Economic News and Expected Changes in Monetary Policy

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The main prediction of the efficient markets hypothesis is that short-run asset price changes are the result of new information arriving in the market and thus are unpredictable. Asset-pricing theories specify what news should matter and why. Empirical work largely supports the prediction that asset prices quickly respond to news events, although identified news events typically explain only a small fraction of asset price changes. For the U.S., the most common finding is that news that is assumed to signal a stronger economy raises interest rates, causes an appreciation of the dollar, and has effects on the stock market that depend on the state of the economy.\(^1\) It is harder to find evidence that news on inflation has substantial effects on exchange rates or stock prices but higher than expected inflation is associated with higher nominal interest rates.\(^2\) While there are many studies of the effects of news on asset prices, there is still no consensus on why the news causes such changes.

Researchers generally assume that the news causes agents to revise their expectations of the future values of the fundamental variables. For example, news that inflation was higher than expected is thought to raise the expected inflation rate, which should cause nominal interest rates to rise via the Fisher effect and the dollar to depreciate via purchasing power parity.\(^3\) But as Faust \textit{et al.} (2007) point out, agents may also factor in the likely response of the Federal Reserve. They note that an unexpectedly low inflation announcement may be interpreted as a drop in demand that will cause the Federal Reserve to loosen monetary policy or it could be interpreted as evidence of an unexpected increase in productivity. These alternative interpretations would generally imply opposite movements in the exchange rate. Similarly, Andersen \textit{et al.} (2003, p. 59) note that

\(^1\) The literature in this area is large. Recent papers include Faust \textit{et al} (2007), Anderson \textit{et al} (2007), and Balducci \textit{et al} (2001). Recent papers by Dominguez and Panthaki (2006) and Evans and Lyons (2008) find that broadening the measures of news and allowing for order-flow effects increase the explanatory power of news.

\(^2\) Flannery and Protopapdakis (2002) report evidence that stock returns fall when unexpected inflation is announced. Adams \textit{et al} (2004) find evidence that stock prices fall after an announcement that inflation was higher than expected but only if high frequency data are used. They also find that the response depends on the state of the economy.

\(^3\) The response of stock prices should be zero if inflation is neutral since nominal cash flows should grow at the new inflation rate and the nominal discount factor should rise just enough to have no immediate effect on stock prices. Tax laws and other effects may result in a non-neutral effect.
A positive U.S. inflation surprise would tend to produce dollar depreciation (e.g. when the U.S. central bank reaction function assigns relatively low weight to the level of inflation), whereas in other interpretations it would produce dollar appreciation (e.g. when the U.S. central bank reaction function shows strong preference for low inflation, as in Taylor, 1993).

Balducci et al. (2001) attribute the increase in interest rates of various maturities after an announcement of stronger than expected economic growth to an increase in expected inflation via a Phillips curve relationship rather than to an expectation of tighter monetary policy.

In this paper we isolate the influence of news on expected changes in monetary policy by investigating how news changes the market’s expectation of the federal funds rate target. Previous work has shown that short-run changes in federal funds rate futures prices are an appropriate measure of the market’s short-run expectations of Fed policy moves.\(^4\) We use these data as our dependent variable and estimate models relating changes in futures prices to standard measures of economic news. We also investigate the symmetry between “good” and “bad” news and the dependency of these relationships on the state of the economy.

The paper is organized as follows. Section 1 briefly reviews past work on news and asset prices. Section 2 describes our data and develops our empirical specification. Section 3 presents our estimated results and section 4 concludes.

1. Past Work on News and Asset Prices

Much of the empirical work connecting economic news to asset price changes arose from the availability of survey data on market forecasts of economic announcements. Initially this work focused on the response of interest rates to the unexpected component of weekly money supply announcements. Immediately after an announcement of a higher than expected money supply, interest rates rose. This led to speculation about whether this was due to an increase in expected

\(^4\) See Bundick (2007) and Hamilton (2008). Piazzesi and Swanson (2008), on the other hand, argue that some adjustment to the change in futures prices must be made.
inflation or an increase in expected real interest rates. When it was found that the dollar generally appreciated after an announcement of higher than expected money growth, this was interpreted to mean that such announcements raised expected real rates. There was still uncertainty, however, as to whether the expected higher real rates reflected an expectation of a tighter monetary policy or an inference that higher than expected money growth meant that real money demand was higher than expected.\footnote{See Engel and Frankel (1984).}

Subsequent studies looked at the response of a variety of asset prices to a large number of news events.\footnote{Studies include Pearce and Roley (1985) on stock prices, Balduzzi \textit{et al} (2001) on interest rates, Anderson \textit{et al} (2003) on exchange rates. Faust \textit{et al} (2007) investigate both interest rates and exchange rates.} These studies generally find that asset prices respond very quickly to news and that high frequency data on asset price changes are often required to find significant effects for most announcements, given the noise in asset price changes. Papers also examined whether the state of the economy affected the impact of news on asset prices. McQueen and Roley (1993) find evidence that stock price responses to news depends on whether the economy is substantially above or below the trend growth rate, Adams \textit{et al.} (2004) report that the effect of inflation on stock prices is state dependent using the same approach, and Anderson \textit{et al.} (2007) find qualitatively similar results for a later period and an alternative measure of the state of the economy. The latter paper attributes the negative response of stock prices to news that the economy is stronger than expected, when the economy is already in an expansion, to an expectation that monetary policy will raise real rates and hence the rate of discount of future cash flows.

Several papers find that changes in expected monetary policy, as measured by the change in fed funds futures, affect asset prices. Anderson \textit{et al.} (2003) find that the dollar appreciates after the FOMC announced an increase in its target rate while Faust \textit{et al.} (2007) report that a positive change in the fed funds futures interest rate is followed by an appreciation of the dollar. Hamilton (2008)
reviews and updates work showing that nominal interest rates are positively related to daily changes in the fed funds futures rate. Burger (2004) finds that the response of U.S. interest rates to many news announcements appears to be a reflection of the response of expected monetary policy to such news events. Burger employs a similar analysis to our paper in that he looks at how news affects the change in the fed funds futures prices. Our paper extends this analysis to a longer time period and explores in greater detail how expected monetary policy has responded to news events.

2. Data and model specification

a. Measuring expected changes in monetary policy

We use daily fed funds futures prices to extract our measure of expected monetary policy. These futures contracts are based on the average daily effective funds rate for all calendar days in the month, using the previous day’s observation for weekend days and holidays. In this version of the paper, we restrict ourselves to the current month’s contract. That is for all business days in say October, we use the closing price of the fed funds futures contract that is based on the average for all days in October. We are interested in the effect that news announcements have on the daily change in this price, which we assume is a noisy measure of the market’s expected change in the Fed’s target for the funds rate.

Our approach follows Hamilton’s (2008). We assume that the fed funds futures rate for day \( d \) of the current month, denoted \( f_d \), is the market’s expectation of the average daily effective funds rate, for the current month:\(^8\)

\[
f_d = E_d(S)
\]  

\(^7\) Burger uses a different measure of the market’s expectation of economic announcements, surveys from the *Wall Street Journal*, than we and most previous studies use, namely the Money Market Services surveys.  
\(^8\) The quoted futures price can be converted into an interest rate measure as follows: 
\[
f = (100 – \text{price})
\] so that a price of 96.2 implies a rate of 3.8%.
where \( S \) is the average effective funds rate in the current month so that:

\[
S = N^{-1} \sum_{d=1}^{N} r_d
\]  

(2)

where \( r_d \) is the effective funds rate on day \( d \) and \( N \) is the number of days in the current month. We assume that the observed funds rate on day \( d \) is the sum of the Fed’s target for that day \( (T_d) \) plus a random error \( (u_d) \), which we assume initially is serially uncorrelated:

\[
r_d = T_d + u_d
\]  

(3)

We assume that market participants believe that the Fed’s target for the funds rate will only be changed at scheduled FOMC meetings.\(^9\) If \( n \) is the day of the month when the FOMC meets, we define \( T_d \) as follows:

\[
T_d = T_0, \quad d = 1, \ldots, n-1
\]

\[
T_d = T_1 \quad d = n, \ldots, N
\]  

(4)

where \( T_0 \) is the target set or continued at the last meeting and \( T_1 \) is the target set at the meeting scheduled for day \( n \). If the FOMC does not meet during the current month, \( t_d = T_0 \) throughout the month so that we set \( n = N+1 \) for months without scheduled meetings.

Given these assumptions, we can substitute equations (2) – (4) into (1) to yield:

\[
f_d = N^{-1} E_d [\sum_{d=1}^{N} (T_d + u_d)] = N^{-1} [(n-1) T_0 + (N-n+1) E_d(T_1) + \sum_{i=1}^{d} u_i]
\]  

(5)

since \( \sum_{i=d+1}^{N} E_d u_i = 0 \). Updating (5) by one day and subtracting (5) yields:

\[
(f_{d+1} - f_d) = N^{-1} (N-n+1) (E_{d+1} (T_1) - E_d (T_1)) + N^{-1} u_{d+1}
\]  

(6)

We assume that market participants change their expectations of the target rate based on the unexpected components of observable news events that occur on date \( d+1 \) and unobservable news that we denote as \( e_{d+1} \). The \( j^{th} \) type of announcement on date \( d+1 \) is denoted as \( D_{j,d+1} \) and the market’s

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\(^9\) Of the 50 changes in the fed funds rate target over our sample period, 5 occurred between formal FOMC meetings when the FOMC conducts a conference call. Conference calls are not usually known ahead of time. Data on changes in the Fed’s target for the funds rate are from the St. Louis Fed’s web site.
expectation of the announcement is $E_d (D_{j,d+1})$. If the news events occur after the scheduled meeting, we assume they do not affect the market’s expectation of the target for the rest of the month. Thus

$$E_{d+1}(T_1) - E_d (T_1) = \sum_{j=1}^{J} c_j (D_{j,d+1} - E_d D_{j,d+1}) + e_{d+1}$$

for $d < n$

$$E_{d+1}(T_1) - E_d (T_1) = 0$$

for $d \geq n$  \hspace{1cm} (7)

We can now express the observed change in the fed funds futures price as a function of observed and unobserved news plus a random error term: $^{10}$

$$f_{d+1} - f_d = N^{-1} (N-n+1) \left\{ \sum_{j=1}^{J} c_j (D_{j,d+1} - E_d D_{j,d+1}) + e_{d+1} \right\} + N^{-1} u_{d+1}$$

for $d < n$

$$f_{d+1} - f_d = N^{-1} u_{d+1}$$

for $d \geq n$  \hspace{1cm} (8)

Equation (8) can be put in the form of a regression equation as follows:

$$f_t - f_{t-1} = c_0 + N^{-1} (N-n+1) \sum_{j=1}^{J} c_j (D_{j,t} - E_d D_{j,t-1}) I_t + v_t$$

(9)

where $I_t$ is an indicator variable that takes the value one when day $t$ occurs before a scheduled FOMC meeting and zero otherwise. Note that $(N-n+1) = 0$ in a month without a scheduled FOMC and that the term $N^{-1} (N-n+1)$ is a constant within a given month but changes from month to month since the number of days in the month changes and the date on which the meeting is scheduled changes from month to month. Equation (9) is the basic model that we will estimate.

Daily changes in the rate implied by fed funds futures prices are given in Figure 1 for our sample period of February 7, 1994 through December 29, 2006.$^{11}$ The starting date was chosen because the FOMC began announcing its target rate with the February 4, 1994 FOMC meeting. The end date reflects the last observations we have on the news events and their expectations. We now turn to a discussion of these news events.

$^{10}$ Equation (8) implies that the variance of $(f_{d+1} - f_d)$ should be larger for a sample of days prior to a scheduled FOMC meeting relative to a sample of days following a meeting and days in months without a meeting. Our data are consistent with this since the sample variance for the first sample is 0.0170 and that for the second is 0.0137.

$^{11}$ For the first business day, we compute the change as follows. For say October 1 we subtract the rate implied by the October futures contract at the close on October 1 from the rate implied for the one-month ahead contract, i.e. the contract for October, on September 30.
b. Measuring economic news

We measure news in the same way as many previous studies, namely as the difference between the actual announcements and the median forecasts from a survey of money market participants.\textsuperscript{12} Previous work has shown that these survey forecasts appear unbiased and competitive with other forecasts.\textsuperscript{13} Moreover, they are usually publicized so that market participants are aware of “average opinion”. The news announcements occur prior to the close of the fed funds futures market. Table 1 gives the announcements we consider, their units and timing, and associated descriptive statistics for the unexpected or news components for the period February 7, 1994 through December 29, 2006.\textsuperscript{14}

3. Investigating how news affects expected monetary policy

A. The basic model

We begin by estimating a standard model in which the change in fed funds futures prices is regressed on the various news announcements.

\[
\Delta f_{ft} = \alpha + \sum \beta_i N_{it} + \varepsilon_t
\]  

(11)

where $\Delta f_{ft}$ = the change in the fed funds futures rate

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\textsuperscript{12} Money Market Services initially conducted the surveys. The survey data are currently maintained and sold by Haver Analytics.

\textsuperscript{13} See for example, Pearce and Roley (1985).

\textsuperscript{14} There is one missing observation for expectations: the January 1996 survey forecast for durable goods orders. The reported estimates set this news event to zero. Assuming that the news was the error from an ARIMA model estimated using prior announcements had no significant effect on the results. There are also two weeks at the end of 1995 without announcements on initial unemployment claims or personal income changes due to the federal government partial closure so we set those events to zero.
\[ N_{it} \text{ = the unexpected component of the announced value of economic variable } i \text{ adjusted for the timing of the announcement as explained above and given in equation (9). The news is measured in standard deviation units.}\]  

We estimate (11) for all business days in our sample correcting the standard errors for possible autocorrelation and heteroskedasticity. Table 2 presents estimates of equation (11), with column one giving the estimates for the entire sample. Only four news events have statistically significant effects on the market’s expectation of future target rate changes and the \( R^2 \)'s indicate that our news events can account for only a small fraction of the variance of the fed funds futures rate. An unexpected increase in inflation (as measured by Core CPI) of one standard deviation (.09\%) is associated with an increase in the expected target, assuming the FOMC meets in that month, of about 1.3 basis points.\(^{16}\) News events that signal stronger than expected real activity also increase the expected target. An unexpected increase in nonfarm payrolls of one standard deviation (108,610) is associated with an expected increase in the target of 1.9 basis points. Similarly an unexpected increase in industrial production of one standard deviation (.29\%) is associated with an increase in the expected target of 1.7 basis points. An unexpected decrease in unemployment claims of one standard deviation (19,191) raises the expected target by about .5 basis points. There is no evidence that other news events have a significant effect. These results suggest that previous studies that find significant responses of asset prices to other news events are capturing transmissions other than the policy anticipation effect. For example, most studies that examine exchange rate responses to surprises find that unexpectedly large

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\(^{15}\) Before adjusting for timing we measure the news as 
\[
\text{news} = (\text{announcement} - \text{survey median forecast}) / \text{standard deviation of forecast error.}
\]

\(^{16}\) We also estimated models using the total CPI and the results were very similar.
trade deficits are associated with immediate depreciations of the dollar, see for example Faust et al. (2007).\textsuperscript{17}

Table 2 also reports estimates of equation (11) in which unscheduled conference call meetings of the FOMC that resulted in an announced change in the funds rate target are dummied out. The largest daily change in the fed funds futures rate, i.e. the large negative spike in Figure 1, occurred on January 3, 2001. The fed funds futures rate fell 34.5 basis points coincident with an announced cut in the target rate of 50 basis points after an unscheduled conference call meeting of the FOMC. Our model assumes that these changes are totally unexpected and hence just add noise. As column 2 of Table 2 illustrates, the results are essentially unchanged if we dummy out all conference call days. We also estimated models that also dummy out the days on which scheduled FOMC meetings occur, again with little effect on the estimated coefficients (column 3) on the news variables. A reason to dummy out the FOMC days is as follows. Suppose that since August 31, the market has anticipated that the FOMC will raise the target by 50 basis points, from 4 to 4.5%, on September 15 and no observable news occurs to change this expectation. The fed funds futures contract for September will reflect an expectation that the average effective funds rate will be 4.25%. If on September 15, the FOMC does not change the target, the fed fund futures contract will change to reflect an expected average rate of 4. The rate should fall to 4% at the close on September 15. Since we are interested in the question of how observable news affects the market’s expected target rate, such changes just add noise to the data.

\textsuperscript{17} A caveat to our results is that we are not using high frequency data on fed funds futures and that our results might change if we used such data as Faust et al. (2007).
B. Tests of asymmetry

Some studies, such as Anderson et al. (2003), find that asset prices respond differently to “good” and “bad” news, where good news is defined as positive surprises on real activity and negative surprises on inflation and bad news is defined as negative surprises on real activity and positive surprises. If the main cause of asset price responses to news comes through the effect on expected monetary policy, there should be evidence of asymmetric effects of news on the change in the fed funds futures rates. To test whether the fed funds futures data respond asymmetrically we estimate

$$\Delta ft = \alpha + \sum \beta_i N_{fi} \cdot D_{it} + \sum \gamma_i N_{fi} \cdot (1 - D_{it}) + \varepsilon_t$$ (12)

where $D_{it} = 1$ if $N_{fi} > 0$

In this formulation, the coefficient on news event $i$, if the surprise is positive, is $\beta_i$ and the coefficient is $\gamma_i$ if the surprise is negative. If the response of the fed funds futures rate is symmetric, we should not be able to reject the hypothesis that $\beta_i = \gamma_i$.

Estimates of equation (12) for our entire sample indicate little evidence of asymmetry and are not reported. A joint test of symmetry for all news events can only be rejected at the 10 percent level. For only one news event, unexpected changes in industrial production is there evidence of asymmetry at the 5 percent level or better. A one-standard-deviation positive surprise to industrial production is associated with a rise in the fed funds futures target of 2.9 basis points while a negative surprise has no significant effect on the target.

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18 We again adjust the news variables for their timing with respect to scheduled FOMC meetings and measure them in units of standard deviations for all our estimated models.
C. Tests for threshold effects

Market participants may believe that the Fed will not respond to small surprises when deciding to change its fed funds target. In order to test for such effects we estimate a model that allows large surprises to have larger effects than the standard linear model assumes. The definition of large is arbitrary so we experimented with two definitions: (1) surprises whose absolute values exceeded one standard deviation or (2) surprises whose absolute values exceeded one and one-half standard deviations. Since we measure surprises in terms of standard deviations, this means we allow surprises exceeding one or one and one-half units to have different effects than smaller surprises. The model we estimate is

\[
\Delta \text{fft} = \alpha + \sum \beta_i N_{it} + \sum \pi_i N_{it} \cdot T_{it} + \varepsilon_t
\] (13)

where \( T_{it} = 1 \) if \(|N_{it}|\) exceeds 1 (or 1.5) standard deviations and zero otherwise.

We find little evidence of threshold effects and so do not report these results. For both definitions of the threshold dummy, the joint hypothesis of no threshold effects, that is that all \( \pi_i \) are jointly zero, cannot be rejected. For only one news event, durable goods sales, is there a significant \( \pi \) but the joint total effect for the large surprise (\( \beta + \pi \)) is not significant. We conclude that there is no evidence of threshold effects.

D. Tests of state dependence

The previous definition of good and bad news assumes that the difference between good and bad depends only on the sign of the surprise. Alternatively, whether a particular surprise is considered good or bad news may depend on the state of the economy. Unexpectedly strong payroll growth or growth in industrial production could be viewed as bad news by the Fed if the economy is already operating at full capacity whereas the same events may be good news if the economy is in a
recession. The Fed may also only respond to higher than expected inflation by tightening policy if inflation is already high or if the economy is booming.

Previous work, such as McQueen and Roley (1993), Adams et al. (2004), and Anderson et al. (2007), find evidence of such state dependence of asset price responses to news using different delineations of states. We follow McQueen and Roley in defining three possible states of the economy: high (H), middle (M), and low (L). We used two alternative schemes to determine the state. First we applied the Hodrick-Prescott filter to the unemployment rate to obtain a measure of cyclical unemployment. The high state occurs if cyclical unemployment is negative and is in the lowest quartile, the low state is when cyclical unemployment is positive and in the highest quartile, and the middle state is when cyclical unemployment is in the second and third quartiles. Our second measure of the state of the economy uses the CBO’s measure of the GDP gap. The high state occurs when the GDP gap is less than -1% (about one-quarter of our sample) and the low state occurs when the GDP gap exceeds +1% (again about one-quarter of our sample). The middle state is thus when the GDP gap is greater than -1% and less than +1% (about one-half the same).

To test for state dependence in the responses of the market’s expectation of the Fed’s funds rate target to economic news, we estimate the following model:

\[ \Delta \hat{f}_t = \alpha + \sum \beta_i N_{it} \cdot H_t + \sum \delta_i N_{it} \cdot M_t + \sum \varphi_i N_{it} \cdot L_t + \varepsilon_t \]  

(13)

If there is no state dependence, we should find that \( \beta_i = \delta_i = \varphi_i \) for all \( i \). Table 3 reports the estimated coefficients for equation (13) for each of the definitions of states of the economy, denoting coefficients that are statistically significant at the 5 percent level or better. We also give the coefficients for the basic model from Table 2 for comparison.

While the F statistics presented in the last row indicate that we should reject the joint hypothesis that the effects of news are independent of the state of the economy, the individual
coefficients are often zero and sometimes counter-intuitive. There is only one news event, unexpected changes in retail sales, for which the joint hypothesis of equal coefficients across states is rejected for both definitions of states of the economy. We would expect unexpectedly rapid retail sales to increase the expected target for the funds rate. If the effect is state dependent, we would expect the response might be larger in the high state. Our estimates suggest that unexpectedly high retail sales in the low state are associated with an expectation of lower targets and there is no evidence that the response is significantly larger in high states. When we use the GDP gap to classify states of the economy, we find that unexpected high housing starts do raise the market’s expectations for the funds rate target while we find no effect ignoring state dependence. When using cyclical unemployment to classify the states, we find that unexpected increases in personal income are associated with an increase in the expected funds rate target, an effect not found when state dependence is ignored. There are two results that are clearly counter-intuitive. A larger trade deficit appears to cause market participants to raise their expected target only in the low state and only for the version 1 measure of state dependence. Using the same definition of states, the results for an unexpected increase in the index of leading indicators imply that market participants reduce their expected target for the funds rate. We have no explanation for this result.

Based on the small number of rejects of no state dependence for individual news events and on their apparent clash with intuition, we conclude that the evidence for state dependence is weak. We plan on investigating this issue further with alternative classification schemes for states of the economy.
4. Summary and Conclusions

Clearly financial market participants spend considerable time and resources in forecasting Federal Reserve policy changes. The general responses of asset prices to the unexpected components of economic news announcements are often interpreted as reflecting how these news events affect the market’s expectation of Fed policy moves. While expectations of Fed policy are unobservable directly, changes in the fed funds futures rate can be interpreted as noisy measures of the market’s expectation of changes in the Fed’s funds rate target. We use these changes to investigate the impact of news on expected monetary policy.

Our results suggest that several news events do appear to change the market’s policy expectations. Some measures of unexpectedly strong (weak) economic activity are associated with increases (decreases) in the market’s expectation of the funds rate target. There is also evidence that news of unexpectedly high inflation triggers an increase in the expected target. The effects, appear, relatively small and our collection of news events does not explain a large proportion of the daily variance in the changes in fed funds futures rate. This suggests that other news, perhaps the frequent speeches of Federal Reserve officials, are a more important source of fluctuations. We also investigated whether the effects of news were symmetric for positive and negative changes and whether there were threshold effects in the responses to news. Neither effect appeared present in our data. Finally, there is some evidence that the effects of news may depend on the state of the economy but our results are not strongly supportive of state dependence.
References


Table 1
Descriptive Statistics
February 7, 1994 through December 29, 2006

<table>
<thead>
<tr>
<th>News Event</th>
<th>Units</th>
<th>Time</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Maximum</th>
<th>Minimum</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>Percentage Change</td>
<td>8:30 am</td>
<td>-.0301</td>
<td>.1263</td>
<td>.3</td>
<td>-.5</td>
<td>156</td>
</tr>
<tr>
<td>Core CPI</td>
<td>Percentage Change</td>
<td>8:30 am</td>
<td>-.0196</td>
<td>.0906</td>
<td>.2</td>
<td>-.3</td>
<td>156</td>
</tr>
<tr>
<td>Civilian Unemployment Rate</td>
<td>Level in percentage points</td>
<td>8:30 am</td>
<td>-.0452</td>
<td>.1414</td>
<td>.3</td>
<td>-.4</td>
<td>156</td>
</tr>
<tr>
<td>Change in Nonfarm Payrolls</td>
<td>Thousands</td>
<td>8:30 am</td>
<td>-17.160</td>
<td>108.61</td>
<td>408</td>
<td>-328</td>
<td>156</td>
</tr>
<tr>
<td>Initial Unemployment Claims</td>
<td>Thousands</td>
<td>8:30 am</td>
<td>-.4859</td>
<td>19.191</td>
<td>85.00</td>
<td>-167.00</td>
<td>675</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>Percentage Change</td>
<td>9:15 am</td>
<td>.0061</td>
<td>.2864</td>
<td>.9</td>
<td>-.7</td>
<td>156</td>
</tr>
<tr>
<td>Retail Sales</td>
<td>Percentage Change</td>
<td>8:30 am</td>
<td>-.0019</td>
<td>.6121</td>
<td>5.00</td>
<td>-1.80</td>
<td>156</td>
</tr>
<tr>
<td>Housing Starts</td>
<td>Millions of units</td>
<td>8:30 am</td>
<td>.0124</td>
<td>.0885</td>
<td>.246</td>
<td>-.273</td>
<td>155</td>
</tr>
<tr>
<td>Durable Goods Orders</td>
<td>Percentage Change</td>
<td>8:30 am</td>
<td>-.0816</td>
<td>2.7087</td>
<td>10.80</td>
<td>-7.60</td>
<td>155</td>
</tr>
<tr>
<td>Personal Income</td>
<td>Percentage Change</td>
<td>8:30 am</td>
<td>.0351</td>
<td>.2302</td>
<td>1.4</td>
<td>-.60</td>
<td>154</td>
</tr>
<tr>
<td>Trade Deficit</td>
<td>$ Billions</td>
<td>8:30 am</td>
<td>-.06</td>
<td>2.3782</td>
<td>7.30</td>
<td>-9.10</td>
<td>156</td>
</tr>
<tr>
<td>Index of Leading Indicators</td>
<td>Percentage Change</td>
<td>10:00 am</td>
<td>.0060</td>
<td>.1773</td>
<td>.90</td>
<td>-.40</td>
<td>156</td>
</tr>
<tr>
<td>Index of Consumer Confidence</td>
<td>Percentage Change</td>
<td>10:00 am</td>
<td>.7830</td>
<td>4.7113</td>
<td>13.20</td>
<td>-13.00</td>
<td>156</td>
</tr>
</tbody>
</table>

Notes: News events are the unexpected components of announcements measured by the announced value less the expected value taken from the MMS surveys. The percentage changes are for month-over-month changes.
Table 2
The Effects of News on the Change in Expected Monetary Policy
February 7, 1994 – December 29, 2006

<table>
<thead>
<tr>
<th>News Variable</th>
<th>Estimated Coefficient - All observations</th>
<th>Estimated Coefficient - Conference call changes dummied out</th>
<th>Estimated Coefficient - FOMC and Conference call changes dummied out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core CPI</td>
<td>.0130 [0.0051]**</td>
<td>.0131 [0.0051]**</td>
<td>.0127 [0.0055]**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-.0061 [0.0039]</td>
<td>-.0060 [0.0039]</td>
<td>-.0059 [0.0039]</td>
</tr>
<tr>
<td>Nonfarm Payrolls</td>
<td>.0192 [0.0048]***</td>
<td>.0193 [0.0048]***</td>
<td>.0194 [0.0049]***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment Claims</td>
<td>-.0051 [0.0021]**</td>
<td>-.0051 [0.0021]**</td>
<td>-.0051 [0.0021]**</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>.0173 [0.0067]**</td>
<td>.0172 [0.0066]**</td>
<td>.0174 [0.0071]**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Sales</td>
<td>.0128 [0.0090]</td>
<td>.0129 [0.0090]</td>
<td>.0135 [0.0090]</td>
</tr>
<tr>
<td>Housing Starts</td>
<td>.0064 [0.0065]</td>
<td>.0063 [0.0065]</td>
<td>.0051 [0.0072]</td>
</tr>
<tr>
<td>Durable Goods Orders</td>
<td>-.0185 [0.0252]</td>
<td>-.0186 [0.0250]</td>
<td>-.0245 [0.0291]</td>
</tr>
<tr>
<td>Personal Income</td>
<td>.00001 [0.0006]</td>
<td>.00001 [0.0006]</td>
<td>.00001 [0.0006]</td>
</tr>
<tr>
<td>Trade Deficit</td>
<td>.0019 [0.0019]</td>
<td>.0019 [0.0019]</td>
<td>.0026 [0.0021]</td>
</tr>
<tr>
<td>Leading Indicators</td>
<td>-.0014 [0.0149]</td>
<td>-.0015 [0.0149]</td>
<td>-.0009 [0.0146]</td>
</tr>
<tr>
<td>Consumer Confidence</td>
<td>-.0786 [0.0492]</td>
<td>-.0787 [0.0490]</td>
<td>-.0735 [0.0551]</td>
</tr>
<tr>
<td>Constant</td>
<td>-.0009 [0.0003]**</td>
<td>-.0007 [0.0003]**</td>
<td>-.0006 [0.0002]**</td>
</tr>
<tr>
<td>R-bar²</td>
<td>.013</td>
<td>.153</td>
<td>.155</td>
</tr>
<tr>
<td>F</td>
<td>3.34***</td>
<td>3.35***</td>
<td>3.20**</td>
</tr>
<tr>
<td>N</td>
<td>3228</td>
<td>3228</td>
<td>3228</td>
</tr>
</tbody>
</table>

Notes: News variables are scaled by their standard errors and adjusted for timing of futures contracts. Newey-West standard errors in brackets. The F statistic is for the test that all coefficients on news variables are jointly equal to zero.
Table 3
Allowing for State Dependence in the Effects of News on the expected Funds Rate Target

<table>
<thead>
<tr>
<th>News Variable</th>
<th>Basic Equation</th>
<th>State-Dependent Coefficients</th>
<th>Version 1*</th>
<th>Version 2#</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Core CPI</strong></td>
<td>.013**</td>
<td>N•L</td>
<td>.001</td>
<td>.016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•M</td>
<td>.013</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•H</td>
<td>.015</td>
<td>.016***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0: equal</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Unemployment Rate</strong></td>
<td>-.006</td>
<td>N•L</td>
<td>-.001</td>
<td>-.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•M</td>
<td>-.012</td>
<td>-.025**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•H</td>
<td>-.008</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0: equal</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Nonfarm Payrolls</strong></td>
<td>.019***</td>
<td>N•L</td>
<td>.019***</td>
<td>.019***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•M</td>
<td>.017*</td>
<td>.028***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•H</td>
<td>.024***</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0: equal</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Unemployment Claims</strong></td>
<td>-.005**</td>
<td>N•L</td>
<td>-.002</td>
<td>-.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•M</td>
<td>-.005**</td>
<td>-.006*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•H</td>
<td>-.005</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0: equal</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Industrial Production</strong></td>
<td>.017***</td>
<td>N•L</td>
<td>.004*</td>
<td>.013</td>
</tr>
<tr>
<td></td>
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<td>N•M</td>
<td>.016**</td>
<td>.018</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•H</td>
<td>.026</td>
<td>.020*</td>
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<td></td>
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<td>H0: equal</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Retail Sales</strong></td>
<td>.013</td>
<td>N•L</td>
<td>-.014**</td>
<td>-.012**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N•M</td>
<td>.026**</td>
<td>.029**</td>
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<td></td>
<td>N•H</td>
<td>.028*</td>
<td>.014</td>
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<td>H0: equal</td>
<td>no</td>
<td>No</td>
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<tr>
<td><strong>Housing Starts</strong></td>
<td>.006</td>
<td>N•L</td>
<td>-.008</td>
<td>-.012</td>
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<td>N•M</td>
<td>.014</td>
<td>.010</td>
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<td>N•H</td>
<td>.010*</td>
<td>.018***</td>
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<tr>
<td></td>
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<td>H0: equal</td>
<td>yes</td>
<td>No</td>
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<tr>
<td><strong>Durable Goods Orders</strong></td>
<td>-.019</td>
<td>N•L</td>
<td>-.049</td>
<td>-.049</td>
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<td>N•M</td>
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<td>.022</td>
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<td>N•H</td>
<td>.017</td>
<td>-.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0: equal</td>
<td>yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Personal Income</td>
<td>.000</td>
<td>N•L</td>
<td>-0.007</td>
<td>-0.006</td>
</tr>
<tr>
<td>Trade Deficit</td>
<td>.002</td>
<td>N•L</td>
<td>0.017***</td>
<td>0.003</td>
</tr>
<tr>
<td>Leading Indicators</td>
<td>-.001</td>
<td>N•L</td>
<td>0.006</td>
<td>-.001</td>
</tr>
<tr>
<td>Confidence Confidence</td>
<td>-.079</td>
<td>N•L</td>
<td>-0.001</td>
<td>0.007</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.001***</td>
<td></td>
<td>-0.001***</td>
<td>-0.001***</td>
</tr>
<tr>
<td>F for all coefficients = 0</td>
<td>3.189***</td>
<td></td>
<td>3.810***</td>
<td>3.234***</td>
</tr>
<tr>
<td>F for all coefficients equal across states</td>
<td></td>
<td></td>
<td>2.993***</td>
<td>1.945***</td>
</tr>
</tbody>
</table>

*Version 1
High state: cyclical unemployment < -.362 (25% of sample)
Mid state: -.362 < cyclical unemployment < .195 (50%)
Low state: .195 < cyclical unemployment (25%)

*Version 2
High state: GDP Gap < -1% (25% of sample)
Mid state: -1% < GDP Gap < 1% (50%)
Low state: 1% < GDP Gap (25%)
Daily Changes in Fed Futures Rates 1994 to 2006