

# Making News: Financial Market Effects of Federal Reserve Disclosure Practices

Antulio N. Bomfim and Vincent R. Reinhart\*

March 14, 2000

## Abstract

As recently as early 1994, market participants had to infer the stance of U.S. monetary policy according to the type and size of the open market operations conducted by the Federal Reserve's Trading Desk. Thus, investors were exposed to uncertainty about both the timing and the motivation for monetary policy actions. Since then, changes in disclosure practices regarding monetary policy decisions have potentially mitigated both types of uncertainty. We examine the effects of the greater openness and transparency of these new practices on the way a wide array of financial market instruments responds to unanticipated policy decisions. In general, the financial markets' response to policy does not seem to be related to what the Federal Reserve says after a surprise decision is announced or to when it decides to act. The invariance of the response of asset prices to policy across time and announcement regimes suggests that what the Federal Reserve says when it acts is of second-order importance to the act itself.

JEL Classification: E58, D84, G14

Keywords: monetary policy transparency, expectations, asset prices

---

\*Division of Monetary Affairs and Division of International Finance, respectively, Federal Reserve Board, Washington, DC, 20551. We thank Marvin Goodfriend, Ken Kuttner, and Daniel Thornton for helpful comments and Ian Anderson for excellent research assistance. The opinions expressed in this paper are not necessarily shared by anyone else in the Federal Reserve System.

## 1. Introduction

Monetary policy actions offer analysts a rare opportunity to observe a controlled experiment, in that a well-defined act occurs at a specific time, which can be compared to expectations gotten from surveys or derived from financial market prices, and generates reactions in a wide variety of financial markets.<sup>1</sup> The movement in the prices of long-lived assets in response to policy action depends on the extent to which market participants were surprised by the action and were induced to revise their outlook about policy going forward. Thus, the magnitude of the movement hinges on the predictability of policy and the ability of investors to read future policy intent from current action. In both regards, the Federal Reserve has changed its policies regarding the transparency and openness of policy actions over the years, suggesting that the ability of investors to make such inferences may also have changed.

As recently as early 1994, market participants had to infer the stance of the policy of the Federal Open Market Committee (FOMC) on a day-by-day basis, according to the type and magnitude of daily open market operations. Because open market operations were sufficiently routine so as to make policy signals quickly discernible, investors almost

---

<sup>1</sup> The clarity of experiment probably explains the wide range of papers investigating the response of market prices to policy action. This literature examines both the impact of changes in reserve market conditions--including Cook and Hahn (1989), Thornton (1996 and 1998), Rudebusch (1995), Reinhart and Simin (1997), and Kuttner (1999)--and changes in the discount rate--including Cook and Hahn (1987 and 1988), Lombra and Torto (1977), May (1992), Smirlock and Yawitz (1985) and Wagster (1993).

invariably detected policy action on the day it occurred.<sup>2</sup> However, unless a change in the FOMC's intended federal funds rate was accompanied by a change in the discount rate (which was only the case about one-quarter of the time from 1988 to 1993), monetary policy makers offered no concurrent explanation to the public about why the action was undertaken.<sup>3</sup> Moreover, whether the federal funds rate was changed alone or in conjunction with the discount rate, the timing of policy action prior to 1994 was not predictable, in that 19 of the 25 changes in the intended federal funds rate from 1989 to 1993 occurred between regularly scheduled meetings of the FOMC. Since February 1994, in contrast, all policy actions by the FOMC have been announced to the public on the day that they have been made and accompanied by a short rationale for the action (as explained in Federal Reserve, 1995). In addition, policy actions have also been more concentrated at meetings, with 12 of the 14 actions in the past five years made on days of regularly scheduled FOMC meetings.

It seems opportune to assess the consequences of these changes. To that end, this paper exploits the variation in the Federal Reserve's release of information and the predictability of policy actions to assess whether such openness has any discernible effect on

---

<sup>2</sup> Thornton (1999) casts some doubt on the markets' ability to correctly detect policy action over the pre-1994 period, but his results are based on analysis of the 1974-1979 period. In contrast, Bomfim (2000) examined the 1989-1998 period, the same sample analyzed in this paper, and found that days of changes in the intended federal funds rate produced significant announcement effects in the stock market, suggesting that market participants were generally able to detect policy actions on the day they occurred.

<sup>3</sup> As explained in Thornton (1986), proposals to change the discount rate are submitted by the boards of directors of Federal Reserve Banks and must be approved by the Board of Governors of the Federal Reserve System and are announced to the public in a press release.

the response of financial market prices to policy action. The paper makes these comparisons as systematic as the data allow within an event-study framework. The logic of an event study is to capture the element of surprise. With monetary policy, there are two opportunities to take such snapshots: When policy makers act, and when they do not act but at least some market participants were expecting them to do so. The former in our sample includes the 39 changes in the intended federal funds rate from 1989 to 1998, while the latter includes the 59 FOMC meetings over that period at which policy makers stood pat.<sup>4</sup> We measure expectations both from a survey--the Money Market Services (MMS) tallies of market economists--and implied from the short-term interest rate futures contract that trades on the Chicago Board of Trade (CBOT). The imprint of policy is examined in eleven markets: yields on (1) three-month, (2) one-year, (3) five-year and (4) ten-year Treasury securities, the (5) S&P 500 and (6) NASDAQ stock indexes, (7) the trade-weighted exchange value of the dollar, (8) the spread of the high-yield ten-year bond rate over the seven-year Treasury rate, and volatilities inferred from the prices of options on (9) three-month Eurodollar, (10) ten-year Treasury note, and the (11) long-term Treasury bond futures contracts. By including information on options prices, we have a direct reading on market participants' expectation of uncertainty. But we also examine the effect of policy regime on uncertainty indirectly through tests of the properties of the residuals of our event-study regressions.

---

<sup>4</sup> Roley and Sellon (1998) look at the response to inaction--what they dub "non-announcement" surprises.

In general, our regression evidence confirms the widely held result that monetary policy is felt most forcefully at the short-end of the yield curve and with ever-more muted effect as the maturity of the instrument lengthens. What is new with this paper is the finding that the strength of those responses does not seem to be related to what the Federal Reserve said or when it acted. Moreover, the uncertainty surrounding those estimated relationships does not differ significantly across regime.

The next section provides a brief recounting of changes in the Federal Reserve's policy of explaining its action and offers a simple framework to understand the types of uncertainty policy creates. Section 3 details the tests to be conducted and the sample, while Section 4 reports the results. Section 5 concludes the paper with some comments on the scope and consequences of further information release.

## **2. Market Uncertainty and a Brief History of Disclosure Policies**

*The elements of uncertainty.* In standard models of finance, monetary policy actions affect the prices of long-lived assets to the extent that they lead investors to revise their expected path of short-term interest rates. How significant is that revision to the expected future path of interest rates depends on what action had been expected, when that action was expected to take place, and how the explanation that monetary policy makers provide shapes market expectations going forward. The question as to what market participants expected policy makers to do can be answered by proxies, such as survey responses or measures derived from financial prices that will be discussed in more detail in the next section.

*A brief history of newsmaking.* The Federal Reserve's policies toward information release potentially help to shape market participants' expectation of *when* policy will act and *why* it will do so. The former we term "timing" uncertainty while the latter concerns "rationale" uncertainty. Until February 1994, policy actions directed by the FOMC to change reserve conditions were signaled to the market through the choice of open market operations. For instance, if the federal funds rate were trading close to what was understood in the market to be its intended level, the decision to add reserves less aggressively (or even to drain them) relative to seasonal norms would be interpreted by Fed watchers as evidence of a tightening of policy.<sup>5</sup> Such a supposition would only be confirmed over time by the continuance of such a reserve stance or subsequent statements by Federal Reserve officials; ultimately, the actual instructions directing the change in stance would be released to the public in the minutes of an FOMC meeting. In particular, the explanation for an action taken at an FOMC meeting would be published in the minutes for that meeting, which were released to the public a few days after the next meeting (or six to eight weeks after the actual action). The explanation for an action taken between meetings would appear in the minutes of the next regularly scheduled meeting, which in turn would not be released until after the following FOMC meeting (or potentially twelve to sixteen weeks after the action). Therefore, market participants focused considerable effort in detecting such changes in the policy stance, and Federal Reserve policy technicians had to be extremely sensitive to the prevailing

---

<sup>5</sup> The types of open market operations available and their signaling content is described in Feinman (1993).

market sentiment and seasonal norms when choosing daily operations.

Changes in the reserve conditions that were accompanied by changes in the discount rate, however, were a different matter. Discount rate changes, which are proposed by the board of directors of a Federal Reserve Bank and must be approved by the Board of Governors, have always been announced in a press release. And those announcements have afforded monetary policy makers the opportunity to influence public opinion by explaining the rationale for the actions. That opportunity was not always taken, in that sometimes the press release merely stated that the discount rate was being realigned to changes in other market rates and did not offer any broader macroeconomic context.<sup>6</sup> Thus, policy actions prior to February 1994 exposed market participants to differing amount of rationale uncertainty, depending on whether they represented changes in the federal funds rate alone or in both the federal funds and discount rates.

On February 4, 1994, the FOMC tightened reserve market conditions, marking the first change in the intended rate in eighteen months and the first policy hike in about five years. Even though the discount rate was kept unchanged, the change in reserve conditions was announced in a press release. The thirteen subsequent policy actions up to the end of

---

<sup>6</sup> Those announcements also offered researchers an opportunity to discern if the content of the press releases had any differential market impact. In a series of papers, Cook and Hahn (1987 and 1988) separated discount rate statements into those providing information about policy--policy statements--and those merely realigning the structure of interest rates--technical statements. Generally, they found that policy statements did have a statistically significant impact of market rates in a way that technical announcements did not. (Thornton, 1982, was the first to use such statements to differentiate between types of changes in the discount rate.)

1998 have also been announced to the public, each time with a short explanation of the reason for that action. Thus, rationale uncertainty for policy actions post February 1994 has been narrowed--to the extent that those announcements have macroeconomic content. On days in which the FOMC meets and no policy action is undertaken, up until May 1999, a brief announcement was made when the meeting is over. In this case, rationale uncertainty as to the reason policy makers kept the intended funds rate unchanged persists.<sup>7</sup> In May 1999, the FOMC released a statement explaining its choice of policy directive even though it had elected to keep the intended federal funds rate unchanged. In this case, the members of the FOMC wanted to alert the public that they had chosen a directive that contained the presumption that they were more likely to tighten than ease--what is known as a biased directive. The possibility that the FOMC could release a tilt announcement has ushered in yet another era in announcement policy, but one that is too short for formal analysis. For that reason, this paper ends the period under study at December 1998.

Another shift is evident in FOMC policy making since February 1994, although this one was not associated with an officially announced change. As shown in columns 2 and 3 of Table 1, three-quarters of the policy actions from 1989 to 1993 occurred on days in which the FOMC was not scheduled to meet.<sup>8</sup> From the beginning of 1994 to the end of

---

<sup>7</sup> In principle, based on the announcement policy explained in Federal Reserve (1995), the FOMC could release an explanation why it had stood pat. At its December 1998 meeting, the FOMC reasserted its right to make announcements at meetings in which policy is not changed (Federal Reserve, 1999).

<sup>8</sup> Appendix A lists each action.



1998, twelve out of fourteen policy actions have been on days on which the FOMC regularly meets. Policy actions are the outcomes of many factors, so it is difficult to single out one reason to explain this shift.

Nineteen-ninety-four inaugurated several changes in FOMC disclosure policy, apart from announcements of policy actions, including the decision to publish lightly edited transcripts of FOMC meetings with a five-year lag, that were the subject of considerable Congressional scrutiny. These reforms may have made FOMC members more likely to act at meetings, in part to be able to provide a more complete justification of their actions for the history books now that the transcripts were to be released. It is also the case that the macroeconomic backdrop for policy setting differed from 1989 to 1993 and 1993 to 1999. As Reinhart and Simin (1997) point out, policy in the earlier period was mostly reacting to surprising weakness in the real economy. In particular, those intermeeting adjustments often followed hard on the heels of the announcements of unexpected shortfalls in employment. In the latter period, Federal Reserve policy was self-described as preemptive--that is, responsive to expected economic trends--which might allow more discretion in the timing of decisions.

Independent of the period, two regularities about Federal Reserve policy making have survived: Changes in the intended federal funds rate tend to cluster in the same direction and be separated by at least several weeks. As evident in the frequency distribution tabulating the number of days between policy actions in Figure 1, the median spell between actions is 6-

1/3 weeks and the modes are 2-1/2 and 4-1/2 weeks.<sup>9</sup> Thus, if policy acts, markets participants can be reasonably thought to assume that policy will be on hold for at least a few weeks.

### **3. A Unified Analytical Framework**

We use a single framework to test for the existence of timing- and rationale-uncertainty effects in the market's reaction to FOMC decisions involving the intended federal funds rate. Table 2 summarizes the previous section's characterization of the types of uncertainty associated with each category of FOMC decisions. Because policy makers were less bound by the FOMC calendar and did not announce their actions, most pre-1994 decisions exposed investors to timing and rationale uncertainty (the first row). The exceptions, though, were those changes in the intended funds rate accompanied by changes in the discount rate, which were announced in a press release. For that reason, the empirical analysis must allow for a special role of discount rate announcements. In contrast, given the disclosure practices adopted in February 1994, we assume that all regularly-scheduled decisions made since then have no timing uncertainty, but some--namely, those decisions to leave the funds rate unchanged--are still subject to rationale uncertainty.

*Market-Implied Expectations.* The element of surprise in each FOMC decision can be calculated using expectations proxies gotten from either surveys or financial prices.

Over the past fifteen years, Money Market Services (MMS) has surveyed financial market

---

<sup>9</sup> Rudebusch (1995) uses this slow decay in the distribution to help explain the effect of policy action on short-term interest rates. Sack and Wieland (1999) review the literature on interest-rate smoothing.

economists, usually about two dozen, each week about their forecasts of a variety of economic indicators. With regard to monetary policy, respondents are asked their expectations for the average federal funds rate over several near-term horizons. By taking the median response to the MMS survey released on the Friday before a policy action or an FOMC meeting, we have a measure of prevailing market sentiment before a policy decision. Given the lags in survey collection, however, and the fact that the reading is only undertaken weekly, there may be as much as an effective 1-1/2 week lag between the survey measure and the policy decision. Even more troubling, the MMS panel is small and, early in our sample, respondents were asked questions that were ambiguous, in that they could be interpreted as referring either to the intended federal funds rate of the FOMC or the actual average federal funds rate that would prevail in the market.

As an alternative, we computed the expectation of the federal funds rate implicit in the thirty-day short-term interest future contract trading on the CBOT, which has a settlement price based on the average federal funds rate for each calendar month.<sup>10</sup> Given the current average federal funds rate consistent with the futures price and the actual average federal funds rate for the month, which is known up to the prior day, the implied marginal federal funds rate--or the rate that is expected to prevail for the remainder of the month--is a simple calculation. In principle, the futures rate also contains a term premium that would make it an overestimate of the expected federal funds rate, but the near-term focus of this analysis makes it reasonable to neglect that factor.

---

<sup>10</sup> An overview of this contract is provided by Thornton (1996).

To be more precise, given that the current-month futures contract is based on market participants' expectations of average daily observations on the actual funds rate over that month, we can write the futures rate on day  $t$  in a given month-- $t=1$  to  $T$ --as

$$f_t^{(0)} = \left\{ \sum_{j=1}^{t-1} i_j + E\left[ \sum_{j=t}^T i_j \mid I_{t-1} \right] \right\} / T \quad (1)$$

where  $f_t^{(0)}$  denotes the current-month futures rate;  $i_t$  is the value of the federal funds rate on the  $t^{\text{th}}$  day of the month;  $T$  is the number of days in the month under consideration;  $E[\cdot \mid I_{t-1}]$  is the conditional expectational operator, and  $I_t$  is the information set, which contains information up to and including day  $t-1$ . The market implied expectation of the federal funds rate for the remainder of the month is easily computed given those daily values that have already been observed.<sup>11</sup>

As can be inferred from equation (1), however, the market-implied expectation corresponds to investors' expectations of the *average* level of the funds rate in the remaining days of the month--that is, they could be consistent with a range of possible dates and magnitude of policy action over the remainder of the month. For each of the days included in the event-study regressions, we make the identifying assumption that the computed marginal federal funds rate--the expectation proxy--is the expected value of the intended rate at the end of that day. This implicitly assumes that market participants assigned some positive probability of a change in the intended funds rate that day and that no further

---

<sup>11</sup> Roley and Sellon (1998) use a similar approach to extract market-implied expectations from federal funds futures rates.

actions are expected through the end of the month. Indeed, the distribution of the time between actions, reviewed in Figure 1, suggests that it is plausible to assume that, were action to take place at day  $t$ , no more would be forthcoming for the remainder of the month.

Under these assumptions, the market-implied is:

$$E[i_t | I_{t-1}] = [Tf_{t-1}^{(0)} - \sum_{j=1}^{t-1} i_j] / (T-t+1) \quad (2)$$

Armed with the market-implied expectations defined by equation (2), we then measure the surprise associated with each FOMC decision as the difference between the actual value of the intended rate and its market-implied expectation.

Both the MMS survey and the futures-derived measures of near-term expectations line up closely over the sample for 1989 to 1998, as is evident in Figure 2. The simple correlation of the levels of the two series is 0.996 and of the spread of those measures over the actual intended federal funds rate is 0.559. Because the futures-based measure is a more timely proxy of market participants' expectations, we use it in the work reported below.

*Estimation Approach.* The basic regularities in the data are evident from a simple regression relating the change in a given financial market quote,  $y_{it}$  to a surprise movement in the intended fed funds rate,

$$\Delta y_{it} = \alpha_{i0} + \alpha_{it} s_t \quad (3)$$

where  $s_t$  denotes the policy surprise (actual minus expected intended rate). In statistical terms, the main question is whether the size of the slope  $\alpha_i$  is influenced by either rationale or timing uncertainty. This hypothesis can be tested by using dummy variables to identify those instances where each type of uncertainty is present. Accordingly, the regression equation becomes:

$$\Delta y_{it} = \alpha_{i0} + \alpha_{i1}(d_{d,t}s_t) + \alpha_{i2}(d_{r,t}s_t) + \alpha_i s_t \quad (4)$$

where the dummy variable  $d_{d,t}$  is set to unity if the policy surprise is associated with timing uncertainty and zero otherwise;  $d_{r,t}$  is analogously defined for rationale uncertainty. Thus, checking for rationale and timing uncertainty effects is simply a test of whether the coefficients  $\alpha_{i1}$  and  $\alpha_{i2}$  are statistically different from zero.

It is simplest to understand this as the case of an omitted variable bias. The inclusion of a dummy variable does not capture all the information that is conveyed by the policy announcement and the increased predictability of policy action. To the extent that what is omitted is correlated with the surprise term, the coefficients  $\alpha_{i1}$  and  $\alpha_{i2}$  will differ statistically from zero. It is possible, though, that the increased openness and transparency of policy was significant in shaping the market's reaction to policy but still had no net effect on the coefficients in equation (4), as the omitted variable was uncorrelated with the surprise term. Announcements, on average, may have had no net effects on averages because sometimes they served to accentuate the impact of a policy surprise and sometimes they dampened the

effects of a policy surprise.<sup>12</sup> Indeed, the announcements may have served, at times, as devices to build consensus within the FOMC or to send signals to policy makers outside the meeting and to the general public, thus implying that the press release need not always have obvious significance for forecasting Federal Reserve action. Nonetheless, regardless of the correlation between the informational content of the announcement and the policy surprise, the error in equation (4) should be heteroskedastic, drawn from a distribution with a higher variance when the FOMC systematically releases additional information important for understanding market pricing but that is not included in the regression. Thus, the appropriate test of whether the new regime had any consequence is to establish if regression coefficients changed (in either direction) or the variance of the error term rose in the later part of the sample.

While the impact effect of a policy surprise is problematic to determine, the greater transparency of FOMC announcements in the post-1994 period, if it mattered, should help to resolve market uncertainty about the future state of the economy going forward. That is, a measure of expected market uncertainty should narrow in the later part of our sample period. Financial derivatives can provide measures to address the effects of openness on uncertainty more directly. To that end, we examine the levels of expected volatility implied by various financial derivatives. The relevant regression equations are similar to the ones

---

<sup>12</sup> For instance, some announcements might have been read as implying that more policy action was in the offing--as was probably the case in the spring of 1994--while others were read as implying policy would be on hold subsequently--as was probably the case in August 1994 and November 1998.

above, except that market uncertainty should react to the size of the policy surprise, regardless of its sign. For example, in the absence of timing and uncertainty effects, the equation to estimate is:

$$\Delta v_{it} = \beta_0 + \beta_1 |s_t| \quad (5)$$

where  $v_{it}$  denotes the implied volatility measure. Here the appropriate test is to determine if expected volatility is systematically lower in the later part of the sample.

#### 4. Results

As an initial check on the significance of the post-1994 disclosure practices, we break up the sample into pre- and post-1994 subperiods. Figure 3 shows regression lines and scatter plots associated with separately estimating equation (3) over each subsample for four Treasury security yields: the three-month bill and one-, five-, and ten-year notes. The results confirm the intuition that an intended funds rate that exceeds expectations tends to increase Treasury yields. Moreover, it provides explicit evidence on the limits of monetary policy action. Policy surprises are reliably felt at the short end of the yield curve--as witnessed by the fact that the three-month bill relationship has the steepest slope of the four panels--but their effect diminishes as maturities lengthen.

More to the point of this paper, the close proximity of the two regression lines in each panel suggests that the relationship between Treasury yields and monetary policy surprises does not appear to have changed much over the two subsamples. The upper half of Table 3 confirms this finding in a formal test of the hypothesis of equal slopes over the



two samples. For each of the four securities analyzed, the hypothesis of equal slopes for the regression lines shown in Figure 3 cannot be rejected. The table also indicates that the positive relationship between changes in Treasury yields and the policy surprise is statistically significant only for the shorter-maturity issues.<sup>13</sup>

Figure 4 and the lower half of Table 3 show the results of conducting the same exercise described above for four additional financial market instruments: the S&P 500 and NASDAQ equity market indexes, the trade-weighted exchange value of the dollar, and the spread of the Merrill Lynch Master II High-Yield index over the seven-year Treasury note. As with the longer-term instruments analyzed in the upper half of the table, we find no statistically significant link between one-day movements in these asset prices and the policy surprise. In addition, the regression results detect no difference in slopes over the two subsamples.

Of course the results presented so far address the effects of the post-1994 disclosure practices only partially, given that two-thirds of the FOMC decisions since February 1994 were still subject to rationale uncertainty (no-action decisions are not explained to the public). Moreover, even if we exclude post-1994 no-action decisions from the analysis, it would still be the case that all we have done so far is to test for the *combined* effect of timing and uncertainty effects.

*Testing Separately for Timing- and Rationale- Uncertainty Effects.* We now turn to the

---

<sup>13</sup> The finding of a statistically insignificant effect of the policy surprise on the longer-term securities is not new, as reported by Cook and Hahn (1989), Thornton (1998), and Reinhart and Simin (1997).

estimation of equation (4) for each of the securities analyzed above. In practice, we will add another dummy variable to the empirical version of equation (4) to allow for a special role for discount rate announcements in the pre-1994 sample (see Cook and Hahn, 1988, for a discussion of such announcements). The results are summarized in Table 4. For all of the eight financial market instruments analyzed, we find no statistical evidence of either a timing- or rationale-uncertainty effect.

*Testing for Heteroskedasticity.* To test for heteroskedasticity in the residuals of equation (4), we use the well-known Breusch-Pagan and Glesjer procedures (Judge *et al.*, 1985). Motivated by omitted-variable interpretation of equation (4), we test the null of homoskedasticity against the alternative hypothesis that the variance of the residuals in the pre- and post-1994 samples is different. The last column in Table 4 shows the marginal significance levels associated with the Breusch-Pagan test, which suggest that for all but the NASDAQ index and high-yield spread equations we cannot reject the hypothesis of homoskedasticity at the 5 percent significance level.<sup>14</sup> Moreover, even in the two equations where the tests did detect heteroskedasticity, we found no conclusive evidence that the phenomenon could be associated with an omitted variable problem: According to the Glesjer test, while the residual variance of the NASDAQ equation increased in the post-1994 sample, the opposite happened to the high-yield spread residuals.

Taken together, the results of the heteroskedasticity tests do not support the

---

<sup>14</sup> These results are robust to modifying the Breusch-Pagan test statistic to allow for non-gaussian residuals.

hypothesis that the informational content of policy announcements was an important omitted variable in equation (4). In particular, even if we allow for the possibility that the informational content of the announcements was largely uncorrelated with policy surprises because at different times FOMC press releases may have served to accentuate and mitigate the markets' response to policy makers' decisions, there is no evidence that the new disclosure policies of the post-1994 period significantly changed the way asset prices respond to monetary policy.

*Have the Post-1994 Disclosure Practices Helped Resolve Market Uncertainty?* Market uncertainty can be proxied by the levels of implied volatility derived from options on futures contracts involving three-month Eurodollar rates, intermediate-maturity Treasury notes, and long-term Treasury bonds. We start out by estimating equation (5) for each of these variables over the pre- and post-1994 subsamples. The results are summarized in Figure 5 and Table 5. While Figure 5 makes it possible to discern various patterns involving changes in each implied volatility measure and the policy surprise, none of them are statistically significant, indicating that the size of a policy surprise appears to play no measurable role in either resolving or exacerbating market uncertainty. Notice, though, that the regression lines associated with the post-1994 sample have negative and statistically significant intercepts. Given that most of the decisions made over this time period took place during regularly scheduled FOMC meetings, these negative intercepts suggest that the FOMC meeting itself, and the possibility of action, creates some uncertainty. Thus, ending the meeting--whatever the decision--seems to reduce implied volatility by a small, but statistically significant,

amount. Nevertheless, the smallness of this effect, together with the results reported above, suggest that the reduction in implied volatility detected in the post-1994 sample is apparently not enough to show through different market responses after the adoption of the new disclosure practices.

## **5. Concluding Remarks**

While theory might suggest that there would be some consequence from increased openness and transparency in policy setting (as argued by Goodfriend, 1986, and Belongia and Kleisen, 1996), the actual variation in Federal Reserve disclosure policies over the past ten years has generally failed to produce effects on price setting that meet any usual standard of statistical significance. The invariance of the response of financial market prices to policy across time and announcement regimes suggests that what the Federal Reserve says when it acts is of second-order importance to the action itself, perhaps for one of two reasons. On the one hand, the silence of the Federal Reserve prior to 1994 may be overstated. While no formal announcement accompanied changes in the intended federal funds rate, policy was responding to key macroeconomic indicators in a predictable manner.<sup>15</sup> On the other hand, the moves toward openness beginning in 1994 may have been too tentative to have a systematic effect on price responses. That is, the press releases have not been specific enough to shape market opinion in any consistent manner.

---

<sup>15</sup> As Reinhart and Simin (1997) note, 7 of the 25 policy eases from 1989 to 1992 took place on days of monthly employment releases. The overall predictability of policy is also documented by Taylor (1993), who finds that quarterly variations in the federal funds rate over the entire sample period are well explained by just two macroeconomic indicators.

## References

- Baker, H. Kent, James M. Meyer, 1980, Impacts of Discount Rate Changes on Treasury Bills, *Journal of Economics and Business*, 33(1), 43-38.
- Batten, Dallas S., Daniel L. Thornton, 1984, Discount Rate Changes and the Foreign Exchange Market, *Journal of International Money and Finance*, 3, 279-292.
- \_\_\_\_\_, 1985, The Discount Rate, Interest Rates and Foreign Exchange Rates: An Analysis with Daily Data, *Federal Reserve Bank of St. Louis Review*, 67(2), 22-30.
- Belongia, Michael T. and Kevin L. Kliesen, 1994, Effects on Interest Rates of Immediately Releasing FOMC Directives, *Contemporary Economic Policy* (12), 79-91.
- Bomfim, Antulio N., 2000, Pre-announcement effects, news, and volatility: Monetary policy and the stock market, manuscript, Federal Reserve Board.
- Cook, Timothy, Thomas Hahn, 1987, The Reaction of Interest Rates to Unanticipated Federal Reserve Actions and Statements: Implications for the Money Announcement Controversy, *Economic Inquiry*, 25, 511-534.
- \_\_\_\_\_, 1988, The Information Content of Discount Rate Announcements and Their Effect on Market Interest Rates, *Journal of Money, Credit, and Banking*, 20, 167-180.
- \_\_\_\_\_, 1989, The Effect of Changes in the Federal Funds Rate Target on Market Interest Rates in the 1970s, *Journal of Monetary Economics*, 24, 331-351.
- Dueker, Michael, J., 1992, The Response of Market Interest Rates to Discount Rate Changes, *Federal Reserve Bank of St. Louis Review*, 74(4), 78-91.
- Federal Reserve Board, 1995, *Federal Reserve Bulletin*, vol.81 , April, pp.342-348.

- \_\_\_\_\_, 1999, *Federal Reserve Bulletin*, vol.85 , March, pp.197-204.
- Feinman, Joshua, 1993, Estimating the Open Market Desk's Daily Reaction Function, *Journal of Money, Credit, and Banking* 25, 231-247.
- Goodfreind, Marvin, 1986, Monetary Mystique: Secrecy and Central Banking, *Journal of Monetary Economics*, 63-92.
- Hafer, R. W., 1986, The Response of Stock Prices to Changes in Weekly Money and the Discount Rate, *Federal Reserve Bank of St. Louis Review*, 68(3), 5-14.
- Judge, George G., W.E. Griffiths, R. Carter Hill, Helmut Lutkepohl, and Tsoung-Chao Lee, 1985, *The Theory and Practice of Econometrics*, Second Edition, New York: John Wiley and Sons.
- Kuttner, Kenneth N., 1999, Monetary policy surprises and interest rates: Evidence from the Fed funds futures market, Manuscript, Federal Reserve Bank of New York.
- Lombra, Raymond E., Raymond G. Torto, 1977, Discount Rate Changes and Announcement Effects, *Quarterly Journal of Economics*, 91(1), 20-26.
- May, Don O., 1992, A Reexamination of Market Returns, Discount Rate Changes, and Market Efficiency, *Journal of Macroeconomics*, 14, 545-553.
- Reinhart, Vincent R. and Timothy Simin, 1997, The Market Reaction to Federal Reserve Policy Action from 1989 to 1992, *Journal of Economics and Business*, 49(2), 149-168.
- Roley, V. Vance and Gordon H. Sellon, Jr., 1995, Monetary Policy Actions and Long-Term Interest Rates, *Federal Reserve Bank of Kansas City Economic Review*, 73-89.
- \_\_\_\_\_, 1998, Market Reaction to Monetary Policy Nonannouncements, Federal

- Reserve Bank of Kansas City, Research Working Paper 98-06.
- Rudebusch, Glenn D., 1995, Federal Reserve Interest Rate Targeting, Rational Expectations, and the Term Structure, *Journal of Monetary Economics* 35(2), pp. 245-274.
- Sack, Brian and Volker Wieland, 1999, Interest Smoothing and Optimal Monetary Policy: A review of recent empirical evidence, manuscript, Federal Reserve Board.
- Smirlock, Michael, Jess Yawitz, 1985, Asset Returns, Discount Rate Changes, and Market Efficiency, *Journal of Finance*, 4, 1141-1158.
- Taylor, John B., 1993, Discretion versus policy rules in practice, *Carnegie-Rochester Conference Series on Public Policy*, 39, 195-214.
- Thornton, Daniel L., The Discount Rate and Market Interest Rates: What's the connection? Federal Reserve Bank of St. Louis *Review*, 64(6), 3-14.
- \_\_\_\_\_. 1986, The Discount Rate and Market Interest Rates: Theory and Evidence, Federal Reserve Bank of St. Louis *Review*, 68(7), 5-21.
- \_\_\_\_\_. 1996, Does the Fed's New Policy of Immediate Disclosure Affect the Market? Federal Reserve Bank of St. Louis *Review*, 78(6), 77-88.
- \_\_\_\_\_, 1998, Tests of the Market's Reaction to Federal Funds Rate Target Changes, Federal Reserve Bank of St. Louis *Review*, 80(6), 25-36.
- \_\_\_\_\_, 1999, The Fed's Influence on the Federal Funds Rate: Is it Open Market or Open Mouth Operations?, manuscript, Federal Reserve Bank of St. Louis.
- Wagster, John, 1993, The Information Content of Discount Rate Announcements Revisited, *Journal of Money, Credit, and Banking*, 25(1), 132-137.

Table 1  
**Distribution of FOMC Decisions**  
(May 17, 1989 — December 31, 1998)

	Action				No action	Total
	At meetings	Between meetings	Total	<i>of which:</i> Accompanied by discount rate change		
<b>1989 to 1993</b>	6	19	25	7	31	56
<b>1994 to 1998</b>	12	2	14	7	28	42
<b>Total</b>	18	21	39	14	59	98



Table 2  
**Transparency in FOMC Decisions, 1989-1998**

	Action		No action	
	<i>Timing</i>	<i>Rationale</i>	<i>Timing</i>	<i>Rationale</i>
<b>1989 to 1993</b>	considerable	depends	considerable	considerable
<b>1994 to 1998</b>	less	less	less	considerable

Table 3  
**Have the FOMC's post-1994 disclosure practices affected  
the way the financial markets react to its decisions?**

$$\Delta y_{i,t} = \alpha_{1,i}(d_t s_t) + \alpha_{2,i} s_t + u_t$$

Where d=1 if t is in pre-1994 sample, 0 otherwise

Dependent variable (y)	Estimated coefficients		S.E.E.
	$\alpha_{1,i}$	$\alpha_{2,i}$	
<b>Selected Treasury Security Yields (N=98)</b>			
<b>3-month bill</b>	-0.01 (0.09)	0.25 * (0.08)	7.34
<b>1-year note</b>	0.01 (0.09)	0.24 * (0.08)	7.28
<b>5-year note</b>	0.09 (0.09)	0.07 (0.08)	7.33
<b>10-year note</b>	0.07 (0.08)	0.04 (0.07)	6.23
<b>Other Selected Financial Market Quotes (N=98)</b>			
<b>S&amp;P 500 Index</b>	0.01 (0.01)	-0.01 (0.01)	0.97
<b>NASDAQ</b>	0.01 (0.01)	-0.01 (0.01)	1.09
<b>Dollar</b>	0.00 (0.02)	-0.01 (0.02)	1.85
<b>High-yield spread <sup>&lt;1&gt;</sup></b>	0.07 (0.10)	-0.07 (0.09)	7.95

Note. Standard errors in parenthesis.

\* Significant at the 5 percent level

<1> N = 88

Table 4  
**Testing Separately for day- and rationale-uncertainty effects**

$$\Delta y_{i,t} = \alpha_{1,i}(d_{d,t} s_t) + \alpha_{2,i}(d_{r,t} s_t) + \alpha_{3,i}(d_{s,t} s_t) + \alpha_{4,i} s_t + u_t$$

$d_{d,t} = 1$  over the pre-1994 sample and two intermeeting actions in the post-1994 sample (day uncertainty), 0 otherwise

$d_{r,t} = 1$  if post-1994 no-action announcement or pre-1994 decision (rationale uncertainty), 0 otherwise

$d_{s,t} = 1$  if pre-1994 discount rate announcement, 0 otherwise

Dependent variable (y)	Estimated coefficients				S.E.E.	p(BP) <sup>#</sup>
	$\alpha_{1,i}$	$\alpha_{2,i}$	$\alpha_{3,i}$	$\alpha_{4,i}$		
<b>Selected Treasury Security Yields (N=98)</b>						
<b>3-month bill</b>	-0.14 (0.12)	0.06 (0.16)	0.19 * (0.08)	0.25 * (0.11)	7.17	0.20
<b>1-year note</b>	-0.05 (0.12)	-0.08 (0.16)	0.19 * (0.08)	0.30 * (0.11)	7.12	0.11
<b>5-year note</b>	0.05 (0.13)	-0.06 (0.16)	0.13** (0.08)	0.12 (0.11)	7.30	0.88
<b>10-year note</b>	0.05 (0.11)	-0.10 (0.14)	0.12** (0.07)	0.10 (0.10)	6.19	0.46
<b>Other Selected Financial Market Quotes (N=98)</b>						
<b>S&amp;P 500 Index</b>	-0.00 (0.02)	0.02 (0.02)	-0.01 (0.01)	-0.02 (0.02)	0.97	0.18
<b>NASDAQ</b>	-0.01 (0.02)	0.03 (0.02)	0.00 (0.01)	-0.02 (0.02)	1.10	0.02
<b>Dollar</b>	-0.04 (0.03)	0.04 (0.04)	0.02 (0.02)	-0.02 (0.03)	1.85	0.16
<b>High-yield spread <sup>&lt;1&gt;</sup></b>	-0.05 (0.14)	0.22 (0.18)	0.03 (0.09)	-0.18 (0.13)	7.97	0.00

Note. Standard errors in parenthesis.

\* Significant at the 5 percent level

\*\* Significant at the 10 percent level

# Marginal significance level of Breusch-Pagan test for heteroskedasticity.

(Accept the null hypothesis of homoskedasticity at the 5 percent level if p(BP) > 0.05).

<1> N = 88

Table 5  
**Have the post-1994 disclosure practices helped resolve market uncertainty?**

$$\Delta y_{i,t} = \alpha_{i,0} + \alpha_{i,1} |s_t| + u_t$$

where y corresponds to different implied volatility measures.

Dependent variable (y)	Estimated coefficients		S.E.E.
	$\alpha_{i,0}$	$\alpha_{i,1}$	
<b>Three-month Eurodollar</b>			
<b>Pre-1994 (N=56)</b>	0.07 (0.21)	-0.01 (0.01)	1.14
<b>Post-1994 (N=42)</b>	-0.75 * (0.22)	-0.03** (0.02)	1.03
<b>Intermediate-Term Treasury Note</b>			
<b>Pre-1994 (N=56)</b>	-0.02 (0.03)	-0.00 (0.00)	0.16
<b>Post-1994 (N=42)</b>	-0.13 * (0.04)	-0.00 (0.00)	0.21
<b>Long-Term Treasury Bond</b>			
<b>Pre-1994 (N=56)</b>	-0.05 (0.06)	-0.00 (0.00)	0.32
<b>Post-1994 (N=42)</b>	-0.14 * (0.05)	-0.00 (0.00)	0.24

Note. Standard errors in parenthesis.

\* Significant at 5 percent level

\*\* Significant at 10 percent level

Note: “s” is the difference between the actual funds rate and the market expectation implied by fed funds futures quotes.

**Appendix A**  
**Chronology of FOMC Decisions**  
May 17, 1989 — December 31, 1998

Date <sup>&lt;1&gt;</sup>	Change in intended federal funds rate <sub>&lt;2&gt;</sub>	Change in discount rate <sup>&lt;2&gt;</sup>	Intermeeting action?
6-Jun-89	-25	0	yes
7-Jul-89	-25	0	no
27-Jul-89	-25	0	yes
10-Aug-89	-6	0	yes
23-Aug-89	0	0	
4-Oct-89	0	0	
18-Oct-89	-25	0	yes
6-Nov-89	-25	0	yes
15-Nov-89	0	0	
20-Dec-89	-25	0	no
8-Feb-90	0	0	
28-Mar-90	0	0	
16-May-90	0	0	
4-Jul-90	0	0	
13-Jul-90	-25	0	yes
22-Aug-90	0	0	
3-Oct-90	0	0	
29-Oct-90	-25	0	yes
14-Nov-90	-25	0	no
7-Dec-90	-25	0	yes
18-Dec-90	-25	-50	no
9-Jan-91	-25	0	yes
1-Feb-91	-50	-50	yes
7-Feb-91	0	0	
8-Mar-91	-25	0	yes
27-Mar-91	0	0	
30-Apr-91	-25	-50	yes

15-May-91	0	0	
4-Jul-91	0	0	
6-Aug-91	-25	0	yes
21-Aug-91	0	0	
13-Sep-91	-25	-50	yes
2-Oct-91	0	0	
31-Oct-91	-25	0	yes
6-Nov-91	-25	-50	no
6-Dec-91	-25	0	yes
18-Dec-91	0	0	
20-Dec-91	-50	-100	yes
6-Feb-92	0	0	
1-Apr-92	0	0	
9-Apr-92	-25	0	yes
20-May-92	0	0	
2-Jul-92	-50	-50	no
19-Aug-92	0	0	
4-Sep-92	-25	0	yes
7-Oct-92	0	0	
18-Nov-92	0	0	
23-Dec-92	0	0	
4-Feb-93	0	0	
24-Mar-93	0	0	
19-May-93	0	0	
8-Jul-93	0	0	
18-Aug-93	0	0	
22-Sep-93	0	0	
17-Nov-93	0	0	
22-Dec-93	0	0	
4-Feb-94	25	0	no
22-Mar-94	25	0	no
18-Apr-94	25	0	yes

17-May-94	50	50	no
6-Jul-94	0	0	
16-Aug-94	50	50	no
27-Sep-94	0	0	
15-Nov-94	75	75	no
20-Dec-94	0	0	
1-Feb-95	50	50	no
28-Mar-95	0	0	
23-May-95	0	0	
6-Jul-95	-25	0	no
22-Aug-95	0	0	
26-Sep-95	0	0	
15-Nov-95	0	0	
19-Dec-95	-25	0	no
31-Jan-96	-25	-25	no
26-Mar-96	0	0	
21-May-96	0	0	
3-Jul-96	0	0	
20-Aug-96	0	0	
24-Sep-96	0	0	
13-Nov-96	0	0	
17-Dec-96	0	0	
5-Feb-97	0	0	
25-Mar-97	25	0	no
20-May-97	0	0	
2-Jul-97	0	0	
19-Aug-97	0	0	
30-Sep-97	0	0	
12-Nov-97	0	0	
16-Dec-97	0	0	
4-Feb-98	0	0	
31-Mar-98	0	0	

19-May-98	0	0	
1-Jul-98	0	0	
18-Aug-98	0	0	
29-Sep-98	-25	0	no
15-Oct-98	-25	-25	yes
17-Nov-98	-25	-25	no
22-Dec-98	0	0	

<1> Dates correspond to FOMC meeting days (day after meeting in the pre-1994 sample) and dates of intermeeting policy actions.

<2> basis points



Figure 1

Distribution of number of days between policy actions (each bin = 15 days)

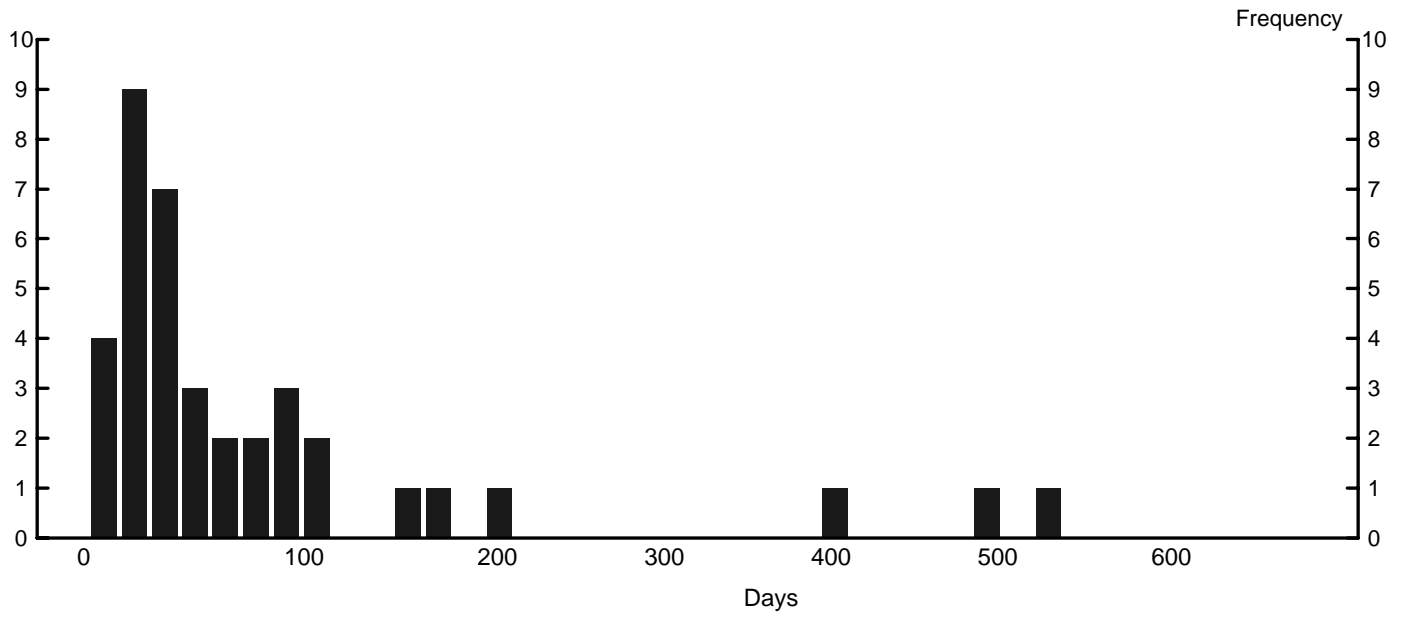


Figure 2

Federal Funds Rate Expectations

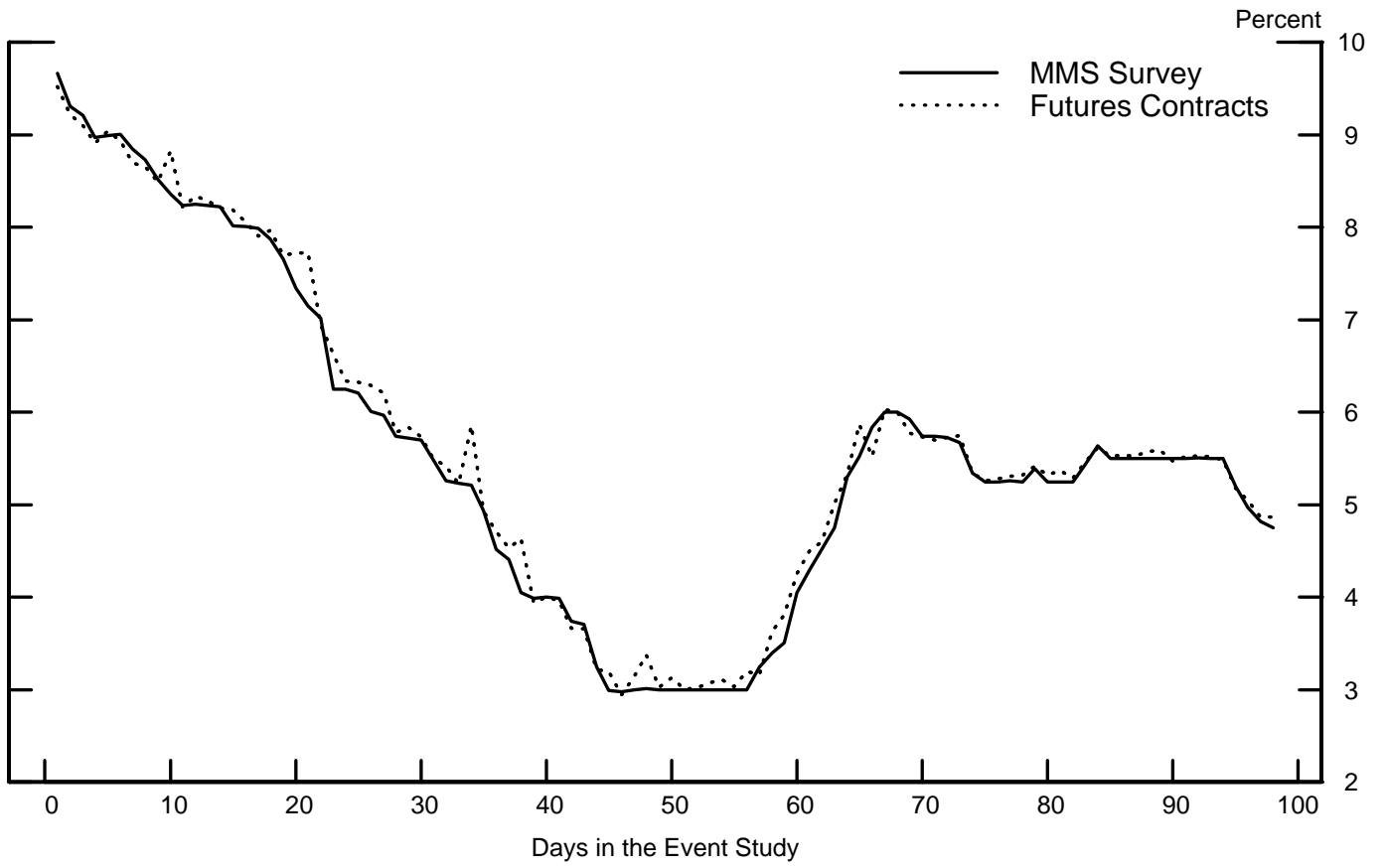


Figure 3  
Treasury Yield Curve

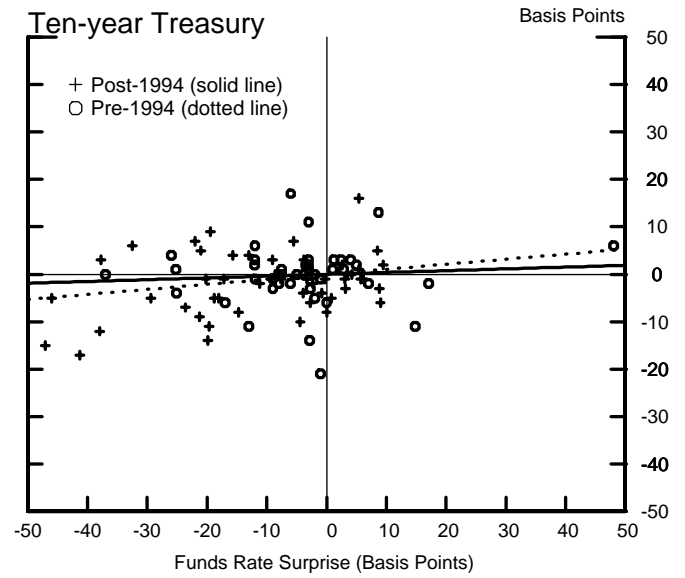
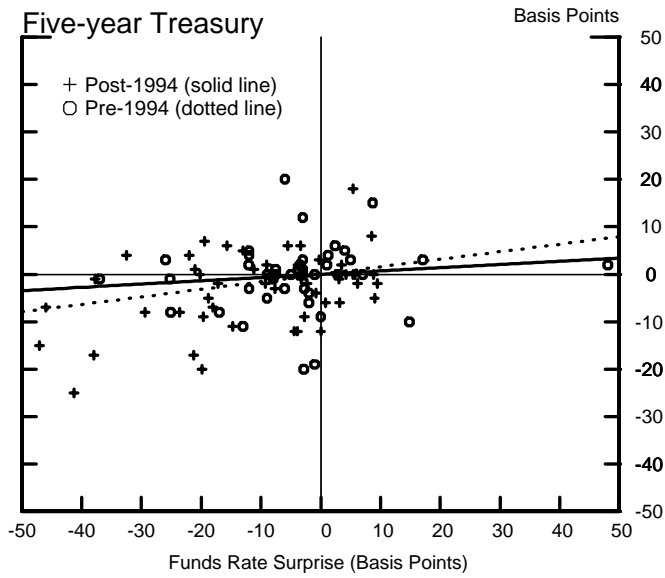
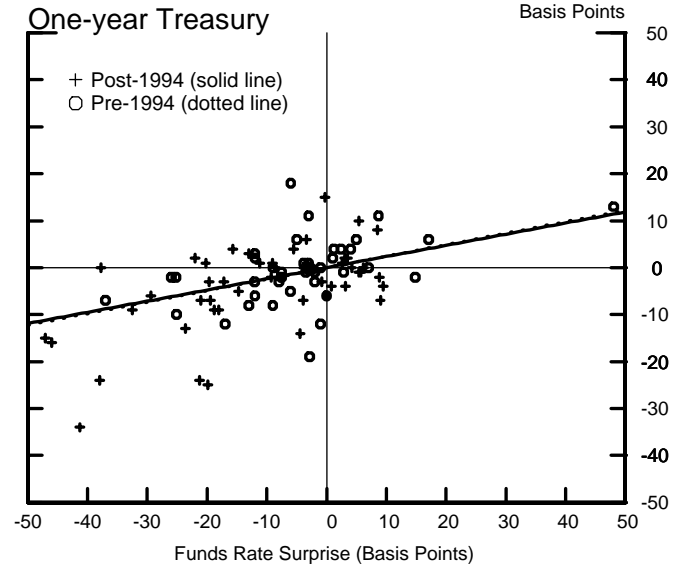
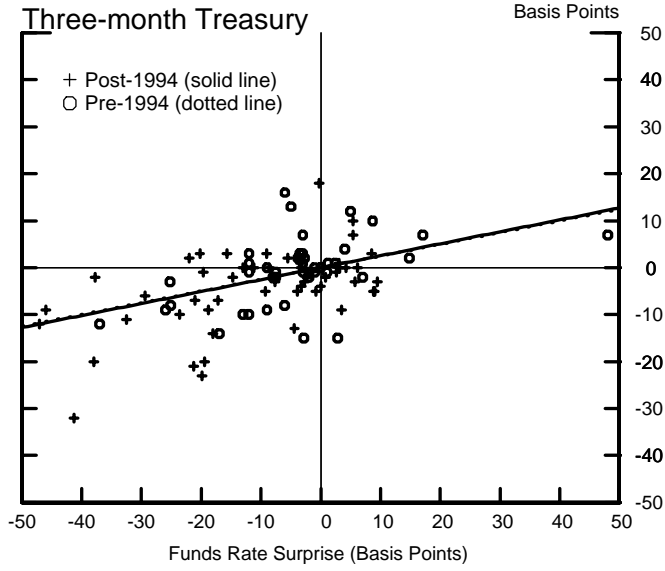


Figure 4

Private Market Quotes

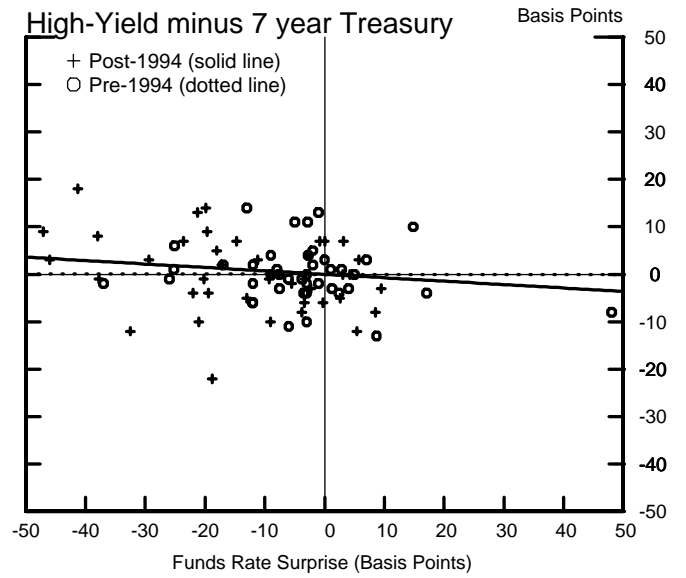
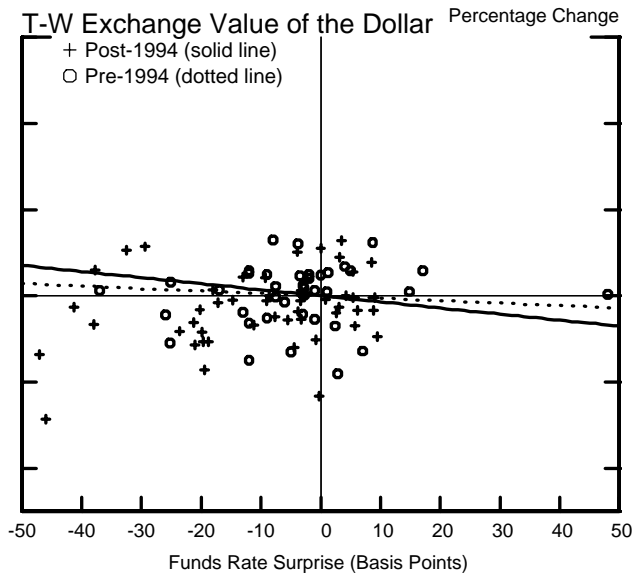
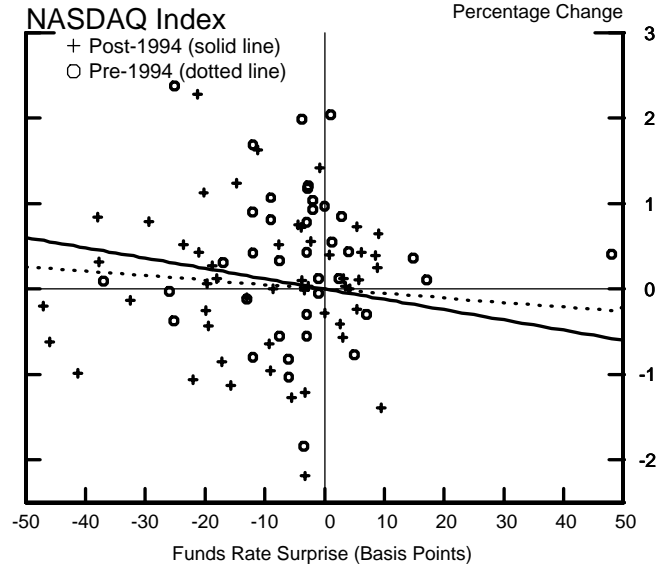
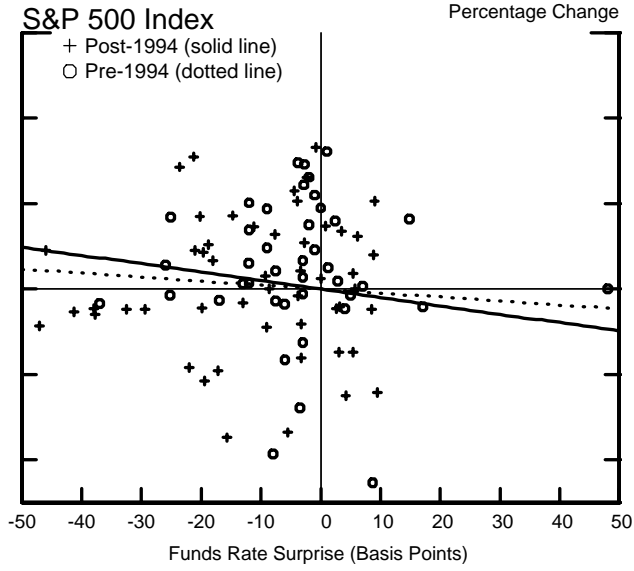


Figure 5  
Implied Volatility

