rise during the next few weeks, gradually increasing to 6½ percent. On May 16, the FOMC voted to raise the intended rate to 6½ percent. Since it is unlikely that the Fed would raise the target between the FOMC meetings—the next meeting was held on June 27-28—by May 15 the market

Figure 1

Fed Funds Futures and the Fed's Interest Rate Target



perfectly predicted what the FOMC would do at its meeting the next day.

What do we make of this situation in which the market correctly forecasts what the Fed is going to do? Is the Fed just following the market? Is the Fed leaking to the market what it intends to do? Is it a good thing that the market can predict Fed actions? To answer these questions it helps to consider the relationship between the futures market and Fed policy actions in more detail.

FOUR POSSIBLE SCENARIOS

Figure 1 illustrates the situation in which the market correctly forecasts a Fed decision to change the intended rate. In fact, there are four possible combinations to consider. The Fed might change the intended rate, or not change it, and in each case the market might correctly forecast the Fed's decision, or not forecast correctly.

Figure 2 contains a matrix of actual examples for each outcome from the fed funds futures market. It is possible that the market anticipates the policy decision or that it does not. The two figures

on the left side of Figure 2 show examples where the policy decision was correctly anticipated. The two on the right show examples where it was not. Let's look at these cases a little further.

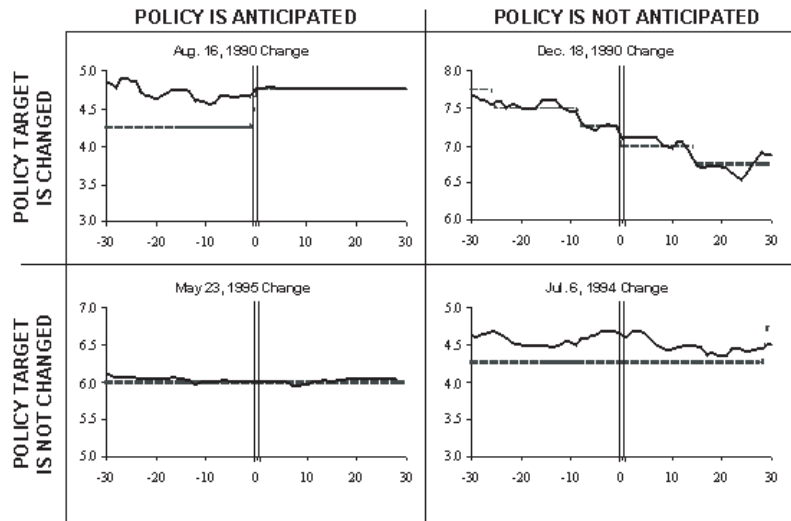
The upper left panel of Figure 2 shows trading in the futures contract for September 1990 and the FOMC meeting held August 16, 1990. In this case, the futures market expected a relatively large (50-basis-point) increase in the intended fed funds rate, and the FOMC raised the rate 50 basis points. This case is like the one examined in Figure 1.

The upper right panel of Figure 2 shows trading in the futures contract for January 1991 and the FOMC meeting held December 18, 1990. Before the meeting, the markets were not anticipating that the FOMC would reduce the intended rate; the rate for the January futures contract did not fall until after the FOMC acted. In fact, during the life of this contract, the FOMC reduced the fed funds target three times and each change appears to have surprised the market.

The two panels in the bottom half of Figure 2 show examples where the FOMC's decision was to leave the intended rate unchanged. The bottom left panel shows trading in the futures contract for June 1995 and the FOMC meeting held May 23, 1995. In this case, the markets expected no

Figure 2

Four Possible Scenarios



change in the fed funds target and the FOMC left the target unchanged.

Finally, the bottom right panel of Figure 2 shows trading in the fed funds futures contract for August 1994 and the FOMC meeting held July 6, 1994. Before the meeting, the markets were anticipating a large increase in the target rate, but the Fed did not change the rate at its July meeting. However, in this case the futures rate did not change much after the meeting; the market was still expecting the Fed to act, which it eventually did at its meeting of August 16, 1994.

Before I get into this subject any further, let me mention briefly a few general findings from my research on this subject, conducted jointly with my colleague Bob Rasche. For those interested, the working paper in all its mathematical and statistical glory is available on the St. Louis Fed’s web site. Two generalizations from this research: First, the accuracy of market predictions of Fed policy improved dramatically in 1994. Second, most of the changes in the fed funds futures rates are driven by economic news such as the monthly employment report and the infla-

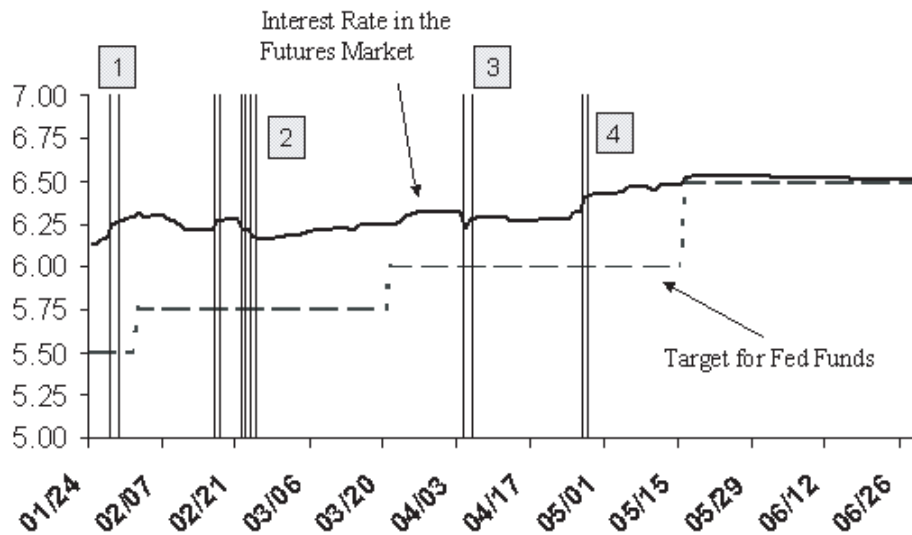
tion data. A relatively small part of the changes in the futures rates comes on days Fed officials give speeches or testimony. Although Rasche and I did not investigate the issue of leaks in our research, I am convinced that leaks are extremely rare. I know of only one example of a leak since I arrived at the St. Louis Fed—it received attention in the press in the spring of 1998—and it only indirectly concerned the probable future setting of the intended funds rate anyway.

UNDERSTANDING MARKET SUCCESS IN FORECASTING FED POLICY ACTIONS

I’m now going to illustrate the key issues concerning market success, or lack thereof, in forecasting Fed actions by analyzing more closely the case discussed in Figure 1. Let’s put aside the relatively infrequent cases in which speeches or testimony by Fed officials seem to telegraph Fed intentions. And I also want to put aside the hypothesis that the Fed is simply following the market,

Figure 3

June Contract for Fed Funds and Economic News



Vertical lines indicate days on which the fed funds futures rate moved by at least 5 basis points

because I'm convinced from my own observation of the process that this hypothesis is not true.

If the market can predict Fed policy actions quite consistently, then Fed behavior must be systematic and regular enough that the market can make accurate predictions. Thus, the ability of the market to predict Fed policy actions means that the market understands the Fed's objectives and the Fed and the markets are reading the flow of incoming information the same way. In this situation, Fed policy adjustments will not take markets by surprise.

Now look at Figure 3. This figure provides a more detailed examination of trading in the June 2000 fed funds futures contract from the initial trade on January 24, 2000, to maturity on June 30, 2000. The figure also includes the history of the fed funds target, which stood at 5½ percent on January 24; the FOMC raised the target to 5¾ percent at its first meeting of the year on February 1-2. The FOMC raised the target again, by another 25

basis points, at its meeting on March 21. As we already saw in Figure 1, the final, 50-basis-point increase came on May 16.

The opening price of the contract on January 24 implied a June fed funds rate of 6.14 percent. Private forecasters were expecting some slowing in the economy. For example, the January Blue Chip consensus forecast was for 3.0 percent real gross domestic product (GDP) growth in 2000:Q1 and 2.9 percent for the year. The upward trend in inflation that had occurred in 1999 was expected to continue in 2000. One way to interpret the June fed funds futures rate of 6.14 percent on January 24 is that slightly more than half the market participants thought the Fed's target rate would be 6¼ percent in June while the rest thought it would remain at 6 percent. Alternatively, market participants placed a probability a bit above 0.5 that the Fed would raise the intended rate by 25 basis points and a probability a bit below 0.5 that the Fed would leave the intended rate unchanged.

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Figure 3 includes vertical lines on days when there were relatively large changes in the interest rate on the June futures contract. The threshold I've used for defining a "relatively large" change was ± 5 basis points. During the life of this contract, there were 8 days on which the absolute change was 5 basis points or larger. These days are sorted into four episodes.

The first episode included a Friday and a Monday, January 28 and 31. On Friday, January 28, the fed funds futures rate rose 9 basis points. On that day, the 1999 fourth quarter GDP data were released showing that real GDP had grown 5.8 percent at an annual rate, well above market expectations. The January Blue Chip consensus, for example, had been 4.5 percent. Inflation also came in higher than expected—2.0 versus 1.6 percent at an annual rate. On Monday, the stock markets rose sharply and the fed funds futures rate rose another 5 basis points as markets digested the unexpectedly good news about economic growth and the effect that it was having on forecasts for future interest rates. After receiving this information, the market expected the fed funds target rate to average 6.25 percent in June.

The second episode included a rise and then a decline surrounding Fed Chairman Alan Greenspan's congressional testimony about monetary policy. The first day of his testimony was on February 17. That day the fed funds futures rate for June rose 6 basis points to 6.27 percent. The next day, the *Wall Street Journal* reported, "Greenspan signaled that the Fed will keep boosting rates unless both consumer spending and the stock market quickly cool down."

On February 22, the fed funds futures rate fell 6 basis points. There were no significant economic data released, and so we cannot link that decline to any particular piece of new information. On February 24, the fed funds futures rate fell another 5 basis points after the government reported that orders for durable goods fell 1.3 percent in January, suggesting that the economy might be slowing a bit.

The FOMC did raise the fed funds target to 6 percent on March 21; from examining the April fed funds futures contract, we know that this

increase was well anticipated by the market. As can be seen in Figure 3, at this point the fed funds futures rate for June was 6.24 percent, indicating that the market expected another 25 basis point increase at the May FOMC meeting.

During the third episode, the fed funds futures rate fell 10 points on April 4 and then bounced back up 5 points on April 5. It is not clear what was the cause of the initial decline. The stock market had been very volatile on the 4th—the Dow Jones industrials fell over 500 points early in the day and then recovered to finish the day down only 57. On the 5th, the Dow fell another 131 points, but Greenspan gave a speech that left markets believing the Fed would lift the fed funds target in May. At the end of this episode, the fed funds futures rate for June was 6.28.

The final episode occurred on April 27 with the release of the advance GDP report for the first quarter. This report showed that real GDP rose at a 5.4 percent rate in the first quarter, with consumer spending jumping 8.3 percent, which was the largest quarterly increase in more than 17 years. Labor costs rose 4.3 percent and consumer prices continued to rise. It is interesting to note that the news was exceptional in one way: The market was surprised by *both* higher than expected real growth and higher than expected inflation. Since 1994, there had been many upside surprises about real GDP growth, but they had typically been accompanied by lower than expected inflation. The *Wall Street Journal* reported that, "The inflation news boosts the odds that the Fed will soon raise interest rates by an aggressive half a percentage point." The fed funds futures market seemed to agree as the rate rose by 11 basis points on that day to close at 6.41. The rate then rose gradually to 6.49 on the Friday before the May 16 meeting.

I've recounted the story of the June 2000 fed funds futures contract in some detail to illustrate a general point. How can the market participants successfully predict what the FOMC will do at its next meeting? That is, how do they know the interpretation the FOMC will place on the flow of incoming information, such as that recounted

in the history of the June futures contract? Part of the answer is that market participants carefully follow speeches by FOMC members, especially those by the chairman, Alan Greenspan. The track record of FOMC actions is also obviously important. Understanding how the FOMC has reacted to information in the past aids in predicting how the Committee will respond to similar information in the future.

Market participants pull together other types of information as well. They receive the minutes of the FOMC meetings with a six or seven weeks delay, a few days after the next scheduled meeting. These minutes reveal the topics discussed, summarize views about the state of the economy and describe the reasons for dissenting votes. The minutes are thorough, which provides an important vehicle for keeping the markets and the public well informed about Fed thinking.

Markets have been able to forecast Fed policy actions partly because the policy process is becoming more transparent than it was in the past. Since February 1994, the FOMC has announced changes in the fed funds target the same day that the decisions were made. As recently as the late 1980s, the Federal Reserve was still using a complex signaling method of conducting open market operations (buying and selling securities) to inform markets about changes in the fed funds rate target. This complex method sometimes took several days to transfer information about policy changes. Occasionally, the signals were crossed and markets perceived changes when there were none. Not only was the process inefficient, but also it tended to favor the bond market dealers who had a special arrangement to participate in the execution of open market operations. Announcing target changes the day they are made makes knowledge about policy changes immediately known to all.

Another important feature of post-1994 Fed practice is that almost all policy actions came at regularly scheduled meetings of the FOMC. Before 1994, the Fed changed the intended rate more often between regular meetings than at regular meetings. Clearly, before 1994, the market was almost always taken by surprise by Fed policy

actions because the timing of the policy decisions between scheduled FOMC meetings could not be predicted.

CONFIDENCE IN THE CENTRAL BANK

A principal responsibility of the monetary authorities in every country is to maintain the purchasing power of the country's currency. Monetary responsibilities are split between the finance ministry (or treasury) and the central bank. The finance ministry manages government finance, including tax collection, and the central bank manages the creation of money. In most countries today, the central bank has a substantial degree of independence from the government, and has assigned to it the goal of maintaining the purchasing power of money. Independence seems to be the best way to achieve control over money creation as necessary to assure stability in the purchasing power of money.

With a fiat money system, the current value of the dollar depends on current policy and expectations about all future policies. Confidence in the central bank is a foundation for confidence in financial markets. Modern economies thrive on the extension of credit to people who are young and people who have good ideas. U.S. prosperity in the 1990s, extending to this day, has been driven by new high-tech enterprises and the application of new technology to existing enterprises. The new enterprises have been financed through private venture capital and the public capital markets. These firms would not have been able to raise such a large amount of capital if lenders had feared that their principal would be confiscated through inflation.

In the United States, and elsewhere, appreciation of the importance of price stability grew significantly as people saw the real effects of inflationary policies in the 1960s and 1970s. This change in beliefs simultaneously increased pressure on the Federal Reserve to achieve sustained low inflation and increased the determination of policymakers to achieve that goal.

Figure 4

CPI Inflation and Short-Term Inflation Expectations

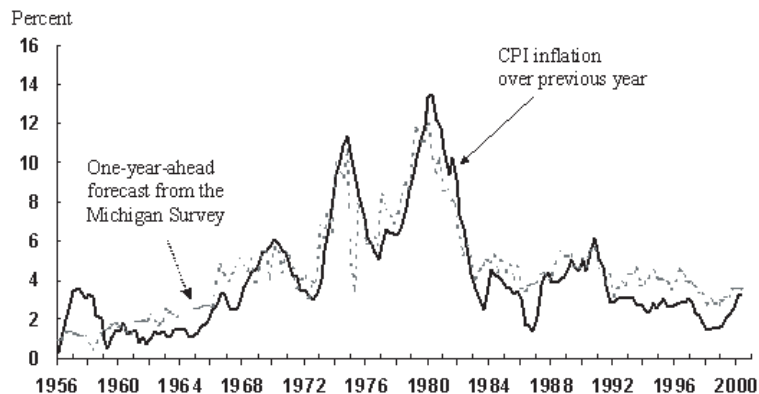


Figure 4 shows the CPI inflation rate and the expected inflation rate according to the Michigan survey from 1956 to the present. The data are quarterly, and the inflation rate shown is the percentage change in the CPI over the same quarter the previous year. The expected inflation rate is the rate respondents said they expected over the next year.

The actual inflation rate rose almost every year from 1965 to 1980. In retrospect, trouble was already brewing in 1964. Although the actual inflation rate in 1964 over the corresponding quarter of 1963 was in the 1 to 2 percent range, survey respondents expected the inflation rate to rise, as can be seen by the fact that the expected rate in Figure 4 lies above the actual rate in 1964. The actual rate did rise after 1964, and from that point through the early 1980s the actual and expected rates moved very much together.

Expected inflation led actual inflation down in 1982, and after 1983 expected inflation was somewhat more stable than actual inflation. The market understood that some of the fluctuations in actual inflation were transitory, and did not justify changing views on likely future inflation. The collapse in oil prices in 1986 reduced actual inflation for a time, but had little effect on expected inflation. Similarly, fluctuations in oil prices in

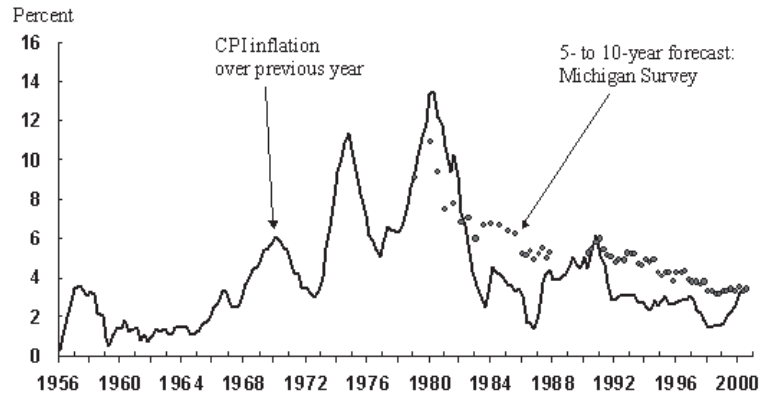
1998-2000 first brought down and then increased measured inflation without having much effect on expected inflation.

One-year ahead inflation expectations are inadequate to fully explore the issue of market confidence in monetary policy, but are the only survey evidence available back to the 1950s. The Michigan survey started to ask about 5-10 year inflation expectations in 1979, and those data are shown in Figure 5. As an aside, judging from the behavior of long-term interest rates, market participants initially viewed the inflation of the late 1960s and early 1970s as temporary, but by the late 1970s long-term inflation expectations rose dramatically. Confidence in U.S. price stability really did erode significantly after 1976. However, as policy succeeded in lowering and stabilizing inflation after 1980, long-term inflation expectations fell and now have reached the lowest levels observed since the early 1960s.

Low inflation forecasts over long horizons reflect confidence that the Fed will be successful in adjusting interest rates in timely fashion as required to yield low inflation on the average. With low inflation on average, the federal funds target will on average remain relatively low because there will be no inflation premium bid into interest rates. The Fed can directly control

Figure 5

CPI Inflation and Long-Term Inflation Expectations



only the overnight interest rate. Thus, a relatively low 25-year bond rate reflects confidence that the Fed will keep inflation under control. That confidence springs from the market's understanding of what the Fed will do with the one-day rate, on average, over the next 25 years. People in markets understand very well that it may be necessary to raise the fed funds rate aggressively in the short-term, to ensure that it remains low over the long-term.

SHORT-RUN POLICY AND LONG-RUN CONFIDENCE

As already emphasized, the Federal Reserve implements policy through open market operations designed to keep the overnight federal funds rate close to the target rate set by the FOMC. Even if the Fed were to implement policy in some other way, there is nothing to guarantee that future policy will be consistent with sustained low inflation. At any given time, success in keeping inflation low requires market expectations that inflation will remain low—the market must have confidence that the central bank will do its job not just today but in the future as well.

Where does confidence in long-run U.S. price stability come from? Sustained success in

achieving low and stable inflation is obviously important. So also is the institutional structure of the Federal Reserve System, which insulates it from day-to-day political pressures. Attitudes within the System, the government, and the general public are surely important. Clearly, the subject is a complex one and beyond the scope of this lecture.

The element of confidence I've concentrated on—one that I believe is insufficiently appreciated—is that the better the market understands the day-to-day operation of monetary policy, the more confident the market will be that the Fed is on the right course for the long run. Since 1994, the market has quite accurately predicted Fed policy actions, indicating that the market understands what the Fed is doing. The market and the Fed study incoming data and, more generally, information of all sorts and arrive at a similar assessment of what the information means for the appropriate setting of monetary policy.

Confidence in any organization is tainted whenever some part of its activities comes under question. The fact that Federal Reserve policy week by week is systematic and predictable inspires confidence in the larger issue of Fed policy over the long run. I believe that this deeper long-run confidence has contributed to the dura-

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bility of the current economic expansion and the increase in productivity growth that has generated such remarkable growth in GDP over the last five years.

There is a mystery, however. The FOMC does not follow a well-specified monetary rule that can be written down as an equation or formula. How is it that the market and the Fed can so consistently agree on the interpretation of new information and its significance for policy actions, or lack thereof? I don't know the answer to this question. Finding the answer may be important for carrying into the future the market's current success in forecasting Fed policy actions. If we can formalize what the Fed does, it should be possible to further improve transparency and accuracy of communication with the market in the future. As successful as monetary policy has been in recent years, there is still a major agenda for the Federal Reserve and for scholars of monetary policy in assuring that the success continues.

CONCLUDING THOUGHTS

One of my themes tonight has been the accuracy with which the market today can forecast Fed policy actions. How is the market so successful? The market has an excellent understanding of the process by which the Fed reaches its policy decisions. That understanding in turn reflects Fed efforts to be more transparent and more systematic. For the most part, the Fed and the market read the flow of new information the same way. As information arrives, the market changes the probability it assigns to Fed action at its next policy

meeting. That is the same process I go through myself, changing my view bit by bit as new information arrives. At the time of an FOMC meeting, I collate all the information, including the expert Fed staff analysis, and settle on a tentative position going into the meeting. That position is subject to change, depending on the force of the arguments my colleagues make during the course of the meeting.

The goal of the policy actions is to achieve low and stable inflation for the United States over the long run. The Fed can do little that is constructive about short-run fluctuations in the rate of inflation, but is responsible for the long-run outcome. The market understands the policy objective and therefore can judge what policy actions are required to achieve the goal, given the ever-changing economic environment. In the research that Rasche and I have conducted, most large changes in rates in the fed funds futures market make good sense given the nature of the new information that apparently drives these changes.

This convergence of Fed and market opinion about what needs to be done is a relatively new development. Although the convergence is still somewhat incomplete, its importance for a successful monetary policy should not be underestimated. I myself continue to work to better understand how the Fed might further improve its communication with the markets. The task is not as easy as it might seem, given the complexity of the economics and the short-run focus of many market participants and press representatives. But that is a subject for another day.