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The Information Effect of Monetary Policy: Self-Defeating or Optimal?

*Wesley Janson and Chengcheng Jia**

As the Federal Reserve has become more transparent about its decisions on the federal funds target rate, the general public has begun to regard the rate as not only a benchmark interest rate, but also as a signal about the state of the economy. However, the specific information considered by the public to be revealed is not clearly understood. We investigate this question and find that the information revealed by monetary policy decisions is regarding future output growth, not inflation, and that such an information effect is theoretically optimal and does not make interest-rate policies self-defeating.

One of the most notable changes at the Federal Reserve in the past few decades has been an increase in transparency. Starting in 1994, the Fed began to release information about the decisions of its policymaking body, the Federal Open Market Committee (FOMC). At first, the FOMC released a public statement when there was a change in its target for the federal funds rate, but since 1999, the Committee has issued a statement after every meeting that conveys not only the Committee's explicit target for the federal funds rate but also the Committee's view on economic fundamentals and the rationale behind its policy decisions. The current chair of the Federal Reserve, Jerome Powell, has emphasized the role of transparency in improving central bank accountability and in enhancing the effectiveness of monetary policy.[1]

This communication strategy (announcing both the policy action and the Committee's assessment of the economic fundamentals) has introduced a new channel through which policy can affect the economy. Not only can policy affect the economy through the direct effect of a change in the target federal funds rate, but it can now also do so through a change in public perceptions of economic conditions that may occur in light of the Fed's assessment of the economy. This latter effect has come to be known by economists as the "information effect."

What information is revealed by monetary policy decisions and is such an information effect optimal? In this *Commentary*, we first empirically estimate the information that the public takes as being revealed by monetary policy decisions and communications; do they reveal information

Wesley Janson is a research analyst at the Federal Reserve Bank of Cleveland and Chengcheng Jia is a research economist at the Bank. The views authors express in *Economic Commentary* are theirs and not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System or its staff.

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about economic activity, inflation, or both? We then develop an economic model that captures key features of the economy, including the ways that households and firms gather information and the broad goal of the central bank that is consistent with the dual mandate of the Federal Reserve.[2] We find evidence that the information revealed by monetary policy decisions is regarding future output growth, not inflation, and that such an information effect is aligned with the direct effect of monetary policy, which makes interest-rate policies theoretically optimal and not self-defeating.

Empirical Methodology: Isolating the Effects of Monetary Policy Surprises on Expectations

A key challenge in estimating the information effect of monetary policy is that most changes in monetary policy are not unrelated to other economic factors, but rather, they are responses to them. For instance, suppose the inflation rate increases. Suppose further that the general public has imperfect information about the increase in the inflation rate—people know it has increased but not by how much, for example. At the same time, assume that the central bank has more precise information about the increase in the inflation rate and raises the federal funds rate target.[3]

Under these circumstances, the initial increase in the public's inflation expectations is not caused by the FOMC's increase in the target interest rate, but rather, both the initial change in inflation expectations and the change in monetary policy are simultaneous responses to the increase in inflation. Since the general public has imperfect information about the inflation rate, they also cannot perfectly predict the change in monetary policy. Therefore, a portion of the monetary policy change is expected by the public and the rest comes as a surprise. This surprise component in the monetary policy change is a new piece of information to the public, and it may lead the public to further adjust its expectations about inflation.

Following other research, we argue that the surprise component of monetary policy will be reflected in high-frequency changes in federal funds rate futures.[4] The idea is that, in a narrow window around when the statements of FOMC meetings are released, asset price fluctuations in financial markets should reflect only the unexpected part of the change in monetary policy. To the extent that a policy action reflects information that the general public already knows, the known information would have been reflected in asset prices immediately preceding a given FOMC meeting. Once we isolate the surprise changes in policy, we can then use them to assess the causal effects of policy changes on expectations for inflation and economic activity.

Empirical Results: What Information Does Monetary Policy Reveal?

To investigate how public expectations about inflation and output growth respond to monetary policy surprises, we estimate regressions of changes in output growth and inflation expectations on the surprise components of monetary policy changes. To measure expectations, we use the quarterly consensus forecasts of real GDP growth and consumer price inflation from Blue Chip Economic Indicators. Specifically, we construct the change in expectations of the same economic variable (inflation expectations or output growth expectations) surveyed in two consecutive months.[5] Separately, we report estimates using 1-quarter-ahead expectations of output growth, 3-quarter-ahead expectations of output growth, 1-quarter-ahead expectations of inflation, and 3-quarter-ahead expectations of inflation.

The regression results presented in table 1 show that real GDP growth expectations are significantly and positively affected by monetary policy surprises. In the regression of 1-quarter-ahead output growth expectations, the interpretation of the coefficient is that an unexpected 100 basis point increase in the federal funds rate increases the expectations of the 1-quarter-ahead real GDP growth rate by 1.74 percentage points at an annualized rate. This is a large effect relative to normal GDP growth rates of about 2 percent (where "normal" is the average growth rate since 2009). The effect of monetary policy surprises on expectations of real GDP decays as the forecast horizon increases, but it still remains significant through the 3-quarter-ahead horizon. In contrast, inflation expectations are not significantly affected by monetary policy shocks, for either 1- or 3-quarter-ahead inflation forecasts.

Table 1. Baseline Estimation of the Information Effect of Monetary Policy

	Dependent variable: Change in expectations of			
	1-quarter-ahead output growth	1-quarter-ahead inflation	3-quarter-ahead output growth	3-quarter-ahead inflation
Δi_t	1.74**	0.67	0.90*	0.32
	(0.76)	(0.55)	(0.51)	(0.26)

Notes: We regress changes from one month to the next in consensus expectations about 1-quarter-ahead and 3-quarter-ahead output growth and inflation on monetary policy shocks. Two asterisks (**) mean the coefficient is significant at the 5 percent level and one asterisk (*) means the coefficient is significant at the 10 percent level. The policy news shock is scaled such that the effect on the one-year Treasury yield is 100 basis points.

During the period in which forecasters change their expectations, monetary policy surprises are not the only new pieces of information that they receive. That fact raises the question of whether the information revealed by monetary policy surprises overlaps with other new information, in which case the information revealed by monetary policy would be redundant. To test this hypothesis, we add economic news releases as control variables to our baseline estimation.

The other economic news releases we consider are releases for two major monthly indicators: nonfarm payroll employment and CPI inflation. Once again, to capture the causal effects of the economic news releases on output growth and inflation forecasts, we need to isolate the surprise portion of the news releases. To this end, we calculate the surprise portion of each release as the difference between the new data in the release less the market expectation for the data as reported in Thomson-Reuters Economic Consensus.[6] With this surprise portion of the news releases, we estimate regressions of changes in expectations of output growth and inflation on the surprise in the monetary policy change, the surprise in the CPI inflation release, and the surprise in the payroll employment release.

The regression results in table 2 show that both monetary policy and news releases contain relevant information and they do not overlap with each other. Specifically, in the regression of inflation expectations (both 1- and 3-quarter-ahead), the coefficients on nonfarm payroll surprises are significantly positive. The regression results for expectations of GDP growth continue to show some responsiveness to monetary policy changes (1-quarter-ahead horizon), and they also show some responsiveness to news on economic activity.

The results of our regressions reported in tables 1 and 2 suggest that the public changes expectations with both unexpected monetary policy changes and unexpected news releases. Regarding the information effect of monetary policy, the general public believes that monetary policy contains information about future output growth, but not inflation, as suggested by the estimated coefficients in the regression results for expectations of GDP growth and for expectations of future inflation.

Theoretical Explanation

Why does the general public extract information from monetary policy about future economic activity but not about future inflation? Does such an information effect improve the effectiveness of monetary policy or make it self-defeating? A theoretical macroeconomic model can be used to assess these questions.[7]

Model Description

The model takes the following form. It consists of an IS equation that makes output a function of expected future output and the real interest rate, a Phillips curve that relates inflation to expected future inflation and output, and a policy reaction function that specifies the interest rate in response to output and inflation. The Phillips curve relation arises because firms gradually adjust prices to changes in their marginal production costs. The policy reaction function reflects the central bank's objective to stabilize economic activity and inflation. More specifically, the central bank's objective is to minimize the weighted sum of inflation fluctuations and output gap fluctuations—an assumption that is consistent with the dual mandate of the Federal Reserve. The output gap is the difference between the current output level and its natural level, the output level that could be achieved, given the current production technology, if all firms have perfect information and if they adjusted prices immediately rather than gradually. Importantly, the central bank does not have a bias toward higher output, but rather it wants to minimize the absolute gap between the actual output and its natural level.

Table 2. Estimation of the Information Effect of Monetary Policy with Control Variables

	Dependent variable: Change in expectations of			
	1- quarter-ahead output growth	1- quarter-ahead inflation	3- quarter-ahead output growth	3- quarter-ahead inflation
Δi_t	1.39**	0.50	0.68	0.23
	(0.66)	(0.49)	(0.48)	(0.25)
Δcpi_t	0.18	0.14*	0.01	0.04
	(0.09)	(0.08)	(0.06)	(0.04)
$\Delta nonfarm_t$	0.80***	0.34*	0.48***	0.20**
	(0.25)	(0.17)	(0.17)	(0.09)

Notes: We regress changes from one month to the next in average expectations about 1-quarter-ahead and 3-quarter-ahead output growth and inflation on monetary policy shocks and surprises in CPI and nonfarm payroll news. Two asterisks (**) mean the coefficient is significant at the 5 percent level and one asterisk (*) means the coefficient is significant at the 10 percent level. The policy news shock is scaled such that the effect on the one-year Treasury yield is 100 basis points. The unit of nonfarm payroll is 1,000.

The aggregate economy potentially gets hit by two types of shocks, a demand shock and a supply shock. A positive demand shock increases output at a given price level,[8] and a positive supply shock increases the price level at a given level of output.[9] A key aspect of the model is the way that the public gathers information. Importantly, the public understands that the interest rate is set by the central bank based on its information about the aggregate state of the economy. As a result, the public can extract the central bank's information from the interest rate decisions.

Model Results

To understand the implications of this information structure for optimal monetary policy, first think of the (unrealistic) case in which both the central bank and the general public have perfect information and there is no need for the general public to extract the information held by the central bank. In this case, after a positive demand shock, the output gap becomes positive. As the aggregate supply curve is upward-sloping, the positive output gap leads to positive inflation in equilibrium. The central bank can increase the interest rate to close the output gap and stabilize inflation at the same time. After a positive supply shock, inflation becomes positive, and as the aggregate demand curve is downward-sloping, positive inflation leads to a negative output gap in equilibrium. A lower level of real GDP compared to its natural level and a higher rate of inflation bring a conflict to the central bank. As a result, the central bank partially adjusts the interest rate. This partial adjustment reflects the Fed's balanced approach to achieving its goals when they are in some conflict, an approach that results in a reduced but still positive inflation rate and a more negative real output gap.

Now, consider the more realistic case in which the public has less information than the central bank. In this case, the public extracts information from the central bank's interest-rate decisions. Since the central bank is aware that the public takes information from its rate decisions, it takes account of that effect in making its policy decisions. As a consequence, when adjusting interest rates, the central bank does not want the public to know if it is facing a conflict between a positive inflation rate and a negative output gap. For the stability of the economy, it is actually better for the central bank to avoid revealing its information on the supply shock. Otherwise, if the public believes an interest-rate increase is the central bank's response to a positive supply shock, the public will expect the central bank to tolerate positive inflation and consequently increase its expectations of future inflation. The increase in expectations will add to the upward pressure on inflation.

Consequently, the central bank favors revealing information about demand shocks but not supply shocks. The central bank achieves this by systematically reacting more aggressively to the demand shock and less aggressively to the supply shock. Consequently, whenever there is a change in the interest rate, the private sector regards it more likely to be a response to a demand shock and less likely to be a supply shock.

This theoretical result explains the empirical evidence found in the previous section. Since the central bank optimally adjusts the target interest rate while favoring revealing information about demand shocks but not supply shocks, the public changes its expectations of GDP growth, but not expectations of future inflation.

Conclusions

In this *Commentary*, we investigate what the information effect of monetary policy is and whether such an information effect is optimal. To this end, we first empirically test what information the public takes to be revealed by the interest-rate decisions of the Federal Reserve and find that it reveals information about GDP but not inflation, as only forecasts of future real GDP growth, not future inflation forecasts, significantly respond to monetary policy surprises. The empirical evidence leads us to study the optimality of this information effect in a model that features an economy potentially hit by two types of shocks and a central bank setting the target interest rate to stabilize the economy. We conclude that the information effect of monetary policy reinforces the effectiveness of policy and does not undermine it, because the effect comes from the fact that the central bank's optimal strategy is to favor revealing information about demand shocks but not supply shocks.

Footnotes

1. See, for example, https://www.federalreserve.gov/newsevents/speech/powell20190604a.htm.

2. The Federal Reserve's objectives as mandated by the Congress are maximum employment and price stability. The explanation of the dual mandate by the Board of Governors of the Federal Reserve System can be found at: https://www.federalreserve.gov/faqs/money_12848.htm.

3. Researchers and the public broadly view the central bank as having good information from its extensive efforts to collect and analyze information. Research also indicates that the general public has incomplete information on inflation and economic activity but pays enough attention to different sources of new information and adjusts its expectations accordingly.

4. Previous studies have used these data to estimate changes in expectations about the fed funds rate after an FOMC announcement. More specifically, we use the high-frequency identification method that was pioneered by Cook and Hahn (1989) and extended in Nakamura and Steinsson (2018). In this *Economic Commentary*, we directly use the monetary policy shocks data constructed in Nakamura and Steinsson (2018), which can be found at https://eml.berkeley.edu/~enakamura/papers.html.

5. Sources: Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Economic Indicators, accessed from Haver Analytics. Details of how we construct the change in expectations are provided in the online appendix.

6. Sources: Thomson-Reuters Economic Consensus (Reuters Poll): CPI Market Surprise and Non-Farm Payroll Employment Median Forecasted Value, accessed from Refinitiv Datastream. We construct the market surprise of nonfarm payroll by taking the difference between the actual data from the Bureau of Labor Statistics (BLS) and its consensus expectations provided by Thomson-Reuters.

7. The model and details are provided in Jia (2019).

8. Examples of demand shocks include unexpected tax increases or cuts, an unexpected change in trade policy, and financial crisis.

9. Supply shocks capture the change in firms' cost of production. Examples of supply shocks include oil price shocks and wage markup shocks.

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