Does the Fed Possess Inside Information About the Economy?

Jon Faust, Eric Swanson, and Jonathan Wright
Federal Reserve Board

Abstract

A number of recent papers have hypothesized that the Federal Reserve possesses information about the future course of inflation and output that is unknown to the private sector. We propose and conduct two direct tests of this hypothesis: 1) can monetary policy surprises improve the private sector's *ex ante* forecasts of subsequent macroeconomic statistical releases, and 2) does the private sector revise its forecasts of macroeconomic statistical releases in response to these monetary policy surprises? We find that the Federal Reserve does *not* possess inside information about any major macroeconomic statistical release, with one notable exception: Industrial Production, which the Federal Reserve produces.

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1. Introduction

Does the Fed possess inside information about the economy? Recent papers in the literature have taken opposing stands on this interesting and important question.

In one oft-cited paper, Romer and Romer (2000) find that the Federal Reserve's forecasts of inflation and output have completely dominated those of the private sector, in the sense that the optimal linear combination of the private sector's forecast and the Fed's internal forecast places a weight of one on the Fed's forecast and a weight of zero on the private sector's.[1] They conclude that the Federal Reserve does possess inside information about the future course of output and inflation, and they interpret this informational advantage as stemming from the huge amount of resources the Fed devotes to forecasting, relative to individual private-sector firms.

Ellingsen and Söderström (2000, 2001) also consider the possibility that the Federal Reserve possesses inside information about the economy. In their theoretical model (2001), these authors derive predictions for how the term structure of interest rates ought to respond to monetary policy surprises, both with and without Federal Reserve inside information. In their empirical paper (2000), Ellingsen and Söderström classify, based on their readings of the *Wall Street Journal,* every Federal Reserve policy action between October 1988 and March 1997 as being either an exogenous policy action or an endogenous response of the Fed to the state of the economy. They note that if the yield curve responds to an endogenous Fed policy announcement, then the Fed's information must not have been publicly available. They conclude that the Federal Reserve posseses significant inside information.

In contrast to the above papers, Cochrane and Piazzesi (2002) and Faust, Swanson, and Wright (2002) have argued that the Fed does *not* possess such inside information about the economy, at least not at a one-month horizon with respect to the macroeconomic time series they consider.[2] These authors, like Kuttner (2001), use high-frequency market interest rate data to measure the surprise component of Federal Reserve policy actions, and treat this surprise as an exogenous monetary policy shock, or as an instrument correlated

[1] More precisely, the estimated weight on the Fed's forecast is numerically close to one, and the hypothesis that the coefficient is equal to one cannot be rejected at even the 10% level. This finding was very robust in their paper.

[2] Cochrane and Piazzesi (2002) do not make this argument explicitly, but it is implicit in their identification strategy, as discussed below.

with the monetary policy shock, in order to identify the effects of monetary policy on the economy in a structural VAR. Clearly, this monetary policy surprise (measured using the high-frequency market interest rate data) would not be a valid instrument for the structural monetary policy shock if it were also correlated with the structural shocks to other variables, such as output or inflation, in the VAR. Thus, this high-frequency, market-based identification strategy requires that the Fed be no better informed than the markets about the other structural shocks in the model.

The issue of Federal Reserve inside information is also important for optimal central bank design. If the central bank possesses a significant informational advantage, then a much stronger case can be made that central bankers should be permitted to be discretionary, and thereby free to react to their inside information, rather than being committed to a rule in terms of variables that are observable to the private sector. Canzoneri (1985) and Athey, Atkeson, and Kehoe (2001) formally analyze the tradeoff between the benefits of committing the central bank to a publicly verifiable rule versus the benefits of allowing the central bank to respond freely to its private information about the state of the economy.

In this paper, we make use of a new dataset on private sector market forecasts that allows us to directly test whether the Federal Reserve possesses inside information about any of the major macroeconomic statistical releases. The intuition for our tests is as follows. Macroeconomic statistics for a given month (or quarter) are typically released after the end of that month (or quarter), in most cases with a significant lag. For example, the Consumer Price Index for a given month (e.g., June) is not released until about the 17th of the following month (July). Federal Reserve policy surprises that occur *after* the end of the month but *prior* to the actual statistical release cannot have a contemporaneous effect on the statistic, but will still be informative about the statistical release if the Fed possesses inside information about that statistic. We run a variety of regressions to test whether the private sector's *ex ante* forecast of each of a number of macroeconomic statistics could be improved upon by making use of the Fed's monetary policy surprise.

To preview our results, we find that 1) the private sector's forecasts could *not* be improved upon by making use of Fed monetary policy surprises, and 2) the private sector does *not* systematically revise its forecasts for macroeconomic statistics in response to Federal Reserve policy surprises, with one notable exception in both cases: Industrial

Production, a statistic which the Fed itself produces. We conclude that the Federal Reserve does not possess significant inside information about any major macroeconomic statistical release other than Industrial Production.

We interpret the difference between our results and Romer and Romer's (2000) as being due to the longer forecast horizon that they consider, and the earlier time period of their data. While private sector firms may not devote a great deal of resources to forecasting U.S. output and inflation at longer horizons, they do devote a considerable amount of resources to forecasting upcoming macroeconomic statistical releases, as these releases have huge effects on the U.S. stock and bond markets (Ederington and Lee (1993), Fleming and Remolona (1997)). Also, when there is a thicker forecast market, we expect information aggregation theorems (e.g., Grossman (1989)) to hold with greater force, increasing our faith in the ability of the market to aggregate up the individual, private information of all of its participants, so that even if the Fed does devote more resources to forecasting than any individual firm, its informational advantage over the market as a whole may still be negligible. Finally, to the extent that markets may have learned and become more efficient over time, we are less likely to find any informational advantage of the Fed in the 1990s (the period of our data) than in the 1980s (the period of the Romers' data).

Finally, it should be noted that we restrict our analysis to Federal Reserve inside information about output and inflation statistics for the U.S. economy, and do not consider the question of whether the Federal Reserve possesses inside information about the health of the banking sector. Peek, Rosengren, and Tootell (1999) consider the latter question in detail, and find that the Federal Reserve does possess significant inside information about bank capital adequacy ratings and the financial health of the banking sector, and that the Fed has used that information in the conduct of monetary policy. They interpret the Fed's informational advantage as stemming from its role as a bank regulator. While we find this variation on our question and the corresponding results very interesting, our data do not allow us to independently verify or refute their findings.

The rest of our paper proceeds as follows. Section two describes our private sector forecast data, and how we measure monetary policy surprises. Section three presents our two primary tests of Federal Reserve inside information, and discusses the results. Section four provides a number of variations on these basic tests to determine the sensitivity and robustness of our results. Section five concludes.

2. Data

We consider whether the Federal Reserve possesses inside information about the following nine macroeconomic statistics: Nonfarm Payrolls, Retail Sales, the PPI, core PPI, Industrial Production, CPI, core CPI, Real GDP, and the GDP Deflator. Of these, the first seven are monthly statistics, and the last two are quarterly, but the last two cycle through "advance," "preliminary," and "final" releases at the monthly frequency.

Table 1 summarizes the basic features of each of these statistics. The first column gives the usual name by which the markets refer to the series. The second column gives the full name of the series, used in official publications, and the third column lists the official agency that produces the statistic. The fourth column gives the approximate release date (actual release dates vary from month to month, can depend on the details of the given statistic's exact sample period for the month, and have in some cases changed over time). The last column of the Table gives the units in which the statistic is reported. For example, Nonfarm Payrolls is released as the change in employment from the previous month, in thousands; the CPI is released as the percentage change in the price index from the previous month; and Real GDP is released as the percentage change from the previous quarter at an annual rate.[3] Note that, in all cases, we consider the seasonally adjusted version of the statistic in question, as this is the version that the markets forecast and that the financial press emphasizes.

We choose to study these particular statistics because they are the most widely watched and widely forecast by the private sector (Ederington and Lee (1993), Fleming and Remolona (1997)). They are also the statistical releases that have the greatest impact on prices and trading volume in the bond markets (*ibid.*). The private sector forecasts of these data are thus likely to be of the highest quality, and any results for these statistics are likely to be of the greatest interest, both to the markets and to the profession.

2.1 Private Sector Forecasts

To measure the private sector's forecasts of these macroeconomic statistics, we use data obtained from Wrightson Associates, a financial information services company that focuses

[3] For additional information and details about these series, refer to the web sites and official publications of the producing agencies.

Table 1: Macroeconomic Data, Description, and Sources

Macroeconomic Statistic	Full Name	Produced by	Release Date†	Units
Nonfarm Payrolls	Employees on Nonagricultural Payrolls	Bureau of Labor Statistics	Friday after 1st day of following month	change from prev. month, 000s
Retail Sales	Advance Monthly Sales for Retail and Food Services	U.S. Census Bureau	about 12th day of following month	change from prev. month, percent
PPI	Producer Price Index for Finished Goods	Bureau of Labor Statistics	about 13th day of following month	change from prev. month, percent
core PPI	Producer Price Index for Finished Goods, less Food and Energy Items	Bureau of Labor Statistics	about 13th day of following month	change from prev. month, percent
Industrial Production	Industrial Production Index	Federal Reserve Board	about 15th day of following month	change from prev. month, percent
CPI	Consumer Price Index, All Urban Workers	Bureau of Labor Statistics	about 17th day of following month	change from prev. month, percent
core CPI	Consumer Price Index, less Food and Energy Items, All Urban Workers	Bureau of Labor Statistics	about 17th day of following month	change from prev. month, percent
Real GDP	Real Gross Domestic Product	Bureau of Economic Analysis	last Thursday of following month	change from prev. quarter, annual percentage rate
GDP Deflator	Implicit Price Deflator for Gross Domestic Product	Bureau of Economic Analysis	last Thursday of following month	change from prev. quarter, annual percentage rate

†Release dates are approximate. Exact release dates are usually determined by details of each macroeconomic statistic's sample period for the given month or quarter, and can vary somewhat over time.

on the U.S. Treasury security and money markets. Their financial newsletter, the *Money Market Observer,* is published every Saturday of the year, and presents forecasts for all of the major macroeconomic statistics to be released over the subsequent four weeks. This dataset is relatively unique, and well-suited for our purposes, in that it provides a fairly high-frequency measure of market expectations of the major statistics up to four weeks before they are released.

Wrightson staff justify their forecasts in great detail in the issue immediately preceding each major statistical release. The newsletter is well-regarded by market participants.

Wrightson forecasts for the core PPI and core CPI are available going back to mid-1990; Wrightson forecasts for the other macroeconomic statistics we consider are available going back to at least 1985.

2.2 Monetary Policy Surprises

We follow Kuttner (2001) and Faust, Swanson, and Wright (2002) in calculating the surprise component of FOMC policy moves using federal funds futures data. The procedure can be summarized as follows: Federal funds futures contracts are standardized to cover a given calendar month, and are settled on the basis of the average federal funds rate that prevails over that calendar month. The average fed funds rate is calculated as the simple mean of the daily averages published by the Federal Reserve Board, where the federal funds rate on a non-business day is defined to be the rate that prevailed on the preceding business day. Each federal funds future contract trades openly on the Chicago Board of Trade Exchange up to and including the day of settlement, which is the last day of the contract month. The market is very liquid, volumes for the current-month and near-future (next three months) fed funds futures contracts are extremely high, and spreads are narrow (Gürkaynak, Sack, and Swanson (2002)).

We measure the *surprise* component of a monetary policy announcement using the *change* in the current-month fed funds future contract in the minutes surrounding the announcement. Thus, if a monetary policy announcement on a given FOMC meeting day is met with no change in the price of the current-month fed funds future contract, we define the surprise component of the announcement to be zero. When the price of the current-month fed funds futures contract moves in the minutes surrounding the announcement, we scale this movement up by the ratio

$$\text{(number of days in contract month)} \Big/ \text{(number of days remaining in contract month)} \qquad (1)$$

in order to back out the surprise in the fed funds rate target, as opposed to the surprise in the monthly average federal funds rate. Thus, if a monetary policy announcement on November 15 is met with a change in the current-month fed funds future contract of 10 basis points, we regard this as a 20 basis point surprise in the fed funds rate target. Implicit in this calculation is the assumption that the surprise in the federal funds rate is much larger than any change in the risk premium associated with the fed funds futures contract. This assumption seems to be well-supported by the data: for example, the total risk premium in the current-month fed funds future contract is estimated by Gürkaynak, Sack, and Swanson (2002) to be about two basis points on average, and the hypothesis of a constant risk premium is not rejected. Therefore, we expect changes in these risk premia to be substantially less than one basis point in magnitude on our announcement days.

The above procedure for calculating monetary policy surprises is modified in two ways for practical purposes. First, for monetary policy announcements that occur late in the month (in the last six days of the month), we use the change in the *next*-month rather than current-month federal funds future contract to measure the surprise component of the announcement. This is because any surprise in the federal funds rate near the end of the month has only a small effect on the current-month average, and will be difficult to distinguish from any noise that might be present in the fed funds futures data, such as changes in bid-ask spreads or liquidity premia. Second, we use the close-to-close change in the price of the fed funds futures contract, rather than the change in the few minutes surrounding the monetary policy announcement. Our data set includes intra-day data for about three years of our sample period, and for these three years, the correlation between the intra-day change in the fed funds futures contract prices and the close-to-close change in those prices is extremely high, because the monetary policy announcement typically dominates any other news released on that day. Moreover, the close-to-close change allows markets some additional time to digest the implications of the monetary policy announcement, which may particularly important for target changes prior to 1994.

The timing of the monetary policy announcements is also worth noting. Beginning with the February 1994 meeting, the FOMC started releasing explicit announcements about the change in its target for the federal funds rate. These announcements occur at 2:15pm on the day of the FOMC meeting. Prior to 1994, changes in the federal funds rate target were often not known until the morning after the FOMC meeting, when the New York Fed's trading Desk intervened in the market.[4] In all cases, we regard the monetary

[4] Note that prior to 1994, changes in the discount rate (the rate at which banks can borrow funds directly from the Fed) have always been announced on the day of the FOMC meeting, and every change in the discount rate has also been accompanied by a change in the federal funds rate target. Thus, market participants could correctly infer a change in the fed funds rate target when the change in the discount rate was announced. Also note that two intermeeting moves—on December 18, 1990, and October 15,

policy announcement as having taken place at the time that the change in policy became known to the markets. In some cases, this is on the day of the FOMC meeting, and in others, the morning after the FOMC meeting.

An alternative approach to measuring market expectations of the federal runds rate would be to use the spot value of the 30-day Eurodollar contract, as in Cochrane and Piazzesi (2002). We consider this measure of market expectations as a robustness check on our results in section 4, below, but regard it as inferior for a number of reasons. First, unlike the current-month futures contracts, which are guaranteed by the Chicago Board of Trade, the Eurodollar market is susceptible to counterparty risk—the risk that the depository institution may default on the 30-day loan. This leads to risk premia on Eurodollar contracts of about 15 basis points, as opposed to 2 basis points for the current-month fed funds future contract (Gürkaynak, Sack, and Swanson (2002)). Changes in risk premia are thus likely to be an order of magnitude greater for Eurodollars then for fed funds futures. Second, Eurodollars are settled based on LIBOR, rather than directly on the federal funds rate. Although the two interest rates track each other closely, they trade at different times of the day and can differ for technical reasons (the federal funds rate fluctuates due to excesses or shortages of reserves in the federal funds market, and tends to be soft on Fridays and tight on settlement Wednesdays, for example). The Eurodollar rate does have one primary advantage, however, in that it has traded on an open market since mid-1984, while fed funds futures have only traded openly since late 1988 (and our fed funds futures data begin in mid-1989).

3. Results

To investigate whether the Federal Reserve possesses inside information about the above macroeconomic statistics, we consider two main types of tests. First, when the Fed surprises the markets, either through a policy action or inaction, we ask whether the private sector's *ex ante* forecasts could be systematically improved by making use of the Fed's subsequent monetary policy surprise. If the Fed possesses significant inside information,

1998—were announced to the public after the close of the fed funds futures market at 3pm. Like Kuttner (2001), we regard these announcements as having taken place the following morning, rather than on the day they were actually announced.

and if the Fed's actions reflect its information, then a policy surprise should be helpful in improving the private sector's *ex ante* forecast.

Second, when the Federal Reserve surprises the markets, we ask whether the private sector *revises* its forecasts in response. If the Fed possesses inside information, and the markets are aware of the Fed's informational advantage, then we should observe a systematic relationship between the market's forecast revisions and the Fed's policy surprises. Indeed, Romer and Romer (2000) argue that exactly this effect is present in the bond market's expectations of inflation. Note that this second test requires a slightly greater set of assumptions than the first one, since it not only requires the Fed to possess inside information about the economy, but requires the private sector to be aware of the Fed's informational advantage as well.

3.1 Monetary Policy Surprises and Private Sector Forecast Errors

We begin by investigating whether the Federal Reserve's monetary policy surprises contain any information that would be of use in improving the private sector's *ex ante* forecasts.

For each monetary policy surprise within our sample period, we consider the Wrightson forecasts from the Saturday immediately preceding the monetary policy surprise as our measure of the private sector's *ex ante* forecasts. If the Fed possesses inside information about a given macroeconomic statistical release, and the Fed's actions reflect its information, then the Fed's monetary policy surprises should have significant explanatory power for that macroeconomic statistic, above and beyond the information contained in the *ex ante* private sector forecast. We test this hypothesis by means of the following regression:

$$y_t = \beta_0 + \beta_1 \hat{y}_t + \beta_2 \text{MPsurprise}_t + \varepsilon_t \tag{2}$$

where y_t is the macroeconomic statistic of interest, $\hat{y}_t$ is the Wrightson *ex ante* forecast, MPsurprise_t denotes the monetary policy surprise (calculated using fed funds futures as described in the previous section), t indexes monetary policy surprises in our sample, and ε_t is a regression residual. Under the null hypothesis of no Federal Reserve inside information, β_2 should be zero. Under the hypothesis that the private sector (Wrightson) forecast is efficient, we should also have $\beta_0 = 0$ and $\beta_1 = 1$.[5] We test this assumption below and are

[5] To be more precise, we have $\beta_0 = \overline{y} - \beta_1 \overline{\hat{y}} - \beta_2 \overline{\text{MPsurprise}}$, where a bar over a variable denotes its mean. However, under the joint hypothesis that $\beta_2 = 0$, $\beta_1 = 1$, and $\overline{\hat{y}} = \overline{y}$, we also have $\beta_0 = 0$.

Table 2: Monetary Policy Surprises and Private Sector Forecast Errors

Macroeconomic Statistic	June 1989 – Dec 2001 # Obs.	June 1989 – Dec 2001 coeff. (std. err.) on MP Surprise		Feb 1994 – Dec 2001 # Obs.	Feb 1994 – Dec 2001 coeff. (std. err.) on MP Surprise	
Nonfarm Payrolls	51	223.5	(155.8)	30	76.2	(272.2)
Retail Sales	64	0.517	(0.906)	30	−0.679	(2.028)
PPI	66	0.530	(0.473)	30	0.737	(1.008)
core PPI	57	0.016	(0.251)	30	0.056	(0.491)
Industrial Production	67	1.711	(0.475)*	33	1.766	(0.762)*
CPI	71	−0.195	(0.180)	34	−0.221	(0.283)
core CPI	60	−0.272	(0.215)	34	−0.026	(0.282)
Real GDP	89	−1.004	(0.638)	50	−1.819	(0.739)
GDP Deflator	85	0.043	(0.412)	46	0.357	(0.453)

$*$ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

unable to reject private sector forecast efficiency.

To avoid any possible causal effects running from the monetary policy surprise to the macroeconomic statistic, we only include a monetary policy surprise in the regression if it occurs after the end of the preceding month, and before the release of the macroeconomic statistic for that preceding month. Thus, if a monetary policy surprise occurs after June 30, and before the CPI (for June) is released on July 19, then there can be no causal effects running from the monetary policy surprise to that CPI release, and we would include that data point in our regression.[6]

Results from regression equation (2) are presented in Table 2, for both the June 1989–December 2001 and February 1994–December 2001 sample periods.[7] The number of observations in each regression (determined by the criteria in the previous paragraph) are given in the second and fourth columns. Regression coefficients on the monetary policy

[6] Our results in Tables 2 and 3 also include monetary policy surprises that occur on or after the third-to-last day of the preceding month. A number of monetary policy surprises in our sample occur in the final three days of the month, so that we gain several observations while still avoiding essentially any chance of the monetary policy surprise having a noticeable causal effect on the macroeconomic statistical release. In the case of Nonfarm Payrolls, we also include monetary policy surprises that occur on or after the 23rd of the previous month. The justification is intuitively the same as that given above: Nonfarm Payrolls is the number of employees on business payrolls for the pay period including the 12th of the month, which for weekly, bi-weekly, and semi-monthly pay periods will almost never overlap with a monetary policy surprise occuring on or after the 23rd. Thus, the chance of our regression picking up any causal effects of the monetary policy surprise on Nonfarm Payrolls in this case is small, and we increase our sample size markedly. In all cases, however, our results are robust to including only monetary policy surprises that occur after the last day of the preceding month—we simply lose observations by doing so.

[7] We impose $\beta_1 = 1$ here for greater estimation efficiency, but the results are robust to the inclusion or exclusion of this restriction—see section 4, below.

surprise ($\hat{\beta}_2$), with standard errors in parentheses, are presented in the third and fifth columns.

For each regression in Table 2, we conduct a one-sided test in the positive direction of the null hypothesis that $\beta_2 = 0$. We use a one-sided test because, if the Fed does possess inside information about output or inflation, then a surprise monetary policy tightening (an upward surprise in the federal funds rate) should be associated with a higher value of the output or inflation statistic than the private sector was forecasting.

Of all the macroeconomic statistics in Table 2, in either sample period, we can only reject the hypothesis $\beta_2 = 0$ at the 5% level for one of them: the Industrial Production Index. The p-values associated with this test are .0003 and .0136 for the early and late samples, respectively. Although the Fed's monetary policy surprises might also seem to be significantly correlated with subsequent real GDP announcements, this correlation is opposite in sign from what we expect if the Fed possessed inside information about the statistic, and thus we do not reject the null hypothesis for this case.

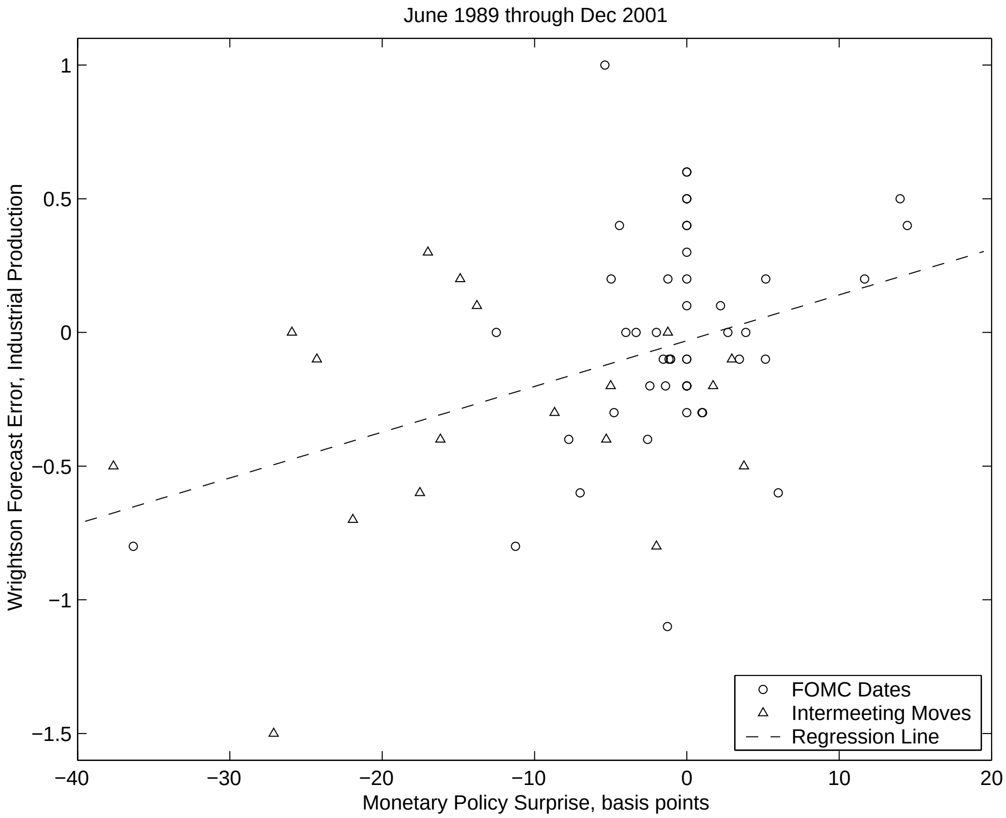
The private sector's *ex ante* forecast errors for Industrial Production are plotted against the corresponding Fed monetary policy surprises in Figure 1, for our full sample period.[8] Observations corresponding to FOMC meeting dates are plotted as circles in the graph, while those corresponding to intermeeting policy moves by the Fed are plotted as triangles. The least-squares regression line is given by the dashed line in the figure.

The significant positive relationship we found in Table 2 is evident in the figure, and cannot be explained by the presence of a few simple outliers. The result also does not seem to be due exclusively to intermeeting policy moves—a robustness check which we perform in more detail in section 4, below—although most of the large negative policy surprises in our sample are due to such moves. Monetary policy surprises above 10bp have always been associated with stronger-than-expected IP, while monetary policy surprises below −10bp have almost always been associated with weaker-than-expected IP, suggesting that the Fed does have inside information about the upcoming IP release, and is using this information in setting policy.

Our finding of Federal Reserve inside information regarding the Industrial Production Index should not be too surprising, since the Federal Reserve is the agency that produces

[8] Results for the post-1994 sample are very similar.

Figure 1: Private Sector Industrial Production Forecast Errors vs. Monetary Policy Surprises



this statistic. The finding of statistically significant inside information at the Fed regarding the Industrial Production Index also demonstrates that our test does have statistical power—we are able to decisively reject the null hypothesis of no Federal Reserve inside information in at least one case where we suspect inside information might be present.

3.2 Monetary Policy Surprises and Private Sector Forecast Revisions

We now consider our second test of Federal Reserve inside information. The previous section considered whether monetary policy surprises *could* be used in a systematic way to improve the private sector's forecast. In this section, we consider whether the private sector *does* revise its forecasts in response to monetary policy surprises.

For each monetary policy surprise within our sample period, we calculate the Wrightson forecast *revision* from the Saturday immediately preceding the policy surprise to the Saturday immediately following the policy surprise. If the Fed possesses inside information about a given macroeconomic statistical release, and the private sector is aware of the Fed's informational advantage, then the Fed's monetary policy surprises should have significant explanatory power for the private sector's forecast revisions from just before to just after the policy surprise. We test this hypothesis by means of the following regression:

$$\Delta\, \hat{y}_t = \gamma_0 + \gamma_1 \text{MPsurprise}_t + \varepsilon_t \tag{3}$$

where $\Delta\hat{y}_t$ is the Wrightson forecast revision, as described above, MPsurprise_t denotes the monetary policy surprise, t indexes monetary policy surprises in our sample, and ε_t is a regression residual. Under the null hypothesis of no Federal Reserve inside information, γ_1 should be zero.

As in the previous section, we avoid any causal effects from the monetary policy surprise to the macroeconomic statistic in question by including a given monetary policy surprise in the regression only if it occurs *after* the end of the preceding month and *before* the release of the macroeconomic statistic for that preceding month. Thus, if a monetary policy surprise occurs after June 30, and before the CPI (for June) is released on July 19, then there can be no causal effects running from the monetary policy surprise to that CPI release, and we would include that data point in our regression.

Results from regression equation (3) for both our sample periods are presented in Table 3. There are fewer observations for these regressions than for those in the preceding section because we require that the monetary policy surprises in each regression occur not only after the end of the preceding month and before the macroeconomic statistical release date, but also immediately in between two forecasts of the macroeconomic statistic in question. This eliminates monetary policy surprises that occur within the same week as the statistical release date, even when these surprises occur prior to the statistical release, because there is no Wrightson forecast for the statistic that occurs immediately after the monetary policy surprise in that case.

A cursory examination of Table 3 reveals that, for many of the statistics (e.g., the PPI and CPI), there is often no forecast revision in response to the monetary policy surprise—i.e., the number of nonzero forecast revisions, given in parentheses in each row next to the total number of observations, is small. For these statistics, at least, monetary policy surprises do not seem to be causing the private sector to revise their forecasts. This result foreshadows and corroborates our regression coefficient estimates in the table.[9]

[9] One could argue that the private sector's forecasts perhaps display excess inertia. We address, and reject, this hypothesis in section 4, below.

Table 3: Monetary Policy Surprises and Private Sector Forecast Revisions

Macroeconomic Statistic	June 1989 – Dec 2001 # Obs. (# Nonzero)		June 1989 – Dec 2001 coeff. (std. err.) on MP Surprise		Feb 1994 – Dec 2001 # Obs. (# Nonzero)		Feb 1994 – Dec 2001 coeff. (std. err.) on MP Surprise	
Nonfarm Payrolls	27	(7)	63.0	(40.6)	16	(1)	−3.2	(24.9)
Retail Sales	58	(36)	1.322	(.551)*	27	(19)	1.043	(.781)
PPI	55	(9)	−0.026	(.067)	27	(3)	−0.045	(.077)
core PPI	51	(3)	0.035	(.045)	27	(1)	0.000	(.044)
Industrial Production	59	(28)	1.495	(.269)*	26	(13)	1.626	(.280)*
CPI	59	(7)	−0.055	(.044)	26	(3)	−0.044	(.079)
core CPI	49	(4)	−0.012	(.040)	26	(2)	−0.018	(.063)
Real GDP	59	(35)	−0.253	(.440)	33	(23)	−0.740	(.526)
GDP Deflator	56	(6)	−0.265	(.278)	30	(4)	−0.258	(.068)

∗ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

Regression coefficient estimates for γ_1 from equation (3), with standard errors in parentheses, are given in the third and fifth columns of Table 3. As in the previous section, for each regression we conduct a one-sided test in the positive direction of the hypothesis that $\gamma_1 = 0$. As in the previous section, we are unable to reject this hypothesis for the vast majority of macroeconomic statistics, implying that the Wrightson forecast of these statistics is *not* systematically revised in response to Federal Reserve monetary policy surprises.

As in the previous section, however, results for the Industrial Production Index are quite different: p-values for the hypothesis test are well below 10^{-4} in both sample periods, indicating that the Wrightson staff revises its forecasts about Industrial Production very systematically in response to monetary policy surprises. The size of the estimated coefficient indicates that a 25 basis point monetary policy surprise causes Wrightson to revise up their forecast for Industrial Production by about 0.4 percentage points, a magnitude that is very much in line with the estimated relationship between Fed monetary policy surprises and the *ex ante* forecast errors in Table 2.

In contrast to Table 2, there appears to be no significant negative correlation between the Wrightson forecast revisions for real GDP and the Fed's monetary policy surprises. This supports our view that the relatively strong negative correlation observed in Table 2 was spurious. In addition, we now observe in Table 3 a statistically significant positive relationship between Wrightson forecast revisions for Retail Sales and monetary policy surprises over the early sample. Given the lack of a significant positive relationship for

Table 4a: Monetary Policy Surprises and Private Sector Forecast Errors excluding intermeeting policy moves

	June 1989 – Dec 2001			Feb 1994 – Dec 2001		
Macroeconomic Statistic	# Obs.	coeff. (std. err.) on MP Surprise		# Obs.	coeff. (std. err.) on MP Surprise	
Nonfarm Payrolls	46	206.9	(205.2)	29	11.4	(442.9)
Retail Sales	47	−0.688	(1.601)	29	−3.415	(3.287)
PPI	49	0.499	(0.753)	29	1.647	(1.652)
core PPI	44	0.479	(0.406)	29	1.084	(0.773)
Industrial Production	49	2.102	(0.745)*	32	2.302	(1.189)*
CPI	51	−0.249	(0.305)	32	−0.154	(0.466)
core CPI	46	−0.090	(0.335)	32	−0.209	(0.467)
Real GDP	71	−0.230	(0.947)	47	−0.106	(1.048)
GDP Deflator	67	−0.703	(0.608)	43	−0.002	(0.685)

∗ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

this statistic in Table 2 and the late sample of Table 3, this could either be a spurious finding, or could indicate that the private sector might have mistakenly believed the Fed was conveying inside information about Retail Sales in its policy moves, when in fact it was not. The lack of statistical significance for the Retail Sales forecast revisions over the late sample in Table 3 could be interpreted to support either of these stories.

4. Sensitivity Analysis

We now examine to what extent our basic results above are sensitive to variations in sample, specification, details of the private sector forecast data, and measure of monetary policy surprises.

4.1 Exclusion of Intermeeting Policy Moves

One possible interpretation of the results in section 3 is that the Federal Reserve sometimes possesses inside information, and at other times does not. In particular, it might be the case that when the Fed possesses inside information, it acts aggressively by cutting (or raising) the federal funds rate in an "intermeeting move" in between regularly scheduled FOMC meetings. If this were the case, our findings of statistically significant inside information for the Industrial Production Index could be entirely due to the subsample of monetary policy surprises that were intermeeting moves.

Table 4b: Monetary Policy Surprises and Private Sector Forecast Revisions excluding intermeeting policy moves

Macroeconomic Statistic	June 1989 – Dec 2001 # Obs.	(# Nonzero)	coeff. (std. err.) on MP Surprise		Feb 1994 – Dec 2001 # Obs.	(# Nonzero)	coeff. (std. err.) on MP Surprise	
Nonfarm Payrolls	25	(5)	9.7	(46.0)	16	(1)	−3.2	(24.9)
Retail Sales	44	(28)	−0.089	(0.819)	26	(18)	−0.601	(1.225)
PPI	45	(5)	−0.089	(0.079)	26	(3)	−0.113	(0.134)
core PPI	41	(2)	0.132	(0.038)*	26	(1)	0.021	(0.077)
Industrial Production	42	(20)	1.472	(0.396)*	25	(12)	1.162	(0.537)*
CPI	43	(5)	−0.039	(0.073)	25	(3)	−0.105	(0.135)
core CPI	38	(3)	0.002	(0.062)	25	(2)	−0.011	(0.108)
Real GDP	45	(28)	−0.442	(0.871)	30	(21)	−1.169	(0.925)
GDP Deflator	42	(4)	−0.419	(0.619)	27	(3)	−0.045	(0.114)

∗ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

In Tables 4a and 4b, we reestimate our regressions from section 3 over the same sample periods, this time excluding all intermeeting policy moves that took place in those periods. In Table 4a, we again reject the hypothesis of no Federal Reserve inside information only for the Industrial Production Index. Significance levels remain very substantial in these regressions, and the magnitude of these estimates is in agreement with our findings in the previous section. In contrast to Table 2, and in agreement with our priors, there does not seem to be a strong negative correlation between monetary policy surprises and private sector GDP forecast errors in Table 4a.

Table 4b presents the analogous results for private sector forecast revisions. The results are again very much in line with Table 3. In contrast to previous tables, however, Table 4b shows a positive and statistically significant relationship between the monetary policy surprise and the market's forecast revision for the PPI, over the full period. This result appears to be spurious, though, as the number of nonzero PPI forecast revisions is extremely small (only 2 over the full sample, and 1 in the late sample), the finding is not robust across the two sample periods, and is not apparent in the earlier tables.

4.2 Not Imposing Unit Coefficient on the Private Sector Forecasts

Our regression results in Table 2 imposed a unit coefficient on the private sector forecasts, essentially imposing private sector forecast efficiency. Table 4c presents the full set of coefficient estimates and standard errors for unrestricted regression specification (2) from

Table 4c: Monetary Policy Surprises and Private Sector Forecast Errors
not imposing unit coefficient on forecast
June 1989 – Dec 2001

Macroeconomic Statistic	Coefficient Estimates for Regression Equation (2) $\hat{\beta}_0$ (std. err.)		$\hat{\beta}_1$ (std. err.)		$\hat{\beta}_2$ (std. err.)		Private Sector Forecast Effic. Test (p-val)
Nonfarm Payrolls	−37.0	(27.5)	1.113	(0.150)	202.7	(158.9)	0.110
Retail Sales	−0.037	(0.100)	1.309	(0.120)	0.630	(0.869)	0.046
PPI	−0.081	(0.068)	1.169	(0.158)	0.468	(0.476)	0.204
core PPI	0.024	(0.045)	0.965	(0.165)	0.016	(0.253)	0.827
Industrial Production	−0.022	(0.053)	0.907	(0.143)	1.730	(0.478)*	0.146
CPI	−0.019	(0.038)	0.924	(0.106)	−0.181	(0.182)	0.135
core CPI	0.036	(0.072)	0.730	(0.250)	−0.280	(0.215)	0.358
Real GDP	0.025	(0.103)	0.979	(0.030)	−0.943	(0.645)	0.672
GDP Deflator	0.075	(0.093)	0.942	(0.031)	−0.064	(0.410)	0.023

∗ denotes statistical signficance of $\hat{\beta}_2$ at the 5% level for a one-sided test in the positive direction.

section 3 over the full June 1989 to December 2001 sample, along with p-values for the joint hypothesis test (F-test) of $\beta_0 = 0$ and $\beta_1 = 1$ (a test of private sector forecast efficiency).

Our results in Table 4c are very much in line with those from Table 2: the only significant value of $\hat{\beta}_2$ that we find is for Industrial Production, and both the point estimate and standard error surrounding this estimate are very similar to what we estimated before. In Table 4c, we reject private sector forecast efficiency at the 5% level for two macroeconomic statistics: Retail Sales and the GDP Deflator. Of these, the inefficiency in the Retail Sales forecasts is also present in the later sample period (February 1994 to December 2001, not shown), while the inefficiency in the GDP Deflator forecasts is not (the p-value rises to .349). The interpretation of these results seems to be that Wrightson has consistently *under*predicted the value of the subsequent Retail Sales release.[10] This suggests we interpret any results involving the Retail Sales forecasts with some caution, but our basic conclusions regarding Industrial Production and the other macroeconomic statistics are unaffected.

4.3 Using Spot Eurodollar Rates to Measure the MP Surprise

Some authors (most notably Cochrane and Piazzesi (2002)) have criticized the use of Federal Funds Futures for measuring monetary policy surprises, and advocated the use of

[10] This is perhaps not entirely surprising, as Retail Sales is an extremely volatile statistic, having a standard deviation of 0.85 percentage points over our sample.

Table 4d: Monetary Policy Surprises and Private Sector Forecast Errors
MP Surprises Measured Using 30-Day Eurodollar Deposit Rate

Macroeconomic Statistic	June 1989 – Dec 2001 # Obs.	June 1989 – Dec 2001 coeff. (std. err.) on MP Surprise		Feb 1994 – Dec 2001 # Obs.	Feb 1994 – Dec 2001 coeff. (std. err.) on MP Surprise	
Nonfarm Payrolls	50	228.8	(164.2)	42	291.2	(176.0)
Retail Sales	64	0.824	(0.863)	50	0.483	(1.053)
PPI	66	0.857	(0.460)*	52	0.758	(0.520)
core PPI	57	−0.011	(0.243)	52	0.026	(0.273)
Industrial Production	68	1.526	(0.445)*	55	1.254	(0.486)*
CPI	71	−0.109	(0.168)	55	−0.234	(0.179)
core CPI	60	−0.251	(0.198)	55	−0.232	(0.224)
Real GDP	88	−1.083	(0.582)	71	−0.883	(0.621)
GDP Deflator	84	0.431	(0.378)	67	0.334	(0.378)

∗ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

spot 30-day rates on Eurodollar deposits instead. Although Gürkaynak, Sack, and Swanson (2002) find that spot Eurodollars perform significantly worse than Fed Funds Futures as predictors of the Federal Funds rate, and have a much larger risk premium (15 basis points vs. 2 basis points), we repeat our regressions from Table 2 using this alternative measure of monetary policy surprises as a robustness check. The results, presented in Table 4d, are very close to those in Table 2, and none of our earlier conclusions are altered.

[We can also use the spot Eurodollar data to calculate MP surprises back to mid-1984, and thus extend our regression sample period backward. We have yet to do this.]

4.4 Private Sector Forecast Revisions due to Non-Monetary Surprises

In our analysis surrounding the private sector forecast revisions in Table 3, one might be concerned about the relatively large number of zero revisions made by the private sector to its forecasts. For example, it could be the case that private sector forecasts display a relatively large degree of inertia (due perhaps to adjustment costs that firms might incur if they change their forecasts). Table 5 investigates this hypothesis by regressing private sector forecast revisions for one macroeconomic statistical release against surprises in *other* (non-monetary) macroeconomic statistical releases.

For example, when the Nonfarm Payrolls statistic is released early in the month, we can calculate the surprise component of the statistical release (i.e., the actual data release minus the *ex ante* private sector forecast), and then see to what extent private sector

Table 5: Private Sector Forecast Revisions and Non-FOMC Surprises
Jan 1985 – Dec 2001

Dependent Variable	Independent Variable	# Obs.	coeff. (std. err.) on Ind. Var. Surp.	
Retail Sales	Nonfarm Payrolls	195	.0005	(.0003)
Industrial Production	Nonfarm Payrolls	195	.0010	(.0002)*
Real GDP	Nonfarm Payrolls	124	.0005	(.0002)*
Industrial Production	Retail Sales	75	−.004	(.018)
Real GDP	Retail Sales	200	.062	(.036)*
CPI	PPI	139	.109	(.015)*
core CPI	core PPI	74	.040	(.022)*
GDP Deflator	PPI	192	−.005	(.023)
Real GDP	Industrial Production	189	−.025	(.107)
GDP Deflator	CPI	150	.216	(.088)*

$*$ denotes statistical signficance at the 5% level for a one-sided test in the positive direction.

forecast *revisions* to *other* macroeconomic statistics (e.g., Retail Sales) can be explained by the surprise in Nonfarm Payrolls. The regression specification is exactly analogous to the one from Table 3, i.e.:

$$\Delta\, \hat{y}_t = \theta_0 + \theta_1 \text{Surprise}_t + \varepsilon_t \tag{4}$$

where Surprise_t denotes the surprise in the independent variable (Nonfarm Payrolls in the example just given) and $\Delta\hat{y}_t$ the Wrightson forecast revision to the dependent variable (Retail Sales).

Results for this exercise are presented in Table 5. Note that we have many more observations in this case because our forecast data go back in many cases to 1985, while monetary policy surprises calculated using Fed Funds Futures are only available from mid-1989 onward. As is evident in Table 5, many statistics are in fact significantly revised in response to surprises in other macroeconomic statistics. For example, surprises in Nonfarm Payrolls are associated with significant upward forecast revisions to Industrial Production and to real GDP. This finding is qualitatively matched by upward revisions in Retail Sales, although the result is not statistically significant for that indicator, perhaps because Retail Sales is a much noisier indicator than either IP or GDP. Note that the coefficients on Nonfarm Payrolls are numerically small because the units of that statistic is in thousands of workers, rather than percentage points (see Table 1).[11]

[11] The standard deviation of the Nonfarm Payrolls statistic is 167.4, corresponding to a monthly change of 167,400 workers. The standard deviation of surprises in the Nonfarm Payrolls statistic is about 100 [need to refine this calculation].

Other results of interest are that forecasts of real GDP are significantly revised in response to surprises in Retail Sales, forecasts of the CPI and core CPI are significantly revised in response to surprises in the PPI and core PPI, respectively, and forecasts of the GDP Deflator are significantly revised in response to surprises in the CPI.

These results strongly suggest that private sector forecasts are in fact not excessively inertial, and are revised quite frequently in response to incoming macroeconomic data. However, as we saw in Table 3, the private sector does *not* revise its forecasts for any of these statistics (except for Industrial Production) in response to monetary policy surprises. It thus appears that monetary policy surprises are not informative about these other macroeconomic statistical releases.

5. Conclusions

To be written.

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