



How Predictable Is Fed Policy?

William Poole

This article was originally presented as a speech at the University of Washington, Seattle, Washington, October 4, 2005.

Federal Reserve Bank of St. Louis *Review*, November/December 2005, 87(6), pp. 659-68.

Day in and day out, all of us depend on a high degree of predictability in the nation's monetary arrangements. Consider, for example, the counterfeiting problem. The problem is in fact small enough that we rarely examine our paper money closely. Through careful design of the currency, and careful monitoring and enforcement, the Treasury and Federal Reserve together maintain a highly reliable currency—its usefulness to us is almost completely predictable.

Historically, the least predictable aspect of our monetary system has been monetary policy. Monetary policy mistakes led to the Great Depression of the 1930s and the Great Inflation of the 1960s and 1970s. Unpredictability can have high costs. The Great Inflation and its correction led to the failure of hundreds of savings and loan associations (S&Ls). The problem was that S&Ls made long-term mortgage loans at interest rates reflecting expectations of modest inflation, but those expectations proved to be too low again and again as inflation rose after 1965. As inflation rose, interest rates on outstanding long-term fixed-rate mortgages did not, creating enormous losses for S&Ls. Later, as inflation expectations became embedded, many borrowed at interest rates that turned out to be unsustainably high; purchases of farmland, for example, financed at high interest

rates turned out to be extremely unwise as inflation fell unexpectedly in the early 1980s. Many farmers and agricultural banks that lent to them failed.

Inflation predictability is the most obvious, and probably most important, consequence of predictable monetary policy. Nevertheless, most economic decisions depend, directly or indirectly, on the predictability of monetary policy. Monetary policy decisions can create surprises that affect outcomes from household decisions as to what jobs to take and where to live. Similarly, business firms find that their decisions on hiring and investment in physical capital may turn out well or poorly depending on the course of monetary policy and its effects on the economy.

If you follow the financial press at all, or watch national TV news following a Fed policy decision, you know that financial markets have an intense interest in what the Federal Reserve does or does not do. Financial market behavior provides an opportunity to study the predictability of monetary policy with some precision. That is my topic today, organized around my title theme: How Predictable Is Fed Policy?

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 thank my colleagues at the Federal Reserve Bank of St. Louis for their com-

William Poole is the president of the Federal Reserve Bank of St. Louis. The author appreciates comments from colleagues at the Federal Reserve Bank of St. Louis. Robert H. Rasche, senior vice president and director of research, provided special assistance. The views expressed are the author's and do not necessarily reflect official positions of the Federal Reserve System.

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ments. Robert Rasche, senior vice president and director of research, provided special assistance. However, I retain full responsibility for errors.

EVOLUTION OF FOMC COMMUNICATION DURING THE GREENSPAN ERA

Since 1989, the FOMC has adopted many practices that improve the transparency of its policy actions. Enhanced transparency is important for improving the Fed's political accountability, but from an economic perspective transparency is essential if markets are to understand Fed policy and therefore be more successful in predicting policy adjustments. Fed policy is implemented through decisions by the Federal Open Market Committee (FOMC) that set the target, or "intended," federal funds rate. The funds rate is the interest rate in the interbank market on overnight (one-day) loans. The funds rate is the fulcrum, or anchor, for all other interest rates in the market.

Here are some milestones of changes in FOMC practices that have enhanced transparency:

- August 1989: Policy changes in the target federal funds rate are limited to multiples of 25 basis points. Prior practice of changing the rate in other increments often created market uncertainty as to exactly what the Federal Reserve's intention was.
- February 1994: Starting with this FOMC meeting, the Committee released a press statement describing its policy action at the conclusion of any meeting at which the Committee changed the target funds rate. Prior to this practice, the market had to infer from Fed open market operations whether, and how, the Fed's policy stance had changed. Consequently, the market was often uncertain as to the current setting of Fed policy.
- August 1997: Public acknowledgment that policy is formulated in terms of a target for the funds rate. The market had come to believe that the federal funds rate was the

policy target but all uncertainty about this issue disappeared after this time.

- August 1997: A quantitative target federal funds rate is included in the Directive to the System Open Market Account Manager at the Trading Desk of the Federal Reserve Bank of New York (the "Desk"). Previously, the Fed often discussed policy in terms of the "degree of pressure on reserve positions" in the money market. A clear focus on a quantitative target ended the ambiguity.
- May 1999: A press statement following the conclusion of every FOMC meeting includes the target federal funds rate and the policy "bias." The bias indicated that the Committee was leaning toward an increase or decrease in the funds rate target but had not yet decided to actually change the target.
- December 1999: In its press statement, the FOMC replaces the policy bias language with "balance of risks" language in an effort to lengthen the horizon of its statement and provide a summary view of its outlook for the economy.
- January 2002: The vote on the Directive and the names of dissenting members, if any, are included in the press statement. Previously, this information was not available to the market until the meeting minutes were released following the subsequent FOMC meeting, six to eight weeks later.
- August 2003: The FOMC introduces "forward-looking" language into its post-meeting press statement.¹ This language suggested the probable direction of the target federal funds rate over the next one or more meetings.

¹ "In these circumstances, the Committee believes that policy accommodation can be maintained for a considerable period." Federal Reserve *Press Release*, August 12, 2003 (www.federalreserve.gov/boarddocs/press/monetary/2003/20030812/). In the press release of January 28, 2004, the language was modified: "...the Committee believes that it can be patient in removing its policy accommodation" (www.federalreserve.gov/boarddocs/press/monetary/2004/20040128/default.htm). Subsequently, in the press release of May 4, 2004, a second modification of the language was introduced: "the Committee believes that policy accommodation can be removed at a pace that is likely to be measured" (www.federalreserve.gov/boarddocs/press/monetary/2004/20040504/).

- January 2005: Release of minutes of FOMC meeting advanced to three weeks after the meeting (and before the next scheduled FOMC meeting).

The purpose of these changes, which have gone a long way toward lifting the traditional veil of secrecy over monetary policy, is to increase transparency of policy, improve accountability, and provide better information to market participants about the future direction of policy. In several earlier speeches and papers written jointly with members of the St. Louis Fed Research Division, I examined how changes in Fed transparency have affected market behavior, especially after 1994. Today, I will review some of those findings and add new findings on market behavior over the past two years, when the most recent innovations were introduced.²

ARE MARKETS IN SYNCH WITH THE FOMC?

On a number of occasions I have stressed my view of the importance of markets being “in synch” with the FOMC. Accumulating evidence has shown that, judging by the reaction of the federal funds futures market, market participants have been increasingly accurate in predicting FOMC policy actions as steps toward more transparency were implemented. The basic theme of this work is that the economy will function more efficiently if the markets and the Fed are interpreting incoming data the same way. If the Fed and the markets have the same view as to the policy implications of new information, then the market will be able to predict Fed policy adjustments accurately.

Those analyses were made prior to the introduction of “forward-looking” language in the post-FOMC meeting press releases, beginning in August 2003. An appropriate question is how the “forward-looking” language has affected market

perceptions of future FOMC policy actions. Figures 1 and 2 replicate and extend the corresponding figures from Poole and Rasche (2003; see footnote 2).

First, a little background. The federal funds market trades continuously during the day and the rate may fluctuate minute by minute. At the conclusion of each day, the Fed publishes the “effective” rate, which is the rate at which most transactions took place. Also trading continuously during the day, on the Chicago Board of Trade, are futures contracts in federal funds. The maturing futures contract is settled at the end of the month based on the average effective federal funds rate during the month. Thus, the federal funds futures market is a direct bet on the FOMC’s target federal funds rate in the future. The number of contracts traded has changed over time, as has the level of trading activity in the market.

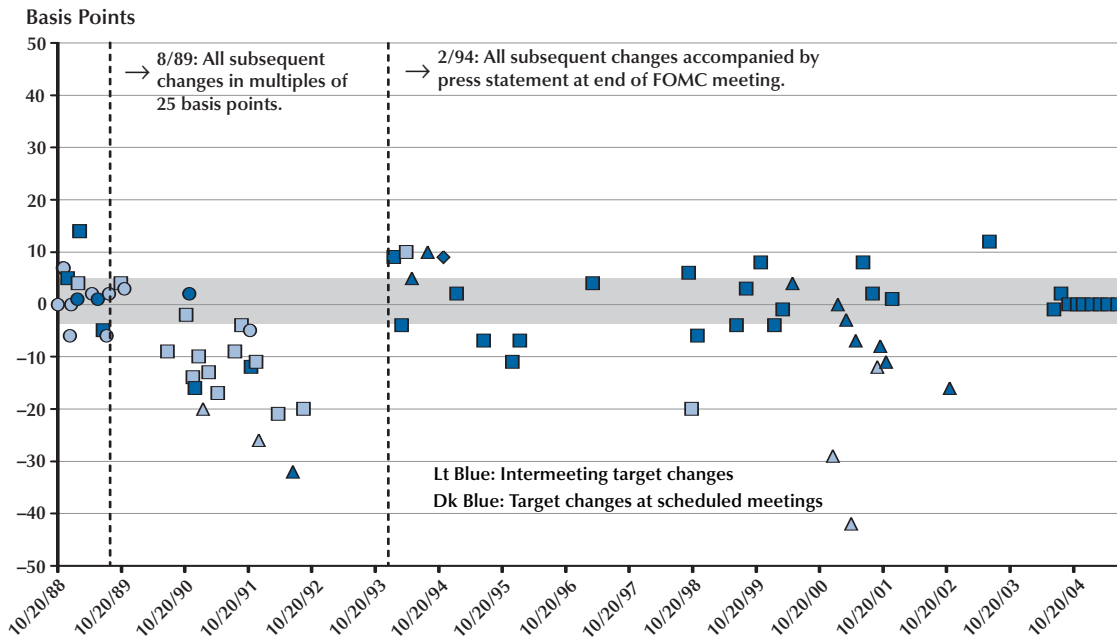
Over the course of a month, data become known and the market trading is based on that information plus expectations as to the federal funds rate during the remaining days of the month. There is also trading in the 1-month-ahead contract—for example, in October 2005, trading in a November 2005 contract. The Chicago Board of Trade lists additional contracts as far as a year or more out, but trading volume is trivial much beyond the 5-month-ahead contract. The distant contracts, because they tend to have thin volume, are not necessarily reliable measures of market expectations of the federal funds rate in the future. However, the 1-month-ahead contract is pretty active and provides an excellent measure of market expectations for that month. In my analysis, I will focus on the 1-month-ahead contract and certain other contracts, such as the 4-month-ahead contract—for example, in October 2005, the contract for February 2006.

Now look at Figure 1. The period covered starts when trading in federal funds futures commenced in October 1988. The data shown are daily changes (close-of-business to close-of-business) in the yield on the 1-month-ahead federal funds futures contract on days of scheduled FOMC meetings and days when the FOMC changed the target funds rate between regular meetings. The area shaded in gray, between plus and minus 5

² For a review of the effect of the earlier improvements in FOMC transparency see W. Poole and R. H. Rasche, “The Impact of Changes in FOMC Disclosure Practices on the Transparency of Monetary Policy: Are Markets and the FOMC Better ‘Synched’?” *Federal Reserve Bank of St. Louis Review*, January/February 2003, 85(1), pp. 1-9.

Figure 1

Changes in Funds Futures Rate When FOMC Changed Target Funds Rate



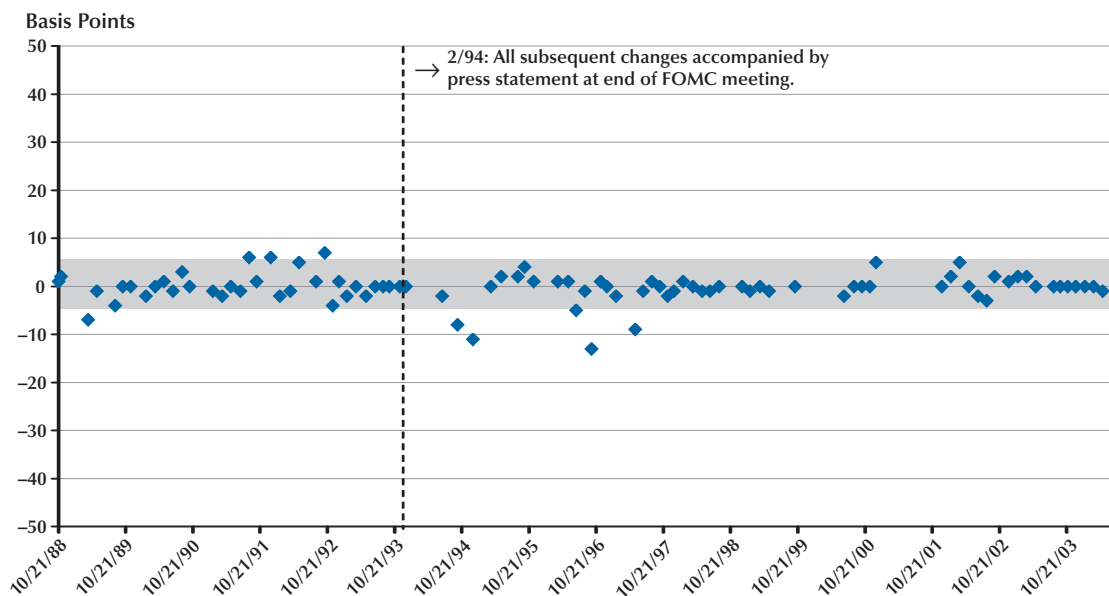
NOTE: □ 25-basis-point change, △ 50-basis-point change, ◇ 75-basis-point change, ○ change that market was not immediately aware had occurred (Poole, Rasche, and Thornton, 2002).

basis points, indicates a region that I have defined as insignificant “noise” in this market.

In Figure 1, the points plotted with a square show days on which the FOMC changed the target federal funds rate by 25 basis points. For example, the second dark blue square from the left shows that on that day the 1-month-ahead futures contract rose by about 0.12 percentage points, or 12 basis points. Thus, on that day, the market had predicted about half of the actual change of 25 basis points in the target funds rate. Looking farther to the right in Figure 1, you can see that most of the dark blue squares fall within the gray band. That means that on days of scheduled FOMC meetings, most of the time the market correctly predicted the Committee’s action of changing the target funds rate by 25 basis points. Remember that the data show the market’s trading the day of the FOMC meeting. The Committee’s decision is not generally predicted accurately weeks or months in advance.

Also in Figure 1, points plotted with a dark blue triangle indicate days of scheduled meetings when the FOMC changed the target funds rate by 50 basis points. There is one point, November 15, 1994, plotted with a dark blue diamond, showing the single case in which the FOMC changed the target rate by 75 basis points. If you look carefully at the dark blue triangles, you can see that the futures market did a pretty good job of predicting changes of 50 basis points. The largest error, in 2002, was about -0.18 , or 18 basis points. One way of interpreting that error is that the market was betting on a decline in the target rate of 25 basis points and putting some probability on a decline of 50 basis points. Looking at all the dark blue points, the market has done a pretty good job of predicting rate changes, especially after February 1994.

Now look at the light blue points in Figure 1. These show days on which the FOMC took policy actions between regularly scheduled meetings.

Figure 2**Changes in Funds Futures Rate on FOMC Meeting Dates With No Change to Target Funds Rate**

As with the dark blue points, squares indicate federal funds target changes of 25 basis points and triangles indicate changes of 50 basis points. Although there are few light blue points after February 1994, it is clear that FOMC policy actions on days other than scheduled meetings are not well predicted. That result is hardly surprising, given that such meetings are not announced in advance. The very existence of such a meeting, as well as the change in the target funds rate, necessarily takes the market by surprise.

Figure 2 shows days when the FOMC met and made a policy decision not to change the target federal funds rate. As can be seen in the figure, there were times before 1998 when the market put some probability on a rate change, and when the FOMC did not change the funds rate target that meant that the futures market adjusted to reflect that outcome. However, most of the time the points fall in the gray band, meaning that the futures market did not change by much because the market had correctly predicted that the FOMC would not change the target rate.

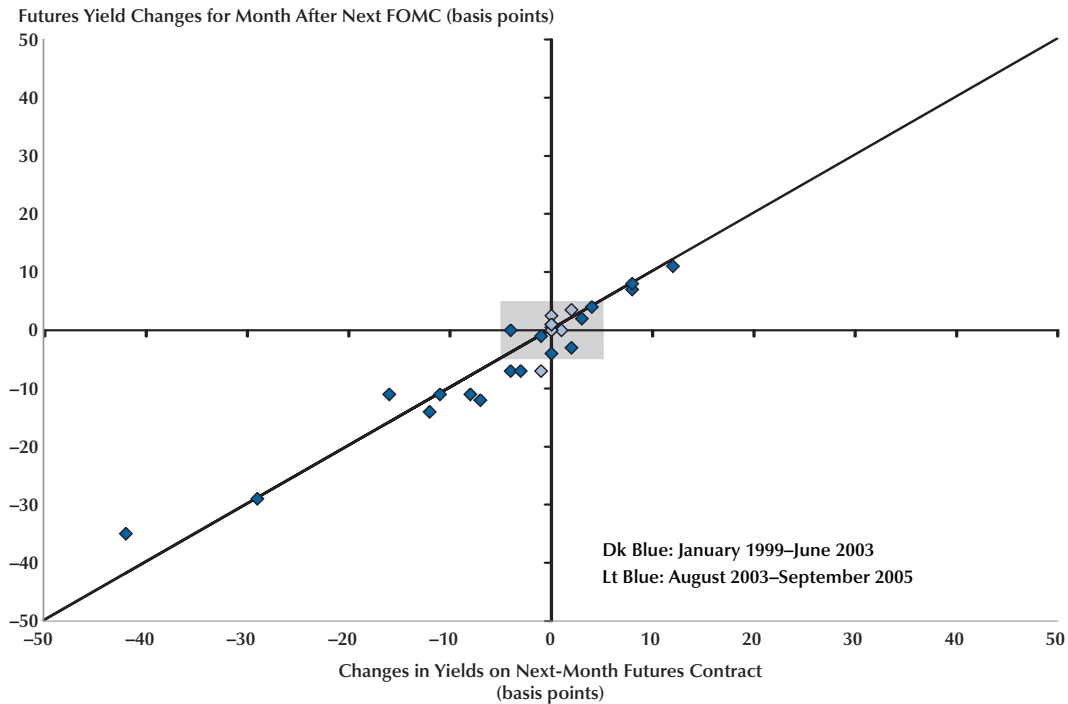
We can summarize these results as follows:

Particularly since February 1994, policy decisions taken at regularly scheduled FOMC meetings, whether or not they've involved a federal funds target change, have generated little if any news in the federal funds futures market. Such decisions have been well anticipated by market participants.

As you have been looking at Figures 1 and 2 you have probably wondered why the points at the end of the period, starting with August 2003, fall almost precisely on zero, indicating no error at all in predicting FOMC decisions. Starting with the statement issued after its meeting of August 12, 2003, the FOMC has included "forward-looking" language that has facilitated nearly perfect market forecasts of the FOMC decision at its next meeting. Initially, the language indicated that "policy accommodation can be maintained for a considerable period." That language suggested that the FOMC would not change the target funds rate at its next meeting. After the meeting of January 28, 2004, the language was modified to say that "the Committee believes that it can be patient in removing its policy accommodation." The market read that language as suggesting that the period of an

Figure 3

Changes in Funds Futures Rate When FOMC Changed Target Funds Rate



unchanged target funds rate was coming to an end, but was not yet over.

Finally, the statement issued after its meeting of May 4, 2004, said that “the Committee believes that policy accommodation can be removed at a pace that is likely to be measured.” That language then appeared in every statement through the most recent statement issued after the meeting on September 20, 2005. The market came to read the language as indicating that the FOMC would raise the target funds rate by 25 basis points at its following meeting. The FOMC in fact did so at every meeting through the most recent one, and the market prediction errors were negligible. In particular, none of the policy actions taken since the introduction of this language—that policy accommodation can be removed at a measured pace—has generated any large (greater than 5 basis points) change in the yield on the 1-month-ahead funds futures contract on the day of the FOMC action. On each of these occasions the

futures market has made an almost perfect forecast of the 25-basis-point increase in the target funds rate.

Bob Rasche and I, in our earlier work, found that the futures market, although predicting FOMC decisions quite accurately a day in advance, usually did not predict accurately several months in advance. But now we have a new question to explore: If the content of the FOMC press releases since August 2003 is signaling the policy decision at the next FOMC meeting so clearly, how well are markets now predicting the more distant trajectory of the target federal funds rate?

Addressing this question is a bit more complicated than it might seem. The FOMC and market participants understand that monetary policy cannot be locked down long in advance because an unpredictable economic event might make a policy adjustment highly desirable. Since June 2004, the press release has clearly indicated that, while the Committee intends to proceed at a meas-

ured pace, its intention is conditioned on future information about the state of the economy.³ A second question concerns the information that is generating adjustments of market expectations.

On the vertical axis of Figure 3 are changes in the futures yield for the contract of the month subsequent to the next FOMC meeting. These changes are plotted on the date when an FOMC policy action was announced. Because there are eight scheduled meetings per year, sometimes there are meetings in adjacent months and sometimes not, which means that the futures contract studied is sometimes two months ahead and sometimes three months ahead. An example may help in understanding what data were used. In the case of the meeting on May 15, 2001, the market knew that there was a scheduled meeting on June 26-27, 2001. Thus, here we examined the change on May 15 in the July 2001 futures contract—the 2-month-ahead contract. However, the next scheduled meeting following the one on June 26-27, was on August 21; there was no meeting scheduled for July. Thus, the relevant change in the federal funds futures market on June 27 was for the September 2001 contract—the 3-month-ahead contract.

In Figure 3, on the horizontal axis are changes in the yield on the 1-month-ahead futures contract, and on the vertical axis are changes in the appropriate 2- or 3-month-ahead contract as just explained. The points plotted in dark blue are for the period from the beginning of 1999 through June 2003. During this period, yields on the two futures contracts essentially moved one-for-one as indicated by the tight scatter of the points around the 45-degree line. That is, if the 1-month-ahead contract changed by 30 basis points, so also did the appropriate 2- or 3-month-ahead contract. The points plotted in light blue are from the succession of 25-basis-point moves during the period of the “measured pace” language. All but one of these points fall into the gray box that designates changes of less than 5 basis points in absolute

value. Hence the changes in the target funds rate during the measured pace regime have generally not been surprises, nor have they generated revisions to market expectations of the policy action at the immediate future FOMC meeting.

If we examine all the daily data, and not just data for days of FOMC meetings, from the beginning of July 2003 through mid-September 2005, there were only two days when the yield on the 1-month-ahead funds futures contract changed by 5 basis points or more. Those two days were June 15, 2004, and September 1, 2005. On the first of these days Chairman Greenspan testified at the hearings for his renomination as Chairman of the Board of Governors. On that day the July 2004 futures yield decreased by 5 basis points. On the other day, September 1, 2005, the October 2005 futures yield decreased by 6 basis points in the aftermath of Hurricane Katrina. Thus, since July 2003 there is simply not much information in the 1-month-ahead contract on how market expectations are reacting to news. This finding is in sharp contrast to earlier Poole-Rasche findings, which I do not have time to discuss in any detail here, that economic news such as employment reports often triggered significant changes in the 1-month-ahead futures contract.

However, over the past two years, the 4-month-ahead futures contract is more informative. Between June 2003 and mid-September 2005 there were 24 occasions when the yield on this contract changed by 5 or more basis points. One was the occasion of the announcement of a 25-basis-point increase in the target funds rate on June 30, 2004. On that date the yield on the October 2004 funds futures contract decreased by 8 basis points. At first glance this market reaction might suggest some confusion about FOMC intentions.

In fact, two pieces of information became available with the FOMC press release on that day. First, the increase of 25 basis points in the target funds rate was the initial policy action under the forward-looking language of removing policy accommodation “at a pace that is likely to be measured.” On the previous day, the October 2004 funds futures contract had closed at 1.90. Since there were only two scheduled FOMC meet-

³ “Nonetheless, the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability.” Federal Reserve *Press Release*, June 30, 2004 (www.federalreserve.gov/boarddocs/press/monetary/2004/20040630/default.htm).

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ings during the July-October 2004 period, this yield implied a market expectation of a cumulative 75-basis-point move and roughly a 0.6 probability of an additional 25-basis-point move over three FOMC meetings in June through September. The August and September futures contract yields were quite consistent. The August contract yield implied a probability of about 0.4 of a 50-basis-point move at the August FOMC meeting conditional upon a 25-basis-point increase at the June meeting. The September contract yield implied a probability of about 0.5 of a 50-basis-point move at the September FOMC meeting conditional upon a 25-basis-point increase at both the June and August FOMC meetings.

The revelation of a 25-basis-point move at the June 2004 meeting solidified market impressions that “measured pace” meant a succession of 25-basis-point increases in the target funds rate. At the close of trading after the June 30 policy action, the October futures yield of 1.83 implied two additional increases of 25 basis points through September, but only about a 0.3 probability of a move larger than 50 basis points during that period. Consistently, after the announcement, the probability of a 50-basis-point move at the August FOMC meeting implied by the August contract fell to around 0.25. The probability of a 50-basis-point move at the September FOMC meeting implied by the September contract, conditional on a 25-basis-point move in August, also fell to around 0.25.

The other information that became available in the June 2004 press release was introduction of the qualification to the measured pace language that “the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability.” On July 2, 2004, the initial estimate of payroll employment growth for June 2004 was only 112,000 new jobs, compared with survey predictions on the order of 250,000. After this news, a second large downward adjustment to the October futures yield occurred, reducing the expectation of any policy action in excess of 25 basis points at either of the next two FOMC meetings to zero. The yields on the August and September contracts also implied approximately zero probability of anything other than

25-basis-point moves at the two forthcoming FOMC meetings.

Of the remaining 23 “large changes” since June 2003, 12 (52 percent) occurred on days when the employment data were released. Three “large changes” occurred in the immediate aftermath of Hurricane Katrina (August 30–September 1, 2005.) Eight changes occurred on days when economic data were released, but in none of these cases were there multiple releases of any single statistical series.⁴ Hence, since the introduction of “forward-looking” language, market expectations appear to have reacted systematically only to employment data.

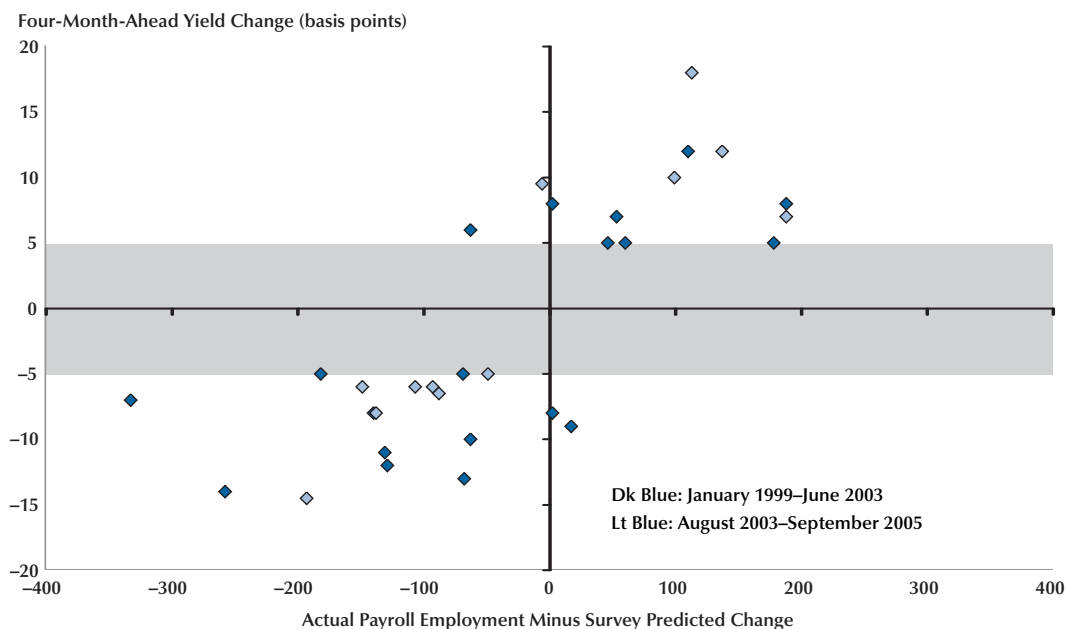
Are the observed market reactions suggestive that markets expect a systematic reaction by the FOMC to employment data? Economic theory and ample empirical investigation in many markets indicate that the appropriate concept is the employment surprise, measured by the difference between the initial estimate of the change in payroll employment and survey predictions of the employment change. Figure 4 presents a scatter plot of changes in the yield on the 4-month-ahead futures contract and employment surprises. The 12 points plotted in light blue indicate the futures market reaction to the employment prediction errors. Since I consider only “large changes” in the futures yield, there are no observations in the gray shaded area of 5 basis points.

With one exception, all of the light blue points fall in the first and third quadrants of the graph and are roughly consistent with a linear relationship between the changes in the futures yield and the employment survey prediction error. Apparently, market expectations of the future level of the funds rate since the FOMC introduced “forward-looking” language into the press release are adjusted in the same direction as the employment surprise. This finding is consistent with an understanding that the short-run strategy of the FOMC involves adjustments in the future path of the target funds rate when incoming data suggest that the risks to employment growth have changed.

⁴ The releases that occurred on these eight dates were wholesale inventories (9-Jun-04), retail sales (14-Jun-04), CPI (15-Jun-04), personal income (28-Jun-04), industrial production (15-Apr-05), leading indicators (21-Apr-05), ISM (6-Sep-05), and productivity (7-Sep-05).

Figure 4

Large 4-Month-Ahead Funds Futures Changes and Employment Surprises



The points plotted in dark blue in Figure 4 indicate “large changes” in the 4-month-ahead fund futures rate on days that the payroll employment data were released between January 1999 and the introduction of “forward-looking” language in August 2003. There are 19 such events of a total of 131 “large change” events during this period (15 percent). Again almost all of the points lie in the first and third quadrants of the graph. Also, there does not appear to be any systematic difference between the scatters of points before and after mid-2003. Thus, at the horizon of the 4-month-ahead futures contract, the adjustment of market expectations to news about payroll employment does not appear to have been systematically influenced by the introduction of “forward-looking” language in the press release.

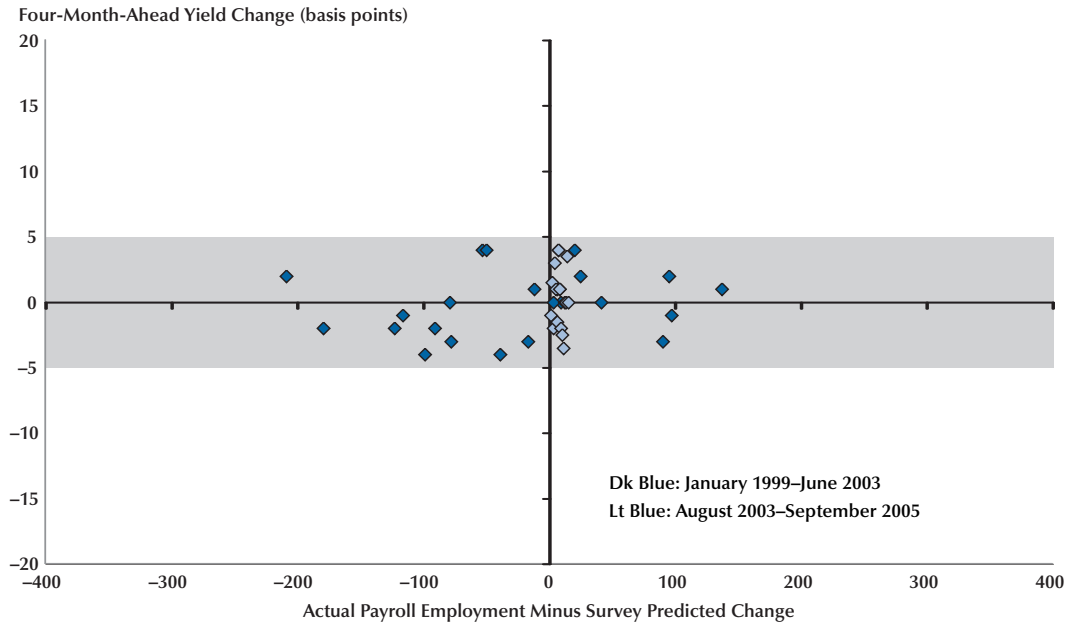
To complete the analysis, it is necessary to examine the nature of market reactions to employment surprises on those dates when the release of the employment statistics was not accompanied by large changes in the yield on the 4-month-ahead funds futures contract. These data are shown in

Figure 5. As before, the points in light blue are for the period since the introduction of “forward-looking” language in August 2003. The points in dark blue are from January 1999 through mid-2003. In contrast to Figure 3, the difference between the data from the past two years and the earlier period is startling. In the recent period, all of the small changes in the futures yield occurred when the employment forecast was highly accurate. Hence, during this period there is a clear distinction in the response of the futures yield to the employment data: When there are large employment surprises the futures rate adjusts; when there are no surprises (or very small surprises) there is little movement in the futures yield. However, in the period from 1999 through mid-2003 there were many occasions when employment surprises did not generate any appreciable reaction in the funds futures yield.

My conclusion from these observations is that market sentiment has coalesced around the view that news about employment growth is a significant influence on the path of the target funds rate in the foreseeable future.

Figure 5

Small 4-Month-Ahead Funds Futures Changes and Employment Surprises



I'll finish with two observations. First, my emphasis on market reactions to employment surprises does not mean that the market ignores inflation. What has happened in recent years is that core inflation—inflation excluding effects of food and energy—simply has not generated significant surprises. The Fed has emphasized that it focuses on core inflation so that monetary policy does not react to energy and food prices, which tend to be highly volatile. I have no doubt that both the FOMC and the market would respond to surprises in core inflation that seemed likely to be persistent and to indicate a developing inflation problem.

Second, recent changes in the federal funds futures rate in response to rapidly changing events connected with hurricanes Katrina and Rita will be interesting to examine carefully in the future. However, these events are too recent to be good candidates for careful analysis now, and I'll forgo an effort at instant analysis.

CONCLUSION

The federal funds futures market, and other markets I have not discussed here, provide a rich source of information to better understand the effectiveness of the Fed's changes in disclosure policies over the Greenspan era. It is quite clear that the markets understand Fed policy to a much greater extent than before. My own view is that the market's improved understanding, and the Fed's efforts to improve clarity of monetary policy decisions and decision processes, have much to do with the economy's improved stability. Recessions have become milder, and core inflation more stable. Maintaining these gains is important to economic welfare. I would not claim that we have enough evidence to say that the gains are permanent, but we do have enough to say that the effort has been very productive.