Perfecting the Market's Knowledge of Monetary Policy

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Abstract

The rational expectations revolution made clear that a complete macro model requires a specification of the government's economic policy. We argue that monetary policy should be conducted in such a way that the market can predict policy actions. An implication of market success in predicting policy actions is that interest rates move ahead of the policy actions, and such a timing relationship may appear to some as the central bank following the market instead of leading it. Another implication of the market predicting policy actions is that nominal interest rate changes provide no useful information to the central bank about the strength of aggregate demand or inflationary expectations. Finally, the failure of the market to predict policy actions reflects a problem that needs to be addressed.

We explore the theoretical implications of a monetary policy that is completely specified and perfectly understood by the market. We construct a bare-bones model to illustrate the key concepts. Finally, we conduct an empirical investigation of these issues, especially in the context of monetary policy since 1988 when the establishment of the federal funds future market made available well-defined market information on expectations about Fed policy actions.

Perfecting the Market's Knowledge of Monetary Policy[*]

We have learned much from Anna Schwartz over the years, and it is a real pleasure to be able to contribute a paper to this conference. We think it fair to say that her work has often focused on monetary policy errors, and that study of these errors has been important in learning how to conduct monetary policy better. Because monetary policy is important, policy errors show up all too clearly and painfully in economic ills of various kinds.

The economy's performance since the end of the 1981-82 recession has been excellent and, particularly over the last five years, even remarkable. If policy errors create problems, it must be the case that the lack of policy errors must have something to do with economic success. But it is hard to know how to write a paper on things that did not occur; our approach is to emphasize the importance of greatly improved market understanding of Federal Reserve policy.

The rational expectations revolution made clear that a complete macro model requires a specification of the government's economic policy. With regard to monetary policy, economists have closed their models by specifying a monetary policy rule of some sort or other. As this line of macro literature developed, authors initially relied on a money growth rule, usually in the form of constant money growth. Later, relying on the innovative work by John Taylor (1993), economists began to close macro models by using a Taylor-rule representation of monetary policy.[1] The Taylor rule is attractive because it is a rule for adjusting the short-term interest rate; setting a target overnight rate, of course, reflects actual central bank practice.

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[*] A nontechnical, and incomplete, exposition of the key ideas in this paper may be found in William Poole, "Synching, Not Sinking, the Markets," (Speech before a meeting of the Philadelphia Council for Business Economics, Federal Reserve Bank of Philadelphia, Philadelphia, Pennsylvania--August 06, 1999) <www.stls.frb.org/general/speeches/990806.html>.

[1] See for example, Judd and Rudebusch (1997), Orphanides (1998), McCallum (1999), Clarida, Gali and Gertler (1999), and the papers in Taylor (1999)

Another strand of literature has emphasized analysis of monetary policy rules themselves, aiming to better understand the implications of rules, such as the Taylor rule, and to refine such rules. However, everyone recognizes that actual monetary policy cannot now be adequately described by any of the proposed rules. Although no one has written down a satisfactory rule, the fact that market participants can so often predict Federal Reserve policy actions suggests that the Fed must be acting in a rule-like fashion in many respects. At a minimum, it certainly does not seem correct to describe U.S. monetary policy—especially after 1982—as being characterized by a large random component. As we document below, in recent years the market has indeed been successful in predicting monetary policy actions with a considerable degree of accuracy.

We will argue that monetary policy should be conducted in such a way that the market can predict policy actions. On one level, that statement seems obviously correct. However, an implication of market success in predicting policy actions is that interest rates move ahead of the policy actions, and such a timing relationship may appear to some as the central bank following the market instead of leading it.[2] Another implication of the market predicting policy actions is that nominal interest rate changes provide no useful information to the central bank about the strength of aggregate demand or inflationary expectations. Finally, the failure of the market to predict policy actions reflects a problem that needs to be addressed; that is the perspective that motivates the paper title.

The plan of the paper is as follows. In the first section we explore the theoretical implications of a monetary policy that is completely specified and perfectly understood by the

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[2] Thornton (1999) for example, argues "A possibility, suggested by the 1974-79 experience, is that some target changes are the endogenous response by the Fed to changes in interest rates. That is, not only do exogenous changes in the funds rate target cause interest rates to change but on some, or perhaps many, occasions change in market interest rates cause the Fed to change its funds rate target." p. 21.

market. The next section contains a bare-bones model to illustrate the key concepts. Following

sections contain empirical investigation of these issues, especially in the context of monetary

policy since 1988 when the establishment of the federal funds future market made available well-

defined market information on expectations about Fed policy actions. We finish with a

commentary that summarizes the main thrust of the argument.

Before proceeding, we want to emphasize that the views we express are ours and do not

necessarily reflect official positions of the Federal Reserve System. We thank our colleagues at

the Federal Reserve Bank of St. Louis for their comments, but retain full responsibility for errors.

The Problem

Prior to the rational expectations revolution in macroeconomics, modeling monetary

policy was not thought to be a necessary part of the enterprise of modeling the private sector of

the economy. The analysis of optimal monetary policy could proceed in an optimal-control

framework. A set of equations described the behavior of the private sector; the job of the central

bank was to select the proper settings for its policy instruments to guide the economy along its

optimal path, given the policymakers' objective function.

The rational expectations revolution destroyed this conception of the policy problem.

The behavior of the private sector could in principle *not* be modeled without specifying the

monetary policy rule, because the behavior of optimizing agents could not be predicted without

modeling their expectations about monetary policy.

As a matter of theoretical modeling, it was not difficult to close a macro model by

making some assumption or other about monetary policy. Whatever that assumption might be,

once it is specified the investigator can explore how the model works. For purposes of this

paper, the essential insight is that the economy will evolve in response to innovations—by which we mean unpredictable changes, or shocks—in the environment. For example, given the optimizing behavior of the private sector and the monetary policy rule, innovations in fiscal policy (both on the spending and tax sides of the budget) would drive changes in interest rates, production, prices, and all the other endogenous variables specified in the model. Given the monetary policy rule, the effects of innovations anywhere in the macro economy—in fiscal policy, in technology and production conditions, in economies abroad, or in any part of the economy the investigator wants to analyze—could be modeled and understood.

Nor is it difficult, in principle, to understand the effects of a change in monetary policy. The characteristics of the economy under two different monetary policies, policy A and policy B, can be worked out. We may not be able to say much about the transition from policy A to policy B, because that gets into matters of learning and the longevity of capital. But the steady-state properties of the economy under alternative policies can be explored.

The rational expectations paradigm takes for granted that the market knows the monetary policy rule. Our paper focuses on the issue of the extent to which the market in fact knows the rule. Our approach is built on a very simple idea. The FOMC sets the federal funds rate target, which the Fed calls the "intended" federal funds rate. For the Fed to achieve its objectives, the intended funds rate must be changed from time to time. Suppose we could write down a rule describing how the FOMC *should* change the intended funds rate to achieve its objectives. Assuming that these objectives are constant over time, changes in the intended rate would be driven by the arrival of new information. Thus, the intended funds rate change at any FOMC meeting could be derived from recent, and possibly lagged, innovations in all the information available. Fed policy would, of course, be based on an understanding that the market would

know the Fed's rule. The market, therefore, would bid interest rates up or down based on exactly the same information innovations that enter the Fed's policy rule.

An implication of this argument—one that may at first seem startling—is that the market should be able to predict perfectly all Fed policy decisions—actions or non-actions—the morning of the day of an FOMC meeting. Market interest rates should adjust in response to information innovations, but not to Fed policy decisions which are the result of a rule applied to the same information innovations.

This perspective helps in understanding the implications of the extensive literature on interest rate responses to news of various kinds, including news of Fed policy decisions. The fact that the market response to news has changed significantly over time is evidence that the Fed's reaction to the news is not constant. The clearest example is that the response of interest rates to information on changes in monetary aggregates has changed enormously. The response was significant in the late 1970s, large from October 1979 to October 1982, and increasingly smaller thereafter. At present, there seems to be no market response whatsoever to the monetary aggregates. Similarly, market responses to data releases on employment and unemployment, inflation, the trade balance, and other indicators have not been constant over time. These changing market responses to information provide clear evidence that monetary policy has changed over time.

The credibility of monetary policy is an important consideration in this context. If policy is fully credible, in the sense that the market has firm expectations that the Federal Reserve will pursue successfully certain objectives, then a rather pure view emerges. For simplicity, assume that the single objective is steady and low inflation in a narrow range. Then, we should observe indicators of inflation expectations fluctuating narrowly in that range. Both Fed policy

adjustments in the intended fed funds rate and market interest rates should respond to the same flow of information.

This model does not provide a unique determination of Fed policy and, therefore, of market interest rates. It is hard to believe that under normal circumstances it makes any difference whether the FOMC adjusts the intended funds rate at a particular meeting or at its next meeting six weeks later. Particular circumstances may affect the timing of Fed action. For example, because of Y2K concerns the Fed had signaled the market pretty clearly that policy action in December 1999 was unlikely. To avoid inducing expectational errors in the market, the Fed needs to communicate such matters to the market as clearly as possible.

When the Fed's credibility is incomplete, changes in market interest rates will reflect a combination of shifting expectations about the Fed's objectives and responses to the flow of new information. In such circumstances, we should not expect the market to predict policy decisions accurately. For example, the market may have the view that the Fed is willing to tolerate an inflation rate of X percent when the Fed is determined to change that expectation to Y percent. In such circumstances, it is inevitable that the market's expectations will not always be realized, and that the Fed will make mistakes in interpreting the significance of changes in interest rates. The inevitability of such mistakes makes clear the importance of credibility to efficient market outcomes and efficient policy decisions.

The Model

A simple model serves to illustrate the impact of monetary policy in a world where markets may have less than full knowledge about the information that the central bank uses to establish the setting for its policy instrument. The model is similar to models that are commonly

used in the contemporary policy analysis literature.[3] The first equation in the model can be

interpreted as the combination of an aggregate demand (IS equation) and an aggregate supply

(Phillips Curve) equation.

$$(1) \qquad P_t = \alpha_0 + \alpha_1 i_t + \alpha_2 R_t + \alpha_3 \Omega_{1t} + \alpha_4 \Omega_{2t} + \alpha_5 E_t^A P_{t+1} + \varepsilon_{Pt}$$

In contrast to the typical model that appears in the literature, in Equation (1) we allow for

aggregate demand to depend on both short-term and long-term real interest rates.[4] The policy

objective, P_t, can be viewed as representing either the price level or the inflation rate, but for

simplicity in exposition we'll think of P_t as the price level. The policy instrument, i_t, is the

short-term nominal interest rate, and R_t is the long-term (two-period) nominal interest rate. Ω_{1t}

and Ω_{2t} are subsets of the information that drives economic activity.

$$(2) \qquad \Omega_{1t} = \rho_1 \Omega_{1t-1} + \varepsilon_{\Omega 1t}$$

$$(3) \qquad \Omega_{2t} = \rho_2 \Omega_{2t-1} + \rho_3 \Omega_{1t} + \varepsilon_{\Omega 2t}$$

Ω_{1t} is a pure autoregressive process. Ω_{2t} can be forecast from its own history and knowledge of

the contemporaneous information in Ω_{1t}. Finally, the long-term nominal interest rate is

determined in the market through the expectations theory of the term structure.

$$(4) \qquad R_t = .5 i_t + .5 E_t^A [i_{t+1}]$$

The notation E_t^A represents expectations formed by private agents; E_t^{CB} represents expectations

formed by central bankers. These expectations are conditioned on different information sets.

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[3] See references in footnote 1.
[4] Some models in the recent policy analysis literature specify that aggregate demand depend on contemporary expectations of future real output. See for example Clarida, Gali and Gertler (1999). We do not present such a general analysis here.

At the beginning of each period, the central bank sets its policy instrument, i_t, to try to achieve its target, P^*, based forecasts using all the available information at that time about Ω_{1t} and Ω_{2t} and its knowledge of the structure of the economy. The setting of the short-term nominal interest rate is revealed to private agents. Then information Ω_{1t} becomes available to both the central bank and private agents. Markets use this information, forecasts of Ω_{2t} conditioned on this information, and knowledge of the structure of the economy to determine the long-term nominal rate and the price level. At the beginning of the subsequent period, the central bank resets its policy instrument according to its objective function with full knowledge of Ω_1 and Ω_2 from the previous period.

The partial reduced form of this model is:

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\begin{bmatrix} P_t \\ \Omega_{2t} \\ \Omega_{1t} \\ R_t \end{bmatrix} = \begin{bmatrix} 1.0 & \alpha_4 & \alpha_4\rho_3 + \alpha_3 & \alpha_2 \\ 0 & 1.0 & \rho_3 & 0 \\ 0 & 0 & 1.0 & 0 \\ 0 & 0 & 0 & 1.0 \end{bmatrix} \begin{bmatrix} \alpha_0 + \alpha_1 i_t + \alpha_5 E_t^A P_{t+1} + \varepsilon_{Pt} \\ \rho_2\Omega_{2t-1} + \varepsilon_{\Omega 2t} \\ \rho_1\Omega_{1t-1} + \varepsilon_{\Omega 1t} \\ .5i_t + .5E_t^A[i_{t+1}] \end{bmatrix},
$$

so the equation for P_t in terms of i_t, $E_t^A[i_{t+1}]$, $\Omega_{1t-1}, \Omega_{2,t-1}$ is:

$$P_t = \alpha_0 + (\alpha_1 + .5\alpha_2)i_t + \varepsilon_{Pt} + \alpha_4\rho_2\Omega_{2t-1} + \alpha_4\varepsilon_{\Omega 2t} + (\alpha_4\rho_3 + \alpha_3)(\rho_1\Omega_{1t-1} + \varepsilon_{\Omega 1t}) + .5\alpha_2 E_t^A[i_{t+1}] + \alpha_5 E_t^A P_{t+1}$$

Assume that the three shocks are unpredictable so that $E_{t-1}^{CB}[\varepsilon_{pt}] = E_{t-1}^{CB}[\varepsilon_{\Omega 1t}] = E_{t-1}^{CB}[\varepsilon_{\Omega 2t}] = 0$. Specify a policy rule that the short term interest rate is set so that $E_{t-1}^{CB}[P_t] = P^*$. Then the reduced form equation for i_t is derived from:

$$E_{t-1}^{CB}[P_t] = \alpha_0 + (\alpha_1 + .5\alpha_2)i_t + \alpha_4\rho_2\Omega_{2t-1} + (\alpha_4\rho_3 + \alpha_3)\rho_1\Omega_{1t-1} + .5\alpha_2 E_{t-1}^{CB}\{E_t^A[i_{t+1}]\} + \alpha_5 E_{t-1}^{CB}\{E_t^A P_{t+1}\} = P^*$$

Assume credibility for the central bank so that $E_t^A[P_{t+1}] = P^*$. A trial solution for i_t in terms of the state variables $\Omega_{1t-1}, \Omega_{2t-1}, P^*$ can be set:

(5) $i_t = \gamma_0 + \gamma_1 \Omega_{1t-1} + \gamma_2 P^* + \gamma_3 \Omega_{2t-1}$

From (5) the forecast by private agents of the future short-term nominal rate is:

(6) $E_t^A[i_{t+1}] = \gamma_0 + \gamma_1 \Omega_{1t} + \gamma_2 P^* + \gamma_3 E_t^A[\Omega_{2t}] = \gamma_0 + \gamma_1 \Omega_{1t} + \gamma_2 P^* + \gamma_3 (\rho_2 \Omega_{2t-1} + \rho_3 \Omega_{1t})$,

since Ω_{1t} is revealed before the market sets the long-term rate, but Ω_{2t} is not revealed to private agents until after the market has determined R_t.

Substituting equations (5) and (6) into the equation for $E_{t-1}^{CB}[P_t] = P^*$ and equating coefficients gives:

$$\gamma_0 = \frac{-\alpha_0}{\alpha_1 + \alpha_2}$$

$$\gamma_1 = \frac{-\rho_1 \left(\alpha_3 + \alpha_4 \rho_3 \left[1 + .5\alpha_2 \left\{ \frac{-\rho_2}{\alpha_1 + .5\alpha_2(1+\rho_2)} \right\} \right] \right)}{\alpha_1 + .5\alpha_2(1+\rho_1)}$$

$$\gamma_2 = \frac{1-\alpha_5}{\alpha_1 + \alpha_2}$$

$$\gamma_3 = \frac{-\alpha_4 \rho_2}{\alpha_1 + .5\alpha_2(1+\rho_2)} .$$

From these expressions, the policy rule for the short-term interest rate in terms of the parameters of the model is:

$$i_t = \left[\frac{-\alpha_0}{\alpha_1 + \alpha_2} \right] + \left[\frac{-\alpha_3 \rho_1 - \alpha_4 \rho_1 \rho_3 + \dfrac{.5\alpha_2 \alpha_4 \rho_1 \rho_2 \rho_3}{\alpha_1 + .5\alpha_2(1+\rho_2)}}{\alpha_1 + .5\alpha_2(1+\rho_1)} \right] \Omega_{1t-1} + \left[\frac{1-\alpha_5}{\alpha_1 + \alpha_2} \right] P^* + \left[\frac{-\alpha_4 \rho_2}{\alpha_1 + .5\alpha_2(1+\rho_2)} \right] \Omega_{2t-1}$$

The long-term rate is determined as:

$$R_t = \gamma_0 + .5[\gamma_1 + \gamma_3\rho_3]\Omega_{1t} + .5\gamma_1\Omega_{1t-1} + \gamma_2 P^* + .5\gamma_3[1 + \rho_2]\Omega_{2t-1}$$
$$= \gamma_0 + .5\gamma_1[\Omega_{1t} + \Omega_{1t-1}] + \gamma_2 P^* + .5\gamma_3[\Omega_{2t} + \Omega_{2t-1}] - .5\gamma_3\varepsilon_{\Omega2t}$$
$$= \gamma_0 + .5[\gamma_1(1 + \rho_1) + \gamma_3\rho_3]\Omega_{1t-1} + \gamma_2 P^* + .5\gamma_3[1 + \rho_2]\Omega_{2t-1} + .5[\gamma_1 + \gamma_3\rho_3]\varepsilon_{\Omega1t}$$

So the error between the long-term rate and the average of the current and future one-period rates

is:

(7) $\qquad -.5\gamma_3\varepsilon_{\Omega2t} = R_t - (.5i_t + .5i_{t+1})$.

The slope of the yield curve is:

(8)
$$R_t - i_t = .5\gamma_1[\Omega_{1t} - \Omega_{1t-1}] + .5\gamma_3[\Omega_{2t} - \Omega_{2t-1}] - .5\gamma_3\varepsilon_{\Omega2t}$$
$$= .5[\gamma_1(\rho_1 - 1) + \gamma_3\rho_3]\Omega_{1t-1} + .5\gamma_3[\rho_2 - 1]\Omega_{2t-1} + .5[\gamma_1 + \gamma_3\rho_3]\varepsilon_{\Omega1t}.$$

Finally, the price level is:

(8) $\qquad P_t = P^* + \varepsilon_{Pt} + \left[\left\{\dfrac{[\alpha_1 + .5\alpha_2]}{[\alpha_1 + .5\alpha_2(1 + \rho_1)]}\right\}\left\{\alpha_3 + \dfrac{\alpha_4\rho_3[\alpha_1 + .5\alpha_2]}{[\alpha_1 + .5\alpha_2(1 + \rho_2)]}\right\}\right]\varepsilon_{\Omega1t} + \alpha_4\varepsilon_{\Omega2t}.$

Several implications follow from this analysis. First, the long rate deviates from perfect

forecasts of current and future short rates because private agents have imperfect forecasts of the

information in Ω_{2t}. Absent such forecast errors, $\varepsilon_{\Omega2t} = 0$, the long-term rate would fully reflect

future settings of the policy instrument in advance. Second, the slope of the yield curve reflects

the effects of the initial conditions (Ω_{1t-1} and Ω_{2t-1}) and the impact of the shocks that are

observed by private agents but are not known to the central bank when the short-term interest

rate target is set ($\varepsilon_{\Omega2t}$). Finally, deviations of the price level from the central bank's objective

depend only on the three shocks. The less accurately private agents can predict the information

in Ω_{2t}, all else equal, the larger the variance of P_t around P^*. The larger the impact of Ω_{1t} on

Ω_{2t} (bigger ρ_3), all else equal, the larger the variance of P_t around P^*.

In this model, Ω_2 represents the degree of "imperfection" in the market's knowledge of monetary policy. When Ω_2 is null, then market participants can forecast the next period setting of the policy instrument perfectly. This fact can be seen by advancing the policy rule equation above by one period and taking expectations conditional on the current period information set of private agents:

$$E_t^A[i_{t+1}] = \left[\frac{-\alpha_0}{\alpha_1 + \alpha_2}\right] + \left[\frac{-\alpha_3\rho_1 - \alpha_4\rho_1\rho_3 + \frac{.5\alpha_2\alpha_4\rho_1\rho_2\rho_3}{\alpha_1 + .5\alpha_2(1+\rho_2)}}{\alpha_1 + .5\alpha_2(1+\rho_1)}\right]\Omega_{1t} + \left[\frac{1-\alpha_5}{\alpha_1 + \alpha_2}\right]P^* + \left[\frac{-\alpha_4\rho_2}{\alpha_1 + .5\alpha_2(1+\rho_2)}\right]E_t^A[\Omega_{2t}]$$

Thus the forecast error for the future policy setting is:

$$i_{t+1} - E_t^A[i_{t+1}] = \left[\frac{-\alpha_4\rho_2}{\alpha_1 + .5\alpha_2(1+\rho_2)}\right]\left[\Omega_{2t} - E_t^A[\Omega_{2t}]\right].$$

We believe that any inherent informational advantage that the Fed has is relatively small. Given the changes introduced over the past decade to improve Fed transparency, any informational advantage for the Fed has likely been reduced close to such a minimum. The above model suggests that such "perfecting" of the market's knowledge of monetary policy reduces the expectational error on the policy setting of future short-term rates and thereby reduces the error in hitting the price level objective.

A Look at Some Data

We introduce our empirical analysis by discussing a few graphs representative of various patterns in the data. The analysis relies on data from the federal funds futures market. Trading in that market, conducted on the Chicago Board of Trade, started in October 1988. Contracts mature on the last business day of the current month (the zero-month contract) and on the last day of each of several months into the future. Open interest is typically quite small for all except the near contacts out to the three- or four-month contract. These contracts have a unique feature

that requires care in interpreting the yields as expectations of future federal funds rate.[5] Upon

maturity, settlement of the futures contract is determined by the daily average effective federal

funds rate for the entire month. Hence during any month, a portion of the information that will

determine the settlement value of the zero-month contract is known and a portion has yet to be

revealed. The further into the month, the larger the weight on the known pricing determinants.

Figure 1 contains four panels, illustrating different patterns. The vertical bar in each

panel represents the date of an FOMC meeting. The solid line shows the path of the intended

federal funds rate as determined by the FOMC, and the dashed line shows the daily closing rate

in the federal funds futures contract for the first full month after the FOMC meeting.[6] The

implicit assumption in this procedure is that the FOMC will change the intended funds rate only

at a scheduled meeting. Given that the meetings are approximately six weeks apart, the intended

funds rate will apply for at least the next full month following the meeting.[7]

Panel A in Figure 1 shows an example of an increase of 50 basis points in the intended

federal funds rate that was well anticipated in the market. The FOMC acted on August 16, 1994

to raise the intended rate from 4.25 percent to 4.75 percent. As can be seen in the figure, the

federal funds futures rate for September had traded at around 4.75 percent for many days prior to

the FOMC meeting. One of the news items that traders responded to was the strong employment

report for July released on Friday, August 5. Interestingly, the commentary in the *Wall Street*

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[5] See Robertson and Thornton (1997) pp. 46-7 and Kuttner (1999) pp. 5-8.

[6] The quote convention in this market is a price equal to 100 minus the federal funds rate. The figures plot the implied federal funds rate, which is 100 minus the quote in the futures market.

[7] It is certainly possible to work with the futures quote for the month of an FOMC meeting. See Roley and Sellon (1999) and Kuttner (1999). For example, if a meeting is held on the 16th of a month with 30 days, then the futures quote at the close on the 15th would reflect the known history of the effective funds rate over the first 15 days plus the expected funds rate over the next 15 days. If the actual rate over the first half of the month equaled the intended rate, then a futures quote 13 basis points higher than that rate would reflect a market bet that the funds rate would be increased by 25 basis points at the FOMC meeting, while a futures rate 6 basis points higher would reflect a market probability of 0.5 that the FOMC would raise the intended rate by 25 basis points. We reduce the computational burden by focusing on the futures market quote for the first full month after each FOMC meeting. We also avoid

Journal on that report (on Monday, August 8) said that "most economists are expecting a quarter-point boost" in the intended rate but the futures market was already showing significant odds of an increase of 50 basis points in the intended rate.

Panel B in Figure 1 shows an example of a rate increase that was not well anticipated in the market. The FOMC cut the intended rate by 25 basis points at its meeting on December 18, 1990. As can be seen clearly from the figure, the market did not anticipate this cut, had not anticipated the earlier intermeeting cut of 25 basis points on December 7, 1990, and did not anticipate the further intermeeting cut of 25 basis points on January 8, 1991. Indeed, the figure suggests that the rate cut at the FOMC meeting was not fully understood even after it had occurred. This misunderstanding occurred even though the *Wall Street Journal* of December 19, 1990 reported that the Fed had cut the discount rate and "is expected to reduce the funds rate a quarter of a point."

Before February 1994, the FOMC did not announce its policy decisions when they were made, but relied on the Open Market Desk at the New York Fed to signal the intended rate through its conduct of open market operations. Ambiguity as to the intended rate vanished once the FOMC began to issue a press release immediately following each meeting at which it changed the intended rate.

Panel C in Figure 1 shows a case in which the FOMC did not change the intended rate, and the market had not expected a change. Such an outcome is not surprising in a period such as 1997, but the example shown is for the FOMC meeting of May 23, 1995. This was a period right after the substantial rate increases in 1994. In May 1995, the market anticipated that the FOMC would not change the intended rate, and it didn't. However, within a few weeks of that meeting,

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the problem that market pressures from an expected change in the intended rate might push the actual funds rate, and therefore the same-month futures contract, above the intended rate just before an FOMC meeting.

after the period covered in Panel C, the market began to anticipate the possibility of a cut. The

FOMC did cut the intended rate by 25 basis points at its next meeting, on July 6, 1995. In the

weeks immediately preceding that action, the market had come to anticipate the cut and there

was no surprise when the FOMC acted. Thus during this period the market correctly anticipated

no policy action in May and policy action in July.

Panel D in Figure 1 shows a case in which the market anticipated FOMC action that did

not in fact occur. Leading up to the FOMC meeting on July 6, 1994, the market persistently

expected an increase in the intended rate; by the time of the meeting, the market was putting

some odds on an increase to exceed 25 basis points. On June 29, 1994 the *Wall Street Journal*

reported that "The recent weakness of the dollar has sparked considerable speculation that the

Federal Reserve would be forced to raise short-term interest rates in order to help the currency

gain strength."

These examples cover the four quadrants of a table reporting a market expectation of a

change or no change in the intended rate, and an FOMC decision to change or not to change.

Our (now extensive) collection of graphs show many cases fitting cleanly in one of the four

quadrants and others falling in the in-between territories. A generalization from our graph-

gazing is that after February 1994, when the FOMC began to announce its decisions, the market

did a better job in predicting FOMC decisions. We believe that this outcome is partly due to the

announcements themselves, which encourage the FOMC to pay more attention to informing the

markets about its intentions.

Another part of the story is that intermeeting adjustments in the intended funds rate have

become rare. Before 1994, the FOMC changed the intended rate more frequently between

meetings than at meetings; after February 1994, there were 18 changes in the intended rate

through March 2000 and only two of these occurred at times other than regularly scheduled

FOMC meetings. When changes in the intended rate commonly occur between meetings, the

market almost inevitably will fail to anticipate the change correctly. Even when the market

anticipates a change, it will not be able to anticipate the timing. Speculation about the timing,

and whether the choice of the exact date has any particular significance, is inevitable. Confining

most changes in the intended rate to regularly scheduled meetings eliminates the problem of

possible market misinterpretation of the significance of the timing of policy actions.

Measuring "News" About Monetary Policy Actions

In this section, we conduct more thorough empirical analyses focusing on the accuracy

with which markets process information in trying to anticipate how the Fed will incorporate this

same information into future policy actions. Differences in how the Fed and the markets

interpret information determine the extent to which policy decisions surprise markets.

We first examine occurrences of large changes in expectations of market participants of

future policy decisions. We measure expectations by the one-month ahead fed funds futures

contract and have defined "large" as a daily change in the futures rate that exceeds either five or

ten basis points. The table in Appendix A indicates all dates between the beginning of 1989 and

the end of 1999 on which large changes occurred and the size of the change. Table 1 presents a

quantitative summary of the frequency of large changes.

The frequency of large changes in the futures rate has decreased over the decade,

particularly after the February 1994 introduction of public announcements of changes in the

intended funds rate at the conclusion of FOMC meetings. This finding is not surprising, since

the frequency of changes in the intended funds rate has also decreased. During 1993, the FOMC made no changes in the intended funds rate and there were only two large daily changes in the funds futures rate that year. Although not shown directly in the table, after 1993 the percentage of FOMC meeting days on which large changes in the futures rate occurred increased. This result is consistent with the emerging understanding in the market that, contrary to pre-1994 practice, the FOMC would change the intended funds rate only at scheduled FOMC meeting dates except in unusual situations. However, the frequency of large changes in the futures rates on FOMC meeting dates declined after 1994, suggesting improved understanding in the markets of the information processed by the FOMC in reaching its policy decisions.

To better understand the process of convergence, or lack thereof, of the futures rate and the intended rate, we have studied large changes in the futures rate and the information that might logically have driven the large changes. We examined the subsequent issue of the *Wall Street Journal* for all dates during 1989-99 for which the futures yield changed by ten or more basis points. For 1993-99, we examined for all dates for which the futures yield changed by five or more basis points. We looked for news reports of information that moved expectations of future interest rate policy.

For the 37 dates during 1989-92 for which the futures rate changed by ten or more basis points, we identified news items from the *Journal* (either in the "What's News – Business and Finance" column on page 1 or in the "Credit Markets" column) relevant for and consistent with the price movements all the dates. For the 67 dates during 1993-99 for which the futures rate changed by five or more basis points, we have identified news items relevant for and consistent with the price movements on 64 of the dates. These reports are indicated in the "News" column of the table in Appendix A. For the remaining three dates over the entire decade we were unable

to identify any news item that appeared of significance for the movement of the funds rate futures. From 1995 on we were able to obtain data on the timing of various statistical releases on economic activity. We have included this information for each date of a large change.

Of the 101 dates for which we found news items that appeared consistent with the movement of the futures rate, 56 of the items contained explicit reference to Federal Reserve policy actions. Of these 56 cases, 24 were references to Federal Reserve actions that had been implemented on the day that the futures rate changed; 32 were references to changes in expectations about future Federal Reserve actions with respect to the intended funds rate.

We also examined the relationship between large changes in the futures rate and the release dates of prominent economic statistics over the entire decade. On 29 occasions, the large changes in the futures rate were associated with the release of an employment report; on 8 occasions, these changes were associated with the release of the GDP (GNP) data; and on 9 occasions, with the release of CPI or PPI inflation statistics.

Analysis of the news permits us to address the question of the extent to which market success in forecasting policy decisions reflects market responses to innovations in fundamental information rather than speeches or statements by members of the FOMC. For the most part, it appears that the market is responding to fundamentals rather than "guidance" by FOMC members. For the 1989-92 period, for which we examined large changes of 10 basis points or more, only one of the 37 changes for which we identified relevant news was related to statements by Fed officials. For the 1993-99 period, for which we examined large changes of 5 basis points or more, 6 of the 67 relevant news items concerned statements by Fed officials. Our conclusion from this analysis is that that a large change in the one-month ahead federal funds futures rate is

a reliable indicator of the arrival of news that reflects current policy actions or affects

expectations about future policy actions.

We estimated regressions for the daily changes of the federal funds rate, the three-month

bill rate, the one-year bill rate and the ten-year Treasury bond rate. The sample includes the days

on which the intended funds rate was changed during the period October 1988 through February

2000. The regressors are measures of the expected and unexpected changes in the intended

funds rate.[8] The change in the yield on the one-month ahead federal funds futures contract is our

measure of the unexpected change in the funds rate (shock). The expected change is measured

as the difference between the actual change in the intended funds rate and the measure of the

shock.

We have used three sample periods. The longest, October 1988 through February 2000,

included all the observations for which our measure of the expected change is available. There

are a total of 53 usable observations.[9] The results of these regressions are included in Table 4. In

no case is the estimated constant or the estimated coefficient on the expected change variable

significantly different from zero. In all cases the estimated coefficient on the SHOCK variable is

significantly greater than zero. The size of the estimated coefficient on the SHOCK variable

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[8] The timing of when the changes in the intended funds rate became known is critical. The timing issue is discussed in detail in Kuttner (1999), pp. 8-10. Our timing is exactly that used by Kuttner with two exceptions during the common sample period of June 6, 1989 through August 24, 1999. We included a change in the intended funds rate on August 10, 1989 of 6.25 basis points that Kuttner omitted. We excluded the change on December 20, 1990 that Kuttner included. because the January 1989 futures contract did not start trading until after the first of that year. As Kuttner notes, the announcement of the changes on December 18, 1990 and October 15, 1998 also occurred after the futures market had closed but before the New York markets had closed. For this observation we measured the change in the one-month ahead futures contract yield from the close of the market on the day of the announcement to the close of the market on the next day. Kuttner used the difference between the yield on the current month futures contract from the close of the market on the day of the announcement to the opening of the market on the next day. An almost identical chronology of changes in the intended funds rate beginning with June 6, 1989 is contained in Appendix A of Bomfim and Reinhart (2000). The single exception that they date a change of –25 basis points on January 9, 1991 while the dating in Kuttner (1999) and in this analysis is January 8, 1991. It is not clear from their text how Bomfim and Reinhart dealt with the timing of the futures rate changes for the December 18, 1990 and October 15, 1998 changes in the intended funds rate.

decreases with the maturity of the instrument. In the funds rate regression, the estimated

coefficient is greater than one, but is measured so imprecisely that it is not significantly different

from 1.0

We have repeated the estimations using the subsample of observations through February

1994. These observations cover the period during which the FOMC was not announcing

changes in the intended funds rate until the publication of the Minutes of the meetings. In

addition, most of the changes in the intended funds rate during this period occurred during the

intermeeting period. The results, presented in Table 5 are substantially the same as those for the

entire sample period.

Finally, we repeated the regressions on the subsample beginning in March 1994 during

which time the FOMC announced any changes in the intended federal funds rate immediately

after the decision. The results, shown in Table 6 differ from the results for the earlier subsample.

Generally the coefficients on SHOCK are measured very imprecisely. The imprecision is not

surprising since the sample is very small (17 observations) as are the sizes of the measured

shocks. With the exception of October 15, 1998, SHOCK is generally no more than 10 basis

points and frequently much smaller (see Appendix B). Since February 1994, when the FOMC

started announcing changes in the intended funds rate and for the most part confined decisions to

change the intended funds rate to scheduled meeting dates, markets have not been surprised very

much, at least by our measure. Given the imprecision of the coefficient estimates in this

subsample, Chow tests for pooling the samples before and after February 1994 do not reject the

hypothesis of no change in the coefficients across the two subsamples.

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[9] The January 1990 futures contract did not start trading until January 1, 1990, hence we are unable to construct a
measure of the expected change in the intended federal funds rate for December 20, 1989 and this observation was
omitted.

The conclusions of this analysis are similar in some respects to an analysis by Kuttner (1999). As noted above, Kuttner constructs a measure of the anticipated and unanticipated changes in the intended funds rate from the current-month futures rate, using a somewhat shorter sample period than the sample we use for Table 4.[10] Kuttner constructs regressions similar to ours using various market yields from 3-month Treasury bill to 30-year Treasury bond rates. Our estimated coefficients on the SHOCK variable are slightly larger than those that he estimates for the 3-month bill rate and the 10-year Treasury bond rate, and almost exactly the same size for the 12-month bill rate regression (his Table 3). The significant difference between the two sets of results is that the estimated coefficient on our measure of the anticipated change in the intended funds rate is never significantly different from zero. In Kuttner's results, the estimated coefficient on his measure of the anticipated change in the intended funds rate is significant in the 3-month bill rate regression. In addition, we have included a regression for changes in the funds rate that is not in Kuttner's table.

The conclusions of our analysis differ from another analysis of the response of interest rates to changes in the intended funds rate. Thornton (1999) investigates the response of the effective funds rate and the 3-month Treasury bill rate to actual changes in the intended funds rate over several sample periods, all longer than the ones that we use here. His investigation is carried out in the framework of a bivariate error-correction model. Generally he finds little support for the hypothesis that the effective funds rate responds to changes in the intended funds rate.[11]

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[10] Kuttner's measure of the unanticipated changes in the intended funds rate from his Table 2 are reproduced in Appendix B for comparison with our measures of these shocks for the dates that are included in both samples.
[11] "The funds rate not only fails to move point-for-point with the funds rate target, but there is no statistically significant relationship between changes in the funds rate and target changes during any period when the Fed was directly targeting the funds rate. Hence the evidence suggests that the Fed has not enforced its funds rate target through open market operations." (Thornton, 1999, pp.25-26.

Other than the differences in the sample period, Thornton's analysis differs in two significant respects from that conducted here. First, he uses daily data, regardless of whether there was an actual change in the intended funds rate or not. Second, he does not distinguish between anticipated changes in the intended funds rate and "shocks". He enters a value of zero for the change in the intended funds rate on all days for which no policy action on the funds rate was undertaken. Absent policy actions, Thornton assumes that the two rates he investigates are a bivariate AR process.

Thornton's results, we believe, depend on the fact that his regressor is the sum of the anticipated component and the shock component of the change in the intended funds rate. In our results, the anticipated component should have a zero coefficient and the unanticipated component a positive coefficient (whose size may depend on the maturity of the interest rate on the left-hand side of the regression). For our sample period, the coefficient on the anticipated coefficient indeed is not significantly different from zero. For those dates when the intended funds rate does not change, Thornton implicitly assumes that the anticipated change also is zero. Our evidence is clear that this assumption is incorrect, as the market does sometimes anticipate a change in the intended rate that does not occur.

Thornton also conducts Granger causality tests between the 3-month Treasury bill rate and the intended funds rate. These tests indicate univariate causality from the bill rate to the intended funds rate (Thornton, 1999, p. 24). This result is exactly that predicted for a world in which the Treasury bill rate incorporates anticipated changes in the intended funds rate.

Thornton considers and dismisses the anticipations interpretation of the history of his sample periods. He argues that the evidence suggests that changes in the intended funds rate are difficult to predict. Data from the funds futures market and our analysis of newspaper reports

suggest that since 1988 such changes were to a considerable extent predicted. In particular, the three 25 basis point reductions in the intended funds rate in June and July 1989, which Thornton highlights, were for the most part predicted in the funds futures market as indicated in Appendix B.[12]

Commentary

We base our analysis on an implication of rational expectations macro models: With a fully articulated monetary policy rule, innovations in interest rates (and, indeed, in market prices generally) will be driven by innovations in the economic environment. If the monetary policy rule is reactive, as is necessary for stability if the policy instrument is a short-term interest rate, then information innovations simultaneously drive changes in policy and changes in market interest rates that depend on expectations about policy. Market interest rates reflect expectations of future monetary policy, mediated by the market's understanding of the central bank's model of the economy. That model, of course, must incorporate both policy objectives and the appropriate policy actions to achieve those objectives, given information innovations. If the market and the central bank have the same information set, then market interest rates do not provide the central bank with any information it does not already have.

This pure model helps in understanding that a key task for the central bank is to make as clear as possible its policy objectives and its model of how the economy works. It seems obviously desirable to us for the Federal Reserve to follow rule-like behavior. Although we do not know how to write down a fully articulated policy rule, our analysis convinces us that the

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[12] This result holds whether the anticipated change is measured by the 1-month ahead funds rate futures contract as we have chosen, or measured by the contemporaneous month futures rate contract as implemented by Kuttner (1999). See Appendix B.

market does increasingly understand how to predict what the FOMC is going to do. Announcing decisions immediately following FOMC meetings has been very helpful. So also has confining most policy actions to the time of regularly scheduled FOMC meetings. What strikes us is that in the absence of a fully articulated rule, dispelling market gossip and speculation in the financial pages about things that just aren't true is every bit as important as conveying information about what is true. The Federal Reserve and other central banks have a long history of relying on vague signals, announcement effects, and indirection. Given this history, it is natural that market participants will try to read something between the lines of press announcements, will speculate about the significance of the choice of timing of policy actions, and so forth. The more regular and straightforward are Federal Reserve actions and communications, the more the market will focus on fundamentals and the less will it be distracted by incorrect interpretations and speculations.

Our analysis of the data indicates that over the last few years improved Federal Reserve transparency and improved market understanding of policy have gone a long way in increasing the accuracy of market forecasts of Fed policy decisions. We believe that the improved accuracy is a very healthy development.

Figure 1: FOMC Dates +/- 30 Days
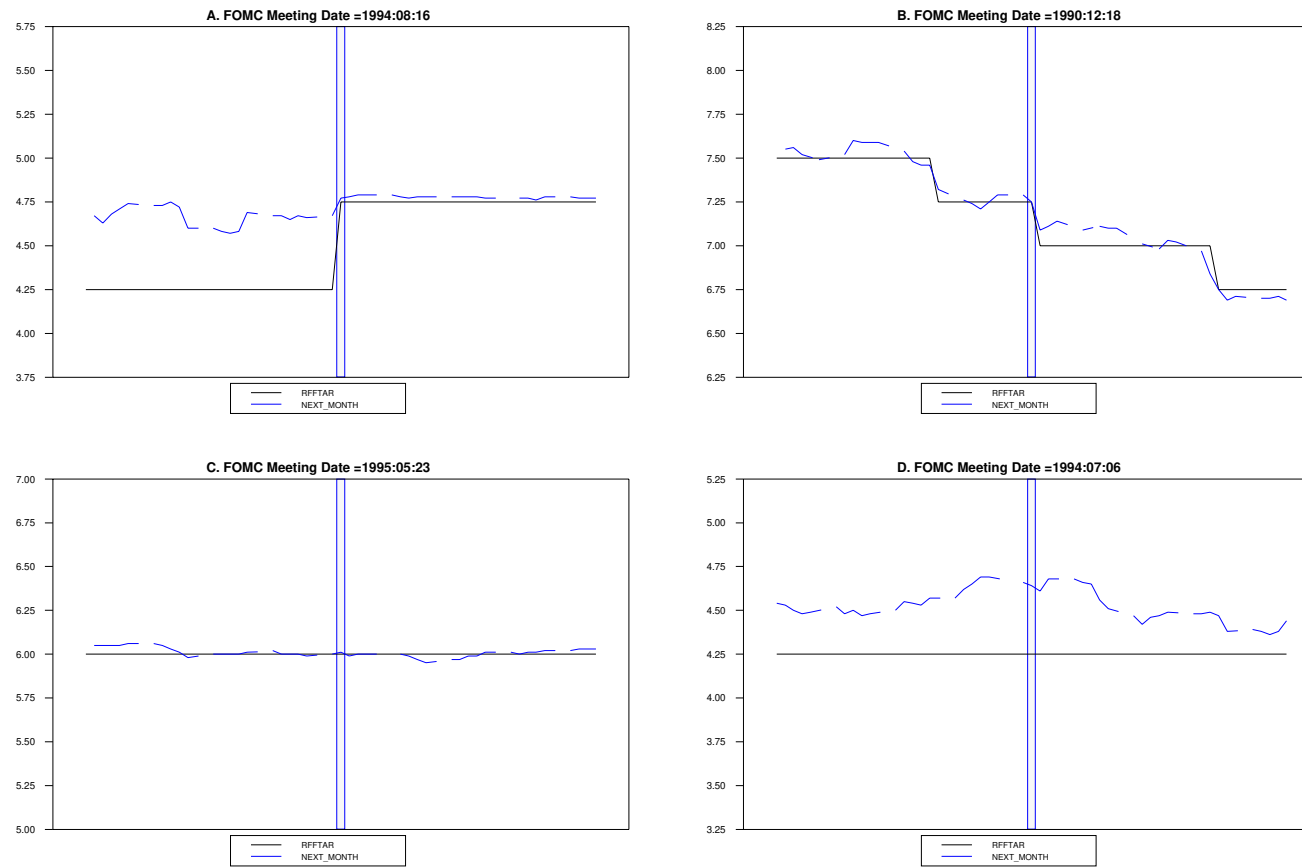
Table 1
Frequency of "Large Changes" in One-Month Ahead Federal Funds Futures Yields

Year	Futures Rate Change >= |.05|		Futures Rate Change >= |.10|
	All Days	FOMC Meeting Days	
1989	41	0	20
1990	20	0	6
1991	25	0	9
1992	16	0	2
1993	2	0	1
1994	30	5	5
1995	12	2	4
1996	8	2	2
1997	2	1	0
1998	8	2	1
1999	5	1	3

Table 2
1989-92 News Reports on Days when the One-Month Ahead Futures Rate Changed by Ten or More Basis Points

	Employment Data Release Referenced	GDP Data Release Referenced	Inflation Data Release Reference	No Releases Referenced	Totals
Fed Actions Taken	4			8	12
Speculation of Future Fed Action	4		1	2	7
Statements by Fed Officials				1	1
No Reference to Fed	5	3	4		12
Totals	13	3	5	11	32

Table 3
1993-99 News Reports on Days when the One-Month Ahead Futures Rate Changed by Five or More Basis Points

	Employment Data Release Referenced	GDP Data Release Referenced	Inflation Data Release Reference	No Releases Referenced	Totals
Fed Actions Taken				12	12
Speculation of Future Fed Action	9	2		14	25
Statements by Fed Officials	1			5	6
No Reference to Fed	6	3	5	n.a.	14
Totals	16	5	5	31	57

Table 4
Interest Rate Change Regressions for days on which the Intended Funds Rate was Changed October 1988 through February 2000

Dependent Variable	Constant	Expected Change	SHOCK	R-bar Squared s.e.
Funds Rate	-.04 (.06)	-.06 (.29)	1.46 (.64)	.07 .43
3 month Bill Rate	-.01 (.01)	.07 (.04)	.73 (.09)	.67 .06
One Year Bill Rate	-.01 (.01)	.01 (.04)	.78 (.09)	.64 .06
10 Year Treasury Rate	-.00 (.01)	-.08 (.05)	.48 (.10)	.27 .07

Table 5
Interest Rate Change Regressions for days on which the Intended Funds Rate was Changed
October 1988 through February 1994

Dependent Variable	Constant	Expected Change	SHOCK	R-bar Squared s.e.
Funds Rate	.02 (.08)	-.12 (.49)	1.88 (.71)	.14 .42
3 month Bill Rate	-.02 (.01)	.01 (.05)	.81 (.08)	.80 .04
One Year Bill Rate	-.01 (.01)	.06 (.05)	.85 (.07)	.84 .04
10 Year Treasury Rate	.01 (.01)	.04 (.06)	.49 (.09)	.50 .06

Table 6
Interest Rate Change Regressions for days on which the Intended Funds Rate was
Changed March 1994 through February 2000

Dependent Variable	Constant	Expected Change	SHOCK	R-bar Squared s.e.
Funds Rate	-.20 (.12)	.42 (.46)	-.11 (1.52)	-.06 .44
3 month Bill Rate	.00 (.02	.10 (.08)	.42 (.27)	.27 .08
One Year Bill Rate	-.02 (.02))	.03 (.08)	.35 (.28)	.05 .08
10 Year Treasury Rate	-.02 (.03)	-.08 (.09)	.31 (.31)	-.05 .09

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Appendix A
"Large Changes" in the federal funds futures rate and "News"

Date (Futures Change- Month Ahead)	News
1/13/89 (-0.06)	
1/17/89 (0.06)	
1/18/89 (-0.06)	
1/25/89 (0.07)	
2/3/89 (0.07)	
2/7-8/89	FOMC Meeting
2/10/89 (0.09)	
2/22/89 (0.05)	
2/23/89 (0.14)	"Interest rates rose again on inflation worries, though Treasury Secretary Brady suggested the jitters were unfounded. The Fed pushed up short-term interest rates and may boost its discount rate as early as today." *WSJ* 2/24/89 p. 1
2/24/89 (0.14)	"The Fed's latest boost in short-term interest rates fueled recession fears among Bush aides. The central bank raised its discount rate Friday to 7 % from 6 ½ % and pushed up the federal funds rate to about 9 ¾ %." *WSJ* 2/27/89 p. 1
3/10/89 (0.19)	"The jobless rate fell to 5.1 % in February, prompting concern that inflation will worsen now that the economy is at 'full employment'. The decline, from 5.4 % in January, brought unemployment to a 15-year low. The Fed isn't likely to push interest rates higher despite Friday's report. Fed policymakers said it's too soon for further credit-tightening." *WSJ* 3/13/89 p. 1
3/16/89 (-0.06)	
3/17/89 (0.40)	"Fed efforts to damp inflation have had little effect so far. Friday's report that producer prices jumped 1 % in February or at a 12.7 % annual rate, alarmed economists and sent financial markets reeling.

The surge in prices, which affected a broad range of items, makes it likely that the Fed will push up interest rates even further, fueling recession fears." *WSJ* 3/20/89 p. 1

3/22/89 (-0.13)   "Durable goods orders fell 3.6 % in February, the second consecutive monthly decline. The drop, which was spread across most industries, was another sign the economy is slowing." *WSJ* 3/23/89 p.1

3/28/89   FOMC Meeting

3/29/89 (-0.11)   "Leading indicators fell 0.3 % in February, largely due to a drop in factory orders and building permits. New-home sales declined 9.4 %." *WSJ* 3/30/89 p.1

4/18/89 (-0.23)   "Consumer prices rose 0.5 % in March, led by soaring energy costs. Though economists said the report signaled worsening inflation, financial markets rallied amid relief the increase wasn't bigger. A 5.4 % drop in housing starts also was considered bullish. The January-March rise in consumer prices was the biggest quarterly advance in two years." *WSJ* 4/19/89 p. 1

4/20/89 (0.21)   "Financial markets were roiled by a surprise half-point boost in West German interest rates. The tightening by the Bundesbank was quickly matched by other central banks, and dashed hopes the Fed may ease credit soon." *WSJ* 4/21/89 p. 1

4/25/89 (-0.06)

4/26/89 (-0.10)   "The U.S. economy expanded at a 5.5 % annual rate in the first quarter due in part to a return to normal farm production. Excluding the effects of last year's drought, however, the gross national product's growth slowed to a 3 % rate from 3.5 %." *WSJ* 4/27/89 p. 1

4/27/89 (-0.13)   "Consumer spending rose only 0.2 % in March as higher interest rates appeared to damp buying of big-ticket items. Personal income also grew more slowly, rising 0.8 %. The greater caution in spending was reflected in the savings rate, which rose to 6.3 % of after-tax income, a four-year high. New construction contracts were essentially unchanged. Stocks and bonds rallied as Fed officials confirmed that the apparent slowing of the economy will forestall any further credit-tightening for now." *WSJ* 4/28/89 p. 1

5/5/89 (-0.18)   "The unemployment rate climbed to 5.3 % in April from 5 % the month before, while new job growth shrank sharply. The report is the latest sing that the economy is slowing down." *WSJ* 5/8/89 p. 1

5/9/89 (0.11)   "Bond prices tumbled as investors reacted coolly to the Treasury's latest note sale, reflecting renewed worries about inflation and interest rates." *WSJ* 5/10/89 p. 1

5/11/89 (-0.07)

5/12/89 (-0.25)   "A mild inflation report ignited rallies on the stock and bond markets Friday. The unexpectedly modest 0.4 % rise in April producer prices came despite a 7.2 % surge in energy costs, the sharpest increase in 15 months." *WSJ* 5/15/89 p. 1

5/16/89 (0.07)   FOMC Meeting

5/25/89 (0.11)   "First-quarter GNP was revised to a 4.3 % annual rate from 5.5 %, indicating a sharp slowing in the economy. Discounting the rebound in farm output following last year's drought, GNP edged up only 1.8 %." *WSJ* 5/26/89 p. 1

     "The report said GNP grew at a revised seasonally adjusted annual rate of 4.3 % in the first quarter, much lower than the preliminary estimate of 5.5 %. The bulk of the change resulted from a downward revision in inventories, most of which were non-farm inventories.

     Economists said the report revealed a severe slowing of economic activity. But bond traders interpreted the inventory depletion as a sign that consumer spending remains strong and, to keep up with demand for new goods, factories may have to boost production. That's considered bad for bonds because a fast-growing economy intensifies inflationary pressures and leads to higher interest rates." *WSJ* 5/26/89 p. C21

6/2/89 (-0.18)   "The Fed may nudge interest rates lower this week amid fresh signs the economy is slowing. The jobless rate fell to 5.2 % in May from 5.3 %, but new jobs grew weakly. Also manufacturing slowed for the first time in three years, purchasing agents said." *WSJ* 6/5/89 p. 1

6/13/89 (0.07)

6/15/89 (0.07)

6/16/89 (0.10)   "Consumer prices rose 0.6 % in May, or at a 7 % annual rate, showing inflation continues to plague the economy." *WSJ* 6/19/89 p. 1

6/23/89 (-0.22)   "Signs of a slowing economy were evident in several news reports. Durable goods orders skidded 4.2 % in May, the steepest decline in 10 months. Also personal spending and income didn't keep pace with inflation." *WSJ* 6/26/89 p. 1

6/29/89 (-0.07)

7/5-6/89   FOMC Meeting

7/27/89 (-0.06)

8/1/89 (-0.08)

8/4/89 (0.29)   "The jobless rate fell to 5.2 % in July from the 5.3 % the previous month, allaying fears of a recession. There was considerable growth in new jobs, with gains in construction, manufacturing and services. But the pace remained well below that of a year earlier." *WSJ* 8/7/89 p. 1

8/11/89 (0.07)

8/22/89   FOMC Meeting

10/3/89   FOMC Meeting

10/6/89 (-0.13)   "The Fed is resisting pressure to cut interest rates, though analysts say a reduction is likely in coming weeks because of the economy's unexpected sluggishness and the dollar's continued strength. The dollar gained Friday as did bond and stock prices. The jobless rate rose to 5.3 % in September from 5.2 % as factory jobs fell sharply. The report signaled a severe weakening in manufacturing and the softness in the overall economy." *WSJ* 10/9/89 p. 1

10/17/89 (-0.06)

10/24/89 (-0.05)

11/03/89 (0.08)

11/7/89 (-0.11)   "The Fed began easing credit yesterday in the face of a continued slowdown of the economy, according to government officials. The

move should push the key federal funds rate to 8 ½ % from 8 ¾ % and allow other interest rates to drop." *WSJ* 11/8/89 p. 1

11/14/89	FOMC Meeting
11/22/89 (-0.09)	
12/18/89	FOMC Meeting

1/18/90 (0.15)   "Consumer prices rose 0.4 % in December, bringing the 1989 inflation rate to 4.6 %, only slightly above the previous two years, but still the highest since 1981. Also, housing starts plunged 8 % last month, bringing the 1989 total to a seven-year low." *WSJ* 1/19/90

1/19/90 (-0.08)	
2/6-7/90	FOMC Meeting
3/9/90 (0.08)	
3/13/90 (0.06)	
3/27/89	FOMC Meeting
4/17/90 (0.08)	

5/4/90 (-0.23)   "The jobless rate rose to 5.4 % in April, from 5.2 % the previous month indicating continued weakness in the economy. The increase surprised many analysts because of the recent signs the economy was picking up." *WSJ* 5/7/90

5/10/90 (-0.06)	
5/11/90 (-0.08)	
5/15/90	FOMC Meeting

6/1/90 (-0.11)   "Private sector payrolls barely grew in May after shrinking in April, the Labor Department said. But temporary census hiring lowered the civilian unemployment rate to 5.3 % from 5.4 %. Meanwhile the purchasing managers' index of manufacturing health rose in May to its highest level since April 1989. The soft jobs picture is leading economists to prune forecasts of second-quarter gross national product." *WSJ* 6/4/90 p. 1

6/13/90 (-0.06)

7/2-3/90   FOMC Meeting

7/12/90 (-0.08)

7/13/90 (-0.09)

8/3/90 (-0.07)

8/16/90 (0.09)

8/21/90   FOMC Meeting

10/2/90   FOMC Meeting

10/9/90 (0.07)

11/13/90   FOMC Meeting

11/16/90 (-0.06)

11/27/90 (0.11)   "Consumer confidence continued to decline in November, and a survey of economists showed most believe the U.S. is now in a recession." *WSJ* 11/28/90 p. 1

                              "Bonds also were hurt by fresh economic reports that were not nearly as weak as analysts had expected. (Weak economic news bolsters bonds because investors assume that slow growth will eventually lead to lower interest rates and milder inflation. Automakers, for example, reported that sales of domestically made cars were running at an annual rate of 7.1 million units in mid-November, stronger than the 6.5-million-unit pace that had been forecast. …

                              Further frustrating bullish bond investors, Federal Reserve Governor John LaWare said the economy is showing none of the classic signs of a recession." *WSJ* 11/28/90 p. C21

12/4/ 90 (-0.06)

12/7/90 (-0.14)   "The U.S. jobless rate rose to 5.9 % in November from 5.7 % in October, suggesting the economic downturn will be steeper that many economists have forecast. The Fed reacted by trying to spur the economy by further reducing interest rates, moving to cut the federal funds rate to about 7 ¼ % from 7 ½ %." *WSJ* 12/10/90 p. 1

12/18/90   FOMC Meeting

"The Fed cut the discount rate half a point to 6.5 %, signaling concern about the economy. and is expected to reduce the funds rate a quarter-point." *WSJ* 12/19/90 p. 1

12/19/90 (-0.16) "Bond prices slumped as investors took profits following the Fed's decision to lower the discount rate." *WSJ* 12/20/90 p. 1

1/8/91 (-0.09) "The Fed eased interest rates three weeks after its last such move, illustrating the central bank's growing concern about the economy. The action is expected to lower the federal funds rate to about 6.75 % from 7 %." *WSJ* 1/9/91 p. 1

1/9/91 (-0.10) "The Fed's surprise move to ease interest rates this week was prompted by unpublished data showing sluggish money-supply growth. The action indicates the money supply's new prominence at the Fed." *WSJ* 1/10/91 p. 1

1/17/91 (-0.06)

2/1/91 (-0.20) "The Fed cut the bellwether discount rate to 6 % from 6.5 % marking a major escalation in the central bank's anti-recession campaign. … The action followed news that the unemployment rate rose to 6.2 % in January from 6.1 % in December." *WSJ* 2/4/91 p. 1

2/5-6/91 FOMC Meeting

2/13/91 (-0.06)

3/8/91 (-0.12) "The Fed eased credit another notch after the government reported that the unemployment rate rose in February to 6.5 % from 6.2 %. The jobs data offer no sign that the recession has relented." *WSJ* 3/11/90 p. 1

3/26/91 FOMC Meeting

4/18/91 (0.09)

4/30/91 (-0.12) "The Fed moved to bring down interest rates by cutting the rate it charges on loans to banks by half a point to 5.5 % and by reducing its target for the federal funds rate by a quarter point to 5.75 %." *WSJ* 5/1/91 p. 1

5/14/91 FOMC Meeting

7/2-3/91 FOMC Meeting

8/2/91 (-0.07)

8/6/91 (-0.09)

8/7/91 (-0.05)

8/14/91 (-0.08)

8/20/91   FOMC Meeting

8/21/91 (0.06)

8/23/91 (0.06)

9/13/91 (-0.06)

10/1/91   FOMC Meeting

10/11/91 (-0.06)

10/17/91 (0.06)

10/29/91 (-0.10)   "The economy grew at a 2.4 % annual rate in the third period after three quarters of decline. Bush officials proclaimed the end of the recession but more recent indicators suggest the economy is rapidly losing momentum. Consumer confidence, meanwhile, tumbled in October to a level common during recessions." *WSJ* 10/30/91 p. 1

10/30/91 (-0.10)   "The factory sector's growth slowed in October, a survey of purchasers suggests. Separately, factory orders fell 1.7 % in September." *WSJ* 11/1/91

11/1/91 (-0.07)   "The economy is struggling to recover, statistics increasingly indicate, and many business people and consumers believe the economy is doing worse than economists and their numbers say it is. Providing the sharpest evidence so far that the recovery is faltering, payrolls declined slightly in October. The unemployment rate inched up to 6.8 %. Separately, the index of leading indicators dropped 0.1 % in September." *WSJ* 11/4/91

11/5/91   FOMC Meeting

11/6/91 (-0.12)	"The Fed cut tow key interest rates in an effort to stimulate the economy, lowering the discount rate to 4.5 % from 5 % and the federal funds rate to 4.75 % from 5 %." *WSJ* 11/7/91 p. 1
12/6/91 (-0.11)	"The Fed lowered its target for a key short-term interest rate by ¼ percentage point to 4 ½ % officials said." "Unemployment was unchanged in November at 6.8 %, but nearly 241,000 Americans tumbled off the payrolls, the largest one-month plunge since last spring, further evidence of a stalled recovery." *WSJ* 12/9/91 p. 1
12/17/91	FOMC Meeting
12/18/91 (0.06)	
12/20/91 (-0.26)	"The Fed slashed the discount rate to 3.5 % from 4.5 % to try to revive the economy. The full-point cut, the first since 1981, brought the rate, charged on loans to banks, to a 27-year low. The Fed also cut the federal funds rate to 4 % from 4.5 %." *WSJ* 12/23/91
12/31/91 (-0.08)	
1/9/92 (0.07)	
2/4-5/92	FOMC Meeting
2/7/92 (-0.11)	"Payrolls shrank by 91,000 jobs in January to a level no higher than before an illusory economic rebound began last spring. The unemployment rate stayed at 7.1 %. The grim report boosted chances the Fed will reduce interest rates during the next few weeks, analysts said." *WSJ* 2/10/92 p. 1
2/13/92 (0.09)	
3/31/92	FOMC Meeting
5/1/92 (-0.06)	
5/19/92 (-0.08)	FOMC Meeting
5/20/92 (0.06)	
5/21/92 (0.07)	
6/24/92 (-0.06	

6/30/92-7/1/92	FOMC Meeting "Stocks surged and bond prices climbed as speculation increased that the Fed will cut interest rates because of slowing economic growth." *WSJ* 7/2/92 p. 1
7/2/92 (-0.32)	"The Fed cut interest rates on the heels of a report showing that the unemployment rate rose to 7.8 % in June, its highest point since 1984, while payrolls shrunk. Analysts said the data signal the weakness, but not the end, of the recovery. The Fed lowered the discount and Fed funds rates each by half a point, to 3 % and 3.25 % respectively, their lowest levels since 1963.
8/18/92	FOMC Meeting
9/25/92 (-0.06)	
10/1/92 (-0.08)	
10/6/92	FOMC Meeting
10/7/92 (0.07)	
10/9/92 (0.08)	
10/20/92 (0.07)	
10/21/92 (-0.06)	
10/23/92 (0.05)	
11/17/92	FOMC Meeting
12/22/92	FOMC Meeting
2/2-3/93	FOMC Meeting
3/5/93 (0.06)	"The unemployment rate fell to 7 % last month from 7.1 % in January. The surprisingly strong jobs report suggests the U.S. economy is now in a solid recovery, but that businesses are still tentative about the future." *WSJ* 3/8/93 p. 1
3/23/93	FOMC Meeting
5/18/93	FOMC Meeting

6/11/93 (-0.10)

"Producers prices were unchanged for May, suggesting that fears of rising inflation are unwarranted. If tomorrow's consumer price report is similarly encouraging the Fed is likely to hold off on any rise in short-term interest rates." *WSJ* 6/14/93, p. 1

7/6-7/93

FOMC Meeting

8/17/93

FOMC Meeting

9/21/93

FOMC Meeting

11/16/93

FOMC Meeting

12/21/93

FOMC Meeting

1/7/94 (-0.06)

"The unemployment rate fell to 6.4 % of the work force in December from 6.5 % in November and 7.3 % a year ago. But the manufacturing and construction sectors, which had offered encouraging signs of job growth recently, added virtually no new workers." *WSJ* 1/10/94 p. 1

2/3/94 (0.06)

FOMC Meeting
"Short-term U.S. interest rates soared as speculation about when the Fed will tighten monetary policy sent a shudder through the bond markets." *WSJ* 2/4/94 p. 1

2/4/94 (0.09)

FOMC Meeting
"The Fed's decision to raise short-term interest rates for the first time in nearly five years won't have a significant impact on the economy, most economists say. They say the Fed, by nudging up the federal funds rate to 3.25 % from 3 % before inflation had begun to accelerate, is waging a psychological war. *WSJ* 2/7/94 p. 1

3/1/94 (0.08)

"Economic growth rocketed ahead at a 7.5 % pace in the fourth quarter, faster than the 5.9 % initially reported. The possibility of continued fast growth, coupled with a purchasing managers' report showing price increases in February, spurred inflation fears." *WSJ* 3/2/94, p. 1

3/18/94 (0.06)

"The bond market faces a major test this week as the Fed's policy-making arm meets. Many expect the Fed to tighten credit again. The benchmark 30-year bond fell nearly 7/8 point Friday. Its yield rose to 6.90 %, mainly in reaction to news of a meeting between Fed Chairman Greenspan and Clinton. Aids called the meeting routine." *WSJ* 3/21/94 p. 1

3/22/94   FOMC Meeting

4/1/94 (0.13)   "March's employment report showing 456,000 additional jobs convinced all but the most pessimistic observers that the U.S. economy grew at better than a 3 % pace in the first quarter." *WSJ*, 4/4/94, p. 1

5/06/94 (0.15)   "The unemployment rate fell to 6.4 % in April from 6.5 %, as employers added 267,000 jobs, demonstrating the economy's momentum and exacerbating Wall Street fears that growth is so fast it will lead to higher inflation." *WSJ* 5/9/94, p. 1

5/10/94 (-0.05)   "Bond prices staged a stunning comeback after plunging for two days on uncertainty about the next interest rate boost by the Fed." *WSJ* 5/11/94 p. 1

5/11/94 (-0.05)   "Keeping potential buyers at bay, traders said, was the continued uncertainty over whether the Federal Reserve might next raise interest rates and by how much." *WSJ* 5/12/94 p. C21

5/12/94 (-0.05)   "Wholesale prices fell 0.1 % in April and retail sales were much weaker than expected, falling 0.8 %, suggesting the economy is losing some steam. Bond prices rallied on the weaker-than-expected signs of inflation, but most of the gains later eroded." *WSJ* 5/13/94 p. 1

5/17/94   FOMC Meeting

5/19/94 (-0.07)   --

6/28/94 (0.05)   "Bentson backed a stronger dollar, making the most forceful statement yet by the Clinton administration that the U.S. doesn't want to let the dollar decline against the yet to help improve the American trade position. The Treasury secretary's comments, if they succeed in bolstering the dollar, could relieve pressure on the Federal Reserve to lift interest rates when it meets next week." *WSJ* 6/29/94 p. 1
"Yesterday some of the bad news took the form of two reports suggesting a strengthening of the economy. Good news is often considered bad news for bond investors, who fear that accelerating economic growth will spark inflation, which, in turn, reduces the value of investments with a fixed rate of return.
      The recent weakness of the dollar has sparked considerable speculation that the Federal Reserve would be forced to raise short-term interest rates in order to help the currency gain strength. With

the June employment report due to be released in Friday and the Fed's policy-making arm meeting next Tuesday and Wednesday, some market watchers believe that a move may come very soon." *WSJ* 6/29/94, p. C21

7/5-6/94	FOMC Meeting

7/8/94 (0.07) "The latest U.S. jobs report shows the economy is still growing strongly, raising the likelihood that the Fed will lift interest rates in coming months." *WSJ* 7/11/94 p. 1

7/14/94 (-0.09) "The Clinton administration forecast an economic slowdown in the second half of the year and raised its prediction for long-term interest rates a full percentage point from its previous forecast in February. Meanwhile, the Commerce Department reported June retail sales rose a modest 0.6 %." *WSJ* 7/15/94 p. 1

7/15/94 (-0.05) "The economy showed further signs of cooling in the second quarter. Inventories rose 1.1 % in May. Industrial production was up 0.5 % in June." *WSJ* 7/18/94 p. 1

7/29/94 (-0.09) "The economy's 3.7 % pace of growth in the second quarter confirmed the strength of the current expansion, while details of the report, especially a huge rise in inventories, eased fears that the economy is overheating." *WSJ* 8/1/94 p. 1

8/5/94 (0.11) "The economy continued to show strength, increasing the likelihood that the Federal Reserve will push up interest rates next week. New job growth in July was slightly better than expected, and came on top of an upward revision of June's job growth. If the Fed does raise rates, most economists are expecting a quarter point boost, although some see an increase as much as a half-point." *WSJ* 8/8/94 p. 1

8/16/94 (0.10) FOMC Meeting
"The Federal Reserve pushed up short-term interest rates by one-half percentage point, sending a clear inflation-fighting message." *WSJ* 8/17/94 p. 1

9/16/94 (0.06) "Industrial production rose 0.7 % in August and the economy was operating closer to full capacity, the Federal Reserve reported. Economists said the reports suggest inflationary pressure may be stronger than anticipated.   Inflation fears sparked a bond market rout, pushing stocks modestly lower." *WSJ* 9/19/94 p. 1

9/21/94 (0.09)	"Stock and bond prices fell for a second straight day as investors worried about a potential Federal Reserve credit tightening." *WSJ* 9/22/94 p. 1
9/27/94 (-0.08)	FOMC Meeting "The Federal Reserve decided to hold short-term interest rates steady, but analysts say it is still likely to raise them before year end unless the economy shows signs of slowing substantially." *WSJ* 9/28/94 p. 1
10/20/94 (0.07)	"Bond prices sank and yields soared to nearly 8 % as an unexpectedly strong housing-market report rattled investors. Housing starts increased 4.4 % in September, heightening expectation of an interest-rate increase by the Fed." *WSJ* 10/21/94 p. 1
10/28/94 (-0.05)	"Strong economic growth raised expectation that the Federal Reserve will increase interest rates in November. Gross domestic product grew at a 3.4 % annual rate in the third quarter." *WSJ* 10/31/94 p. 1 "Gross domestic product in the third quarter expanded at a 3.4 % annual rate, but elements of Friday's report suggested that inflation remained subdued." *WSJ* 10/31/94 p. C1
11/15/94 (0.09)	FOMC Meeting "The Fed raised short-term interest rates by three-quarters of a percentage point, a sharper than-expected increase that it said was necessary to keep inflation at bay. In contrast with previous rate moves, the Fed didn't indicate that it expects this increase to be the last for a while, an omission confirming predictions that further boosts are almost a certainty." *WSJ* 11/16/94 p. 1
11/23/94 (-0.06)	"Factory orders declined 1.5 % in October, a sign that the Federal Reserve's attempts to slow the economy may be beginning to take effect." *WSJ* 11/25/94 p. 1
11/29/94 (0.07)	"The consumer confidence index surged to its highest level in four years, rebounding from four months of declines." *WSJ* 11/30/94 p. 1
12/2/94 (0.06)	"The unemployment rate fell to 5.6 % in November from 5.8 % in October. The October index of leading indicators slipped 0.1 %, but economists continued to see strong growth." *WSJ* 12/5/94 p. 1

12/6/94 (-0.06)	"With no significant economic news released yesterday, market activity took on a life of its own and was often directed by rumors and speculation. … Because Wall Street observers generally attribute those losses to rising interest rates, some now speculate that the Fed may delay any tightening of monetary policy until 1995." *WSJ* 12/7/94 p. C16
12/15/94 (-0.05)	"For the second consecutive day, shorter-term securities outpaced longer-term issues amid growing expectations that the Federal Reserve won't boost interest rates when its policy-making arm meets next week." *WSJ* 12/16/94 p. C17
12/20/94 (-0.11)	FOMC Meeting "The Federal Reserve left short-term interest rates unchanged. But it is widely expected to boost rates early next year unless the economy falters." *WSJ* 12/21/94 p. 1
1/4/95 (-0.10)	Value of New Construction Put in Place "Construction spending rose 0.7% in November, as rising interest rates had little effect on building activity" *WSJ* 1/5/95 p. 1
1/10/95 (-0.06)	Wholesale Trade PPI Greenspan Testimony "Producer prices rose just 0.2% in December and only 1.7% for the year, despite the economy's vigorous growth. But many economists doubt such modest inflation can last." *WSJ* 1/11/95 p.1
1/11/95 (-0.09)	Quarterly Financial Report – Retail CPI Real Earnings "The consumer price index rose just 0.2% in December, holding its gain for the year to 2.7%. The so-called core rate of inflation, which excludes food and energy costs, rose only 2.6%, the smallest annual increase in 30 years." *WSJ* 1/12/95 p. 1
1/13/95 (-0.09)	"The economy showed signs of cooling off as consumer spending slipped in December. Retail sales fell 0.1% last month and November sales, originally reported as showing a healthy 1.2% gain, were restated to show a rise of just 0.2%. The report raised questions about whether the Fed will see the need to raise interest rates when it meets later this month." *WSJ* 1/16/95 p. 1

1/31/95-2/1/95	FOMC Meeting
3/28/95	FOMC Meeting

5/5/95 (-0.09)   Employment
"Unemployment jumped 0.3 percentage point to 5.3 % in April, raising concern that the economy may be slowing too much. But economists doubt the slowdown will deteriorate into recession. The jobs report, the latest sign that growth has cooled, led many investors to believe the Federal Reserve's next move could be to lower interest rates rather than raise them." *WSJ* 5/8/95 p. 1

5/23/95   FOMC Meeting

6/1/95 (-0.07)   Manufacturers Orders, Shipments and Inventories
Personal Income
"Federal Reserve officials don't anticipate a recession and therefore are unlikely to cut interest rates in the near future. The Fed is braced for a wave of reports showing that the economy has slowed, such as yesterday's data indicating that manufacturing growth and new factory orders declined this spring." *WSJ* 6/2/95 p. 1

6/2/95 (-0.08)   Value of New Construction Put in Place
Leading Indicators
Employment
"Recession concerns were bolstered by grim May employment data, including the largest drop in nonfarm payrolls in four years. The price of the 30-year Treasury rallied sharply, for a short time equaling its largest one-day gain of the decade, before ending 1 ¼ points higher. Its yield plunged to 6.52 % on the prospect that, absent a soft landing for the economy, the Fed might reduce interest rates." *WSJ* 6/5/95 p. 1

6/7/95 (0.07)   --
"Fed Chairman Greenspan said he doesn't see a recession on the horizon, despite new evidence of a 'quite pronounced' slowdown in the economy. Bond prices fell sharply as Greenspan and other Fed officials appeared to distance themselves from an interest-rate cut." *WSJ* 6/8/95 p. 1

6/13/95(-0.13)   Advanced Retail Sales
International Transactions
CPI
Real Earnings

"Retail sales grew 0.2% in May, less than expected, heightening concerns about the economy's health. Separately, consumer prices rose 0.3%."

"Bonds and stocks rallied on hopes the Fed may soon consider interest rate cuts to spur the economy." *WSJ* 6/14/95

6/29/95(0.11)   New One Family Houses Sold

"New-home sales jumped 19.9% in May, the Commerce Department said, a sharp change from lackluster performance earlier this year. Separately, unemployment claims fell. The data suggest the worst may be over for the housing market and the broader economy, analysis and others said."

"Bonds plummeted on signs that the economy is too strong to warrant a Fed interest-rate cut." *WSJ* 6/30/95 p. 1

7/6/95 (-0.07)   FOMC Meeting
Leading Indicators

"The Fed trimmed a pivotal short-term rate by 0.25 %, its first loosening of rates in nearly three years, and markets welcomed the news." *WSJ* 7/7/95 p. 1

8/22/95   FOMC Meeting

9/26/95   FOMC Meeting

11/15/95   FOMC Meeting

12/19/95 (-0.11)   FOMC Meeting
Housing Starts
PPI

"The Federal Reserve cut short-term interest rates by a quarter percentage point, citing favorable inflation trends. The move also served to counter the perception that the central bank was waiting for Clinton and Congress to reach a budget compromise before cutting rates." *WSJ* 12/20/95 p. 1

1/31/96(-0.06)   FOMC Meeting
Import and Export Prices

"The Fed trimmed two short-term interest rates a cautious one-quarter percentage points, acknowledging recent signs of low inflation and slowing economic growth. It was the third rate cut in seven months." *WSJ* 2/1/96 p. 1

3/1/96 (-0.06)   Value of New Construction Put in Place
GDP (95:4)

"Manufacturing activity stayed soft in February, according to a closely watched purchasing management index, giving a boost to bond prices." *WSJ* 3/4/96 p. 1

3/8/96 (0.10)   Wholesale Trade
                        Employment
                        "Wall Street girded for trading to resume after Friday's rout, in which stocks and bond prices fell more than 3% as vigorous job growth undermined hopes for a Fed rate cut." *WSJ* 3/11/96 p. 1

3/26/96   FOMC Meeting

5/21/96   FOMC Meeting

6/7/96 (0.09)   Wholesale Trade
                        Employment
                        "The surprisingly strong report of 348,000 new jobs in May isn't enough to persuade Fed policy makers to change course and raise rates, Fed officials indicated. But the report caused long-term bond prices to soar above 7 % and led some traders to predict that long rates are not headed for 7.5 %". *WSJ* 6/10/96 p. 1

7/2-3/96   FOMC Meeting

8/1/96 (-0.07)   Value of New Construction Put in Place
                        GDP
                        "Bond prices surged as investors interpreted the day's mix of economic indicators as suggesting that a Fed rate increase is less of a likelihood. Second quarter GDP rose at an annual rate of 4.2 % far outpacing the first quarter's 2 % gain, but inflation climbed a mere 2.1 % rate." *WSJ* 8/2/96 p. 1

8/2/96 (-0.07)   Manufacturing Shipments, Orders and Inventories
                        Personal Income
                        Employment
                        "Subdued job growth and falling July hourly wages signaled the economy is throttling down. Financial markets concluded that the report takes pressure off the Fed to raise interest rates." *WSJ* 8/5/96 p. 1

8/20/96   FOMC Meeting

9/13/96   (-0.06)   Quarterly Financial Report – Manufacturing, Mining, Wholesale Trade
                        Advanced Retail Sales

CPI
Real Earnings
"Bond prices surged nearly 1 ½ points, as a batch of economic data seemed to indicate the Fed might not need to increase interest rates at its Sept. 24 meeting." *WSJ* 9/16/96 p. 1

9/24/96 (-0.13)

FOMC Meeting
Investment Plans Survey
Import and Export Prices
Yields on FHA New Home Mortgages
"The Fed left short-term interest rates unchanged, apparently convinced the economy's steady growth hasn't yet fueled higher inflation. Raising rates would have thrust the central bank into the heat of the presidential campaign. Still, Fed officials made it clear that they were prepared to raise rates if thigh labor markets and higher wages pushed up prices." *WSJ* 9/25/96 p. 1

11/13/96

FOMC Meeting

12/17/96

FOMC Meeting

2/4-5/97

FOMC Meeting

3/25/97

FOMC Meeting

4/29/97 (-0.09)

Advanced Report on Durables
Employment Cost Index
"Stocks and bonds soared after the release of economic data that helped to ease fears inflationary pressures are building." *WSJ* 4/30/97 p. 1

5/20/97 (-0.07)

FOMC Meeting
"The Fed left its target for the federal-funds rate at 5 ½ %, apparently convinced the economy will slow enough to avoid a pickup in inflation. Since the Fed opted to tighten rates by one-quarter percentage point on March 25, economic data have indicate that growth is moderating from its startling 5.6 % first-quarter rate." *WSJ* 5/21/97

7/1-2/97	FOMC Meeting
8/19/97	FOMC Meeting
9/30/97	FOMC Meeting
11/12/97	FOMC Meeting
12/16/97	FOMC Meeting
1/9/98 (-0.09)	Wholesale Trade Employment "Unemployment remained low in December, with the jobless rate at a tiny 4.7 %. The economy also added 370,000 jobs, a gain that was both large and exceptionally broad-based." *WSJ* 1/12/98 p. 1 "Indeed, comments by Fed Chairman Alan Greenspan and Fed Governor Laurence Mayer were interpreted as raising the odds of a near-term rate cut." *WSJ* 1/12/98 p. C11
2/3-4/98	FOMC Meeting
3/31/98	FOMC Meeting
4/30/98 (-0.06)	GDP (98:1) Employment Cost Index "The U.S. economy grew at a 4.2 % annual rate in the first quarter while inflation fell to early 1950s levels. Meanwhile labor costs decelerated." *WSJ* 5/1/98 p. 1
5/19/98	FOMC Meeting
6/30/98-7/1/98	FOMC Meeting
8/19/98	FOMC Meeting
9/10/98 (-0.09)	US International Transactions "The current-account gap widened to a record $56.53 billion in the second quarter as foreign buyers of U.S. goods reduced their spending. Many analysts predict that the deficit picture will continue to deteriorate." *WSJ* 9/11/98 p. 1 "Meanwhile, comments by Janet Yellen, who heads the White House Council of Economic Advisers, that inflation remains 'well under control and falling' encouraged some investors. 　　　Elsewhere, Robert Parry, president of the Federal Reserve Bank of San Francisco, said hat the recent slide in U.S. stock

prices is 'likely to slow domestic consumer and business spending to some extent'." *WSJ* 9/11/98 p. C20

9/16/98 (0.05)   Manufacturing and Trade Inventories and Sales
Industrial Production
"Greenspan denied that he and other central bankers are working together to lower interest rates. He also offered little hope for a U.S. rate cut, though he indicated concern that the global crisis may damp U.S. growth. Meanwhile, the Fed said the U.S. economy is continuing to expand at a moderate pace in most regions." *WSJ* 9/17/98 p. 1

9/23/98 (-0.11)   Greenspan Testimony
"Greenspan signaled interest rates could be cut as soon as Tuesday's meeting of Fed policy makers. The Federal Reserve chairman told Congress he is growing worried that the 'restraining effects' of global financial turmoil on the U.S. economy are likely to intensify." *WSJ* 9/24/98 p. 1

9/24/98 (-0.08)   Advanced Report on Durables
GDP (98:2)
Corporate Profits (98:2)
Yields on FHA New Home Mortgages
"Durable goods orders rose 1.6 % in August, and first time jobless claims sank by 8,000 last week, as the U.S. economy continued to hold steady. But global turmoil remains threatening." *WSJ* 9/25/98 p. 1
"For one day at lease, the bailout, together with comments by Federal Reserve Chairman Alan Greenspan suggesting an interest-rate cut could take place as early as Tuesday, helped the tone of the overall bond market." *WSJ* 9/25/98 p. C1

9/29/98 (0.06)   FOMC Meeting
"The Fed cut a key short-term rate by one-quarter percentage point, in a pre-emptive strike against recession. It was the first rate decrease since January 1996, but some investors were disappointed the cut wasn't bigger." *WSJ* 9/30/98 p. 1

11/17/98 (-0.06)   FOMC Meeting
Manufacturing Shipments, Orders and Inventories
CPI
Real Earnings
"The Fed reduced interest rates for the third time in seven weeks, hoping to inoculate the U.S. against recession and financial-market disruptions. But the central bank signaled that the quarter-point cut may be the last for a while." *WSJ* 11/18/98 p. 1

12/21/98	FOMC Meeting
1/12/99 (0.15)	Quarterly Financial Report – Retail Import and Export Prices "Producer Prices rose 0.4% in December, but the figure was inflated by a cigarette-price surge. The government released data early online, in the second such incident in two months." *WSJ* 1/13/99 p. 1
1/13/99 (-0.17)	Advanced Retail Sales PPI
2/2-3/99	FOMC Meeting
3/30/99	FOMC Meeting
5/18/99	FOMC Meeting
6/29-30/99	FOMC Meeting
7/2/99 (-0.10)	"Job Growth remained strong in June with nonfarm employers adding 268,000 jobs to payrolls. The unemployment rate increased slightly to 4.3 %. Separately new orders for manufactured goods rose 1.1 % to $348 billion." *WSJ* 7/6/99 p. 1
8/6/99 (0.06)	"Payrolls grew by 310,000 jobs in July, stoking fears that the Fed will raise interest rates to cut inflationary pressures." *WSJ* 8/9/99 p. 1
8/24/99	FOMC Meeting
10/5/99	FOMC Meeting
11/16/99 (0.08)	FOMC Meeting Industrial Production CPI Real Earnings "The Federal Reserve raised interest rates for the third time this year, but suggested it will pause in its aggressive campaign to rein in the U.S. economy. The central bank said it was confident that the quarter-percentage-point increase should accomplish its chief objective of 'markedly' diminishing the 'risk of inflation going forward'." *WSJ* 11/17/99 p. 1
12/21/99	FOMC Meeting

Appendix B
Estimated Expected and Unexpected Changes in Intended Funds October 1988 through February 2000

Date	Target Change	Expected Change	Shock	Kuttner Shock
10/20/1988	0.125	0.125	0.000	na
11/17/1988	0.063	-0.008	0.070	na
11/22/1988	0.063	-0.008	0.070	na
12/15/1988	0.313	0.263	0.050	na
12/29/1988	0.063	0.123	-0.060	na
1/5/1989	0.250	0.250	0.000	na
2/9/1989	0.063	0.053	0.010	na
2/14/1989	0.250	0.210	0.040	na
2/23/1989	0.250	0.110	0.140	na
2/24/1989	0.188	0.048	0.140	na
5/4/1989	0.063	0.043	0.020	na
6/6/1989	-0.250	-0.260	0.010	-0.010
7/7/1989	-0.250	-0.200	-0.050	-.0.030
7/27/1989	-0.250	-0.190	-0.060	0.000
8/10/1989	-0.063	-0.083	0.020	na
10/18/1989	-0.250	-0.290	0.040	0.000
11/6/1989	-0.250	-0.280	0.030	0.040
12/20/1989	-0.250	na	na	-0.170
7/13/1990	-0.250	-0.160	-0.090	-0.140
10/29/1990	-0.250	-0.230	-0.020	-0.310
11/14/1990	-0.250	-0.270	0.020	0.040
12/7/1990	-0.250	-0.110	-0.140	-0.270
12/18/1990	-0.250	-0.090	-0.160	-0.210
1/8/1991	-0.250	-0.150	-0.100	-0.180
2/1/1991	-0.500	-0.300	-0.200	-0.250
3/8/1991	-0.250	-0.120	-0.130	-0.160
4/30/1991	-0.250	-0.080	-0.170	-0.170
8/6/1991	-0.250	-0.160	-0.090	-0.150
9/13/1991	-0.250	-0.210	-0.040	-0.050
10/31/1991	-0.250	-0.200	-0.050	-0.050
11/6/1991	-0.250	-0.130	-0.120	-0.120
12/6/1991	-0.250	-0.140	-0.110	-0.090
12/20/1991	-0.500	-0.240	-0.260	-0.280
4/9/1992	-0.250	-0.040	-0.210	-0.240
7/2/1992	-0.500	-0.180	-0.320	-0.360
9/4/1992	-0.250	-0.050	-0.200	-0.220
2/4/1994	0.250	0.160	0.090	0.120

Date	Target Change	Expected Change	Shock	Kuttner Shock
3/22/1994	0.250	0.290	-0.040	-0.030
4/18/1994	0.250	0.150	0.100	0.100
5/17/1994	0.500	0.450	0.050	0.130
8/16/1994	0.500	0.400	0.100	0.140
11/15/1994	0.750	0.660	0.090	0.140
2/1/1995	0.500	0.480	0.020	0.050
7/6/1995	-0.250	-0.180	-0.070	-0.010
12/19/1995	-0.250	-0.140	-0.110	-0.100
1/31/1996	-0.250	-0.180	-0.070	-0.070
3/25/1997	0.250	0.210	0.040	0.030
9/29/1998	-0.250	-0.310	0.060	0.000
10/15/1998	-0.250	-0.050	-0.200	-0.260
11/17/1998	-0.250	-0.190	-0.060	-0.060
6/30/1999	0.250	0.290	-0.040	-0.040
8/24/1999	0.250	0.220	0.030	0.020
11/16/99	0.250	0.170	0.080	na
2/2/2000	0.250	0.290	-0.040	na