Communications Breakdown: The Transmission of Different Types of ECB Policy Announcements*

Preliminary and Incomplete

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Abstract

We identify two types of monetary policy shocks that emerge from ECB communication on policy meeting days: interest rate target shock and forward guidance shock. This is in the spirit of Gurkaynak, Sack and Swanson (2005) but with a very different identification strategy. We also separately identify ECB private information on the economy that may be revealed by the announcement. To disentangle target rate shocks from forward guidance, we measure high-frequency changes in interest rate futures around ECB announcements, first in the short window around announcements regarding the target interest rate and second during the subsequent press conferences for the forward guidance shock. To separate monetary policy shocks from revelations on the ECB's private information, we orthogonalize these interest rate futures with respect to ECB and private sector forecasts. We find that using movements in futures prices around the press conferences as instruments in our VARs produces counterintuitive impulse responses in output and inflation, but that the orthogonalized movements produce responses expected by conventional Keynesian theory. Our work indicates that movements in futures prices around ECB announcements reflect the ECB’s private information as well as monetary policy surprises, consistent with the notion of Delphic forward guidance. Finally, we incorporate monetary policy uncertainty (MPU) into our analysis. Following the approach in Baker, Bloom, and Davis (2015), we construct news-based measures of the uncertainty the public perceives about ECB monetary actions and their consequences. We use our measure of ECB MPU to illuminate the information effect. We ask, for example, is MPU higher when the information effect is stronger? How does MPU change around ECB announcements? What is the relationship between MPU and changes in private sector forecasts around ECB announcements?
1 Introduction

The question of how monetary policy affects the economy has long been a focus of research in macroeconomics and is of course a crucial issue for central bankers. As is well known, identification is difficult, hampered by the potential endogeneity of monetary policy and macroeconomic aggregates like GDP. Is the economy reacting to (exogenous) changes in monetary policy, or is monetary policy reacting to (exogenous) developments in the economy? Recent practice in the literature has been to use high-frequency changes in bond price futures in tight windows around monetary policy announcements (Kuttner (2001), Cochrane and Piazzesi (2002), Gurkaynak, Sack and Swanson (2005), Gertler and Karadi (2015), and Nakamura and Steinsson (2017)). Measuring monetary policy “surprises” in these tight windows enhances the plausibility that what is being captured are exogenous changes in monetary policy, in part because very little other economic news is revealed in that time span.

This assertion has recently been called into question, however (Romer and Romer (2000), Campbell et. al. (2012 and 2016), Nakamura and Steinsson (2017), and Miranda-Agrippino (2016)). Under this view, the central bank reveals in its meeting day announcements not only pure monetary policy “news” but also its private information on the state of the economy, its own preferences, or the model it uses to analyze the economy. This in turn causes the private sector to change its outlook for macroeconomic developments. Thus, conventionally-measured monetary policy surprises may be correlated with developments in non-monetary policy economic fundamentals, even in tight windows around central bank announcements. Further confounding identification, these studies document a tendency for private sector expectations to go in the wrong direction. That is, following a contractionary monetary policy surprise, expectations of future GDP growth rise. This has been labelled the “Fed information effect” (Romer and Romer (2000), Nakamura and Steinsson (2017)) or “Delphic forward guidance” (Campbell et. al. (2010, 2012)). The empirical presence of this calls into question the central assumption that these surprises are appropriate to identify (pure) monetary policy shocks.

In this paper, we examine the “Fed” information effect using data from European Central Bank (ECB) monetary policy announcements. The institutional arrangements of ECB monetary policy communications make it an ideal case to examine (Brand, Buncic, and Turunen (2010); Leombroni, Vedolin, Venter, and Whelan (2017)). As characterized in Figure 1, the ECB com-

\[ \text{It may also be that risk premia change at the time of the announcement.} \]
municates policy in two separate pieces on Governing Council meeting days. The first is a very brief on-line release of about 40-50 words that simply describes what action was taken (or not taken) on the policy interest rate (henceforth, decision) at 1:45 PM, Central European Time. This decision only describes the current target rate and any asset purchases the ECB is making. Because the decision contains no content on the ECB’s future policy or outlook, it is reasonable to believe that market movements immediately after its release reflect information related to immediate policy changes. The second piece begins at 2:30 when the president of the ECB hosts a press conference, where he discusses the economic outlook and the ECB’s goals in the future. We treat movements around the press conference as related to forward guidance, both because the press conference contains information related to the ECB’s future policies, and because investors have already accounted for target rate changes following the release of the decision.

Given this institutional structure, we define the two windows depicted at the top of Figure 1: “target” and “communications” windows. We construct monetary policy surprises within each of those windows by recording the price of Euro-area government bonds: (1) fifteen minutes before the decision is released, (2) forty minutes after the decision is released (and five minutes before the press conference begins), and (3) fifty minutes after the press conference begins. The difference between the prices at 2:30 and 1:30 is the target rate surprise, while the difference between the prices at 3:20 and 2:30 is the communications surprise.

Because the Euro Crisis covers much of our January 2008 to April 2017 sample period, we use the Italian-German government bond spread as our instrument. Contractionary monetary actions as measured by the high-frequency movements are therefore indicated by a widening
spread, while expansionary actions are indicated by a narrowing spread. In so doing, we take as a baseline assumption that ECB monetary policy has been focused on interest rate spreads between periphery and core countries within the euro area (Rogers, Scotti, and Wright (2016)) and thus examine 2-year and 5-year interest rate spreads between Italy and Germany as the ECB’s monetary policy instrument.

As noted above, although these intra-day movements in interest rate futures around central bank announcements are usually treated as capturing exogenous monetary policy shocks, recent literature has indicated that these movements also reflect new information about the economy that investors glean from central banks’ actions and announcements (Campbell, Fisher, Justiniano, and Melosi (2016); and Miranda-Agrippino (2016). If the central bank possesses private information on the economy, it may reveal this information through policy actions and announcements. In turn, investors may trade on this new economic information, contaminating the movements around central bank announcements. Thus we test not only for the presence of Delphic guidance in ECB communications, but also by constructing an information revelations time-series based off the differences in private sector forecast errors and ECB forecast errors. We then orthogonalize the high-frequency target rate and communications surprises with respect to these information revelations. The resulting series are the orthogonalized target rate and communications surprises, similar to the orthogonalized surprises computed by Miranda-Agrippino (2016) for the United States and United Kingdom. We then produce impulse responses using each of these three series as an external instrument in a VAR setting.

As detailed below, our results indicate that information revelations substantially contaminate the intraday bond price movements. While output and inflation do not exhibit significant responses to the target rate surprises, they respond significantly and immediately to the orthogonalized target rate surprises in a manner consistent with conventional Keynesian theory. Output and inflation display counterintuitive responses to raw communications surprises, but respond insignificantly to orthogonalized communication surprises. Information revelations move GDP.

In addition, and more novelty, we incorporate monetary policy uncertainty into our analysis. Following the approach in Baker, Bloom, and Davis (2015) and Husted, Rogers, and Sun (2017), we construct news-based measures of the uncertainty the public perceives about ECB monetary actions and their consequences. We use our measure of ECB MPU to illuminate the information effect. We ask, for example, is MPU higher when the information effect is stronger? How does
MPU change around ECB announcements? What is the relationship between MPU and changes in private sector forecasts around ECB announcements? Finally, we examine the transmission of the ECB’s policy to the real economy via monetary policy uncertainty (MPU). We find that while orthogonalized target rate shocks do not affect MPU, orthogonalized communication shocks produce a statistically significant response to MPU. This difference may explain the differing responses of output and inflation to orthogonalized target rate and communication shocks.

2 Data: High-Frequency Surprises and Macro Forecasts

For the intraday prices of government bonds, we turn to the Thomson Reuters Tick History. We record bid prices for Italian and German bonds at the beginning of the target rate window, the end of the target rate window/beginning of the communications window, and end of the communications window.\(^2\) We then take the spread of these prices at each time, and compute the change in yield over each window (appropriately adjusting for the maturity of the bond).

We plot a timeline of these surprises in Figure 2. The communication surprises are divided into regular communication (press conferences after regularly scheduled Governing Council meetings) and intermeeting communication (unscheduled announcements from the ECB, such as Mario Draghi’s “whatever it takes” speech, as well as the monetary policy accounts released during and after 2015). Caldara and Herbst (2016) suggest that surprises around intermeeting communications are endogenous to the broader economic outlook, and so we restrict our analysis to target rate surprises and regular communication surprises.

\(^2\)We record the the price of the transaction that ocurred closest to the time we are interested in. However, we set a 6-minute window around the transaction time, and if there are no transaction within the window record a missing value. For example, if the nearest transaction to 1:30 on an ECB meeting day is 1:34, we record the bid price of that transaction. If there are no transaction between 1:24 and 1:36, however, we treat it as missing.
To study the presence of Delphic forward guidance, we collect data on several private sector forecasts and the ECB’s forecasts. Consensus Economics interviews fifty-eight forecasters each month on current and next-year GDP growth, industrial production growth, inflation, and unemployment. To get the ECB’s forecasts, we read the president’s press conferences after General Council meetings. The forecasts for current and next-year GDP growth and inflation are first revealed by the president in these statements.

2.1 Private forecasts vs ECB forecasts

To investigate whether private forecasters’ expectations are influenced by ECB announcements, we used Consensus Economics’ monthly forecast data and the ECB’s quarterly inflation and GDP forecasts. To establish the usefulness of the ECB’s information to the private sector, we measured the mean absolute error of the the forecasts and conducted a t-test for means, as shown
Table 1: Private sector vs ECB forecast mean absolute error

<table>
<thead>
<tr>
<th>Forecast</th>
<th>Private Sector</th>
<th>ECB</th>
<th>Diff (p-val)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP nowcast</td>
<td>0.60</td>
<td>0.48</td>
<td>0</td>
</tr>
<tr>
<td>GDP 1 year ahead</td>
<td>1.49</td>
<td>1.39</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Mean absolute errors for private sector and ECB forecasts. Errors were constructed by subtracting forecasts of GDP growth made by private forecasters and the ECB from realized GDP growth in the forecasted year. For example, the private sector’s forecasts of next year’s GDP growth were usually off by 1.49 basis point, while the ECB was usually off by only 1.39 basis points.

in Table 1.

The ECB’s forecasts are more accurate than the private forecasters’ for nowcasts and next-year forecasts. The difference is significant at the 1% level for nowcasts and the 10% level for next-year forecasts. Given this finding, we can expect private forecasters to consider the ECB a reliable source for macroeconomic information.

To investigate this claim more fully, we constructed a series of changes in private forecasts around ECB meeting days. In Figure 3, we display a scatterplot of these changes. Private forecasters tend to change their forecasts in the same way the ECB does, suggesting that these forecasters use the ECB’s forecasts to update their own.

These plots demonstrate a strong relationship between ECB and private forecasts. Forecasts for both horizons are strongly and positively correlated. To investigate this relationship more formally, we run the following regression:

\[ \Delta \text{private forecast}_i,t+\delta,t-\delta = \Delta \text{ECB forecast}_t,t-1 + \epsilon_{it} \] (1)

Denote the day of an ECB general council meeting as \( t \). \( \Delta \text{ECB forecast}_t,t-1 \) is the change in the ECB’s forecast of a macroeconomic variable from the previous meeting to the meeting at time \( t \). The last forecast made by private forecaster \( i \) at time \( t - \delta \) (before the ECB meeting at \( t \)) is denoted by \( \text{private forecast}_i,t-\delta \). Similarly, \( \text{private forecast}_i,t+\delta \) denotes the first forecast made by forecaster \( i \) after the ECB meeting at \( t \). Thus, \( \Delta \text{private forecast}_i,t+\delta,t-\delta \) is the change in private forecaster’s \( i \) expectations from just before the meeting at \( t \) to just after. We restrict \( \delta < 1 \) to minimize contamination of the private forecast by ECB forecasts other than the one at \( t \) (i.e. we ignore any private sector forecast changes that occurred over several ECB meetings).
Changes in individual private sector forecasts vs changes in ECB forecasts. For each ECB meeting, the private sector change in the forecast around that meeting is the difference between the first forecast survey after that meeting and the last forecast survey before the meeting. Private forecast changes were computed monthly. ECB forecast changes were computed quarterly.

In this context, a significant coefficient for $\Delta ECB_{\text{forecast}}_{t,t-1}$ provides evidence that the private sector updates its information using the ECB’s forecast changes. To test this, we run regressions of private nowcasts and next-year forecasts of GDP growth on ECB forecasts for the same variable. In addition to using the quarterly ECB forecasts, we constructed a monthly qualitative ECB forecast changes series by closely reading the language of the ECB press conferences’ transcripts. If the transcript indicated that the ECB’s forecasts were being exceeded, we assigned the monthly variable a value of 1; if forecasts were not being met, -1; and if forecasts were being met, 0. As shown in Table 2, we find that private sector forecasts change in response to both quantitative and qualitative ECB forecast changes. The relationship is both positive and significant, indicating that private forecasters update their forecasts using the ECB’s new information.

2.2 Forecast Revisions and High-Frequency Surprises

We examine forecaster’s responses to surprises around ECB announcements and press conferences. Each month, Consensus Economics interviews fifty-eight forecasters on their expectations for the Eurozone economy. We count the number of forecasters each month that alter their next-
Table 2: Private sector GDP forecast changes regressed on ECB forecast changes

<table>
<thead>
<tr>
<th>ECB forecasts</th>
<th>Private sector forecasts</th>
<th>Nowcast</th>
<th>Next year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>GDP nowcast</td>
<td></td>
<td>0.33**</td>
<td>(0.01)</td>
</tr>
<tr>
<td>GDP next year</td>
<td></td>
<td></td>
<td>0.30**</td>
</tr>
<tr>
<td>Qual. no change dummy</td>
<td></td>
<td>0.05**</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Qual. positive change dummy</td>
<td></td>
<td>0.17**</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td>0.01</td>
<td>-0.10**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>870</td>
<td>2,583</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td></td>
<td>0.48</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Note: Changes in individual private sector forecasts regressed on changes in ECB forecasts using OLS. For each ECB meeting, the private sector change in the forecast around that meeting is the difference between the first forecast survey after that meeting and the last forecast survey before the meeting. Regressions on the qualitative ECB forecast change used dummy variables that denoted whether the ECB forecast was worse, unchanged, or better than the previous meeting’s. For these regressions, the constant is the effect of a negative change in ECB forecasts on private sector forecasts, the constant + the no change dummy coefficient the effect of no change, and the constant + the positive change dummy is the effect of a positive change. Qualitative ECB forecast changes were computed monthly. Quantitative ECB forecast changes were computed quarterly.
year GDP forecasts in a positive or negative direction from the month before. We then compare the sign of the change in the forecast to the target rate surprise and communication surprise for that month for each forecaster. If the signs of the forecast change and surprise are the same (i.e., a forecaster increased their GDP growth expectation after a contractionary surprise), we classify that forecaster as having a Delphic response. In Figure 4, we show the percent of each month’s forecasters that exhibited a Delphic response.
Figure 4: Delphic Responses with respect to Target Rate and Communication Surprises over Time

Target Rate Surprises

Communication Surprises

Each bar shows the percent of private forecasters that responded in a Delphic way to the monetary surprises in each month. A Delphic response is one that moves in the same direction as the high-frequency movement.
Figure 5: Private Sector Forecast Change vs High-Frequency Instrument

GDP 1-year ahead forecast
Target Rate Surprises  Regular communications surprises

Changes in individual private sector forecasts vs target rate and communication surprises.

A pattern can be seen when checking the forecasts against the target rate surprises. More forecasters respond in a Delphic way during the financial crisis and after major ECB announcements to combat the Eurocrisis, such as the decision to buy Spanish and Italian bonds in August 2011, Mario Draghi’s “Whatever it Takes” speech in July 2012, and the introduction of the Outright Monetary Transactions program in August 2012. Thus, periods where the ECB takes more aggressive action in response to worsening economic conditions are associated with higher proportions of forecasters adjusting their projections in a Delphic manner.

We directly examine whether the high-frequency movements around ECB announcements can be used by private forecasters to update their expectations. First, we create scatterplots of private sector forecast changes against high-frequency movements in Figure 5. In contrast to the evidence for the United States (as in Nakamura and Steinsson 2017), comparing forecasts with the monetary policy surprises does not produce clear evidence of Delphic Guidance. However, the correlation is not strongly negative, indicating that factors other than the pure monetary policy surprise may be driving the high-frequency movements around General Council meetings and press conferences.

2.3 Monetary Policy Uncertainty

The evidence for “Delphic forward guidance” in the Euro Area is tangential at best. This is in stark contrast with the overwhelming evidence the recent literature documents for the U.S. As
any information effect would be influenced by uncertainty about the information in question, we examine monetary policy uncertainty and its role in accounting for the distinct patterns in the Euro Area and the U.S.

To gauge monetary policy uncertainty, we construct a newspaper-based MPU index for the Euro Area following Husted, Rogers, and Sun (2017). Using the ProQuest Newsstand and historical archives, Husted, Rogers, and Sun (2017) construct the MPU index by searching for keywords related to monetary policy uncertainty in major newspapers. For monetary policy uncertainty in the U.S., they search for articles containing the triple of (i) “uncertainty” or “uncertain,” (ii) “monetary policy(ies)” or “interest rate(s)” or “Federal fund(s) rate” or “Fed fund(s) rate,” and (iii) “Federal Reserve” or “the Fed” or “Federal Open Market Committee” or “FOMC”. For the Euro Area, we search for articles containing the triple of (i) “uncertainty” or “uncertain,” (ii) “monetary policy(ies)” or “interest rate(s)” or “policy rate” or “refinancing tender” or “EONIA rate” and (iii) “European Central Bank” or “ECB” or “Governing Council”. We do this for every day’s issue of the Washington Post, Wall Street Journal, and New York Times.

Importantly, the MPU indexes control for the changing volume of total news articles over time and the possibility that some newspapers naturally cover monetary policy more than others by first dividing the raw count of identified articles by the total number of news articles mentioning any of the words in category (iii) for each newspaper in a given period. This scaling choice also helps address issues related to time-varying popularity and increased coverage of the central bank in question due to improved transparency in their communication strategy. The share of articles is subsequently normalized to have a unit standard deviation for each newspaper over the sample period. Each monetary policy uncertainty index is aggregated by summing the resulting series and scaling them to have a mean of 100 over the sample. The daily index can then be aggregated into monthly and inter-meeting intervals.

We display the Euro Area MPU index in Figure 6. The sample is January 1985 to May 2017. The index spikes around the September 11 attacks, the March 2003 invasion of Iraq, the Euro debt crisis, and the Brexit vote. The correlation with the U.S. MPU is 0.62. To address concerns about automated news-based computer search, we will conduct an audit based on human readings, following Husted et al. (2017). We aim to begin by reading and coding 6000 randomly-selected articles and construct a human index based on the share of articles discussing
Monetary Policy Uncertainty index for the Eurozone and the United States.
high or rising monetary policy uncertainty in the Euro Area. To concentrate on articles that are likely relevant, the random samples we draw are from the set of articles that meet our criterion (iii); that is, articles that contain “European Central Bank” or “ECB” or “Governing Council”. We compare the evolution of the human index with the computer-automated index, including calculating the Type II error rate. We also characterize the nature of monetary policy uncertainty, quantifying the number of articles on uncertainty concerning ECB actions versus uncertainty about the consequences of those actions. We then read an additional 1500 randomly-selected articles contained in our computer-automated MPU index in order to estimate the Type I error rate associated with the Euro Area MPU index.

3 Information Surprises

While the presence of Delphic guidance has been documented in the literature, we are the first to investigate its effect on the economy in a VAR setting with MPU. In this section, we identify “information surprises” explicitly and use them to construct impulse responses.

Formally, denote the private sector’s information about a future date $\tau$ at time $t - \delta$ by $\Omega_{p,\tau,t-\delta}$, and the ECB’s information on announcement day $t$ by $\Omega_{ecb,\tau,t}$. The information surprise is therefore $\Omega_{ecb,\tau,t} - \Omega_{p,\tau,t-\delta}$. Since we cannot observe these information sets directly, we measure the equivalent $(\Omega_{\tau} - \Omega_{p,\tau,t-\delta}) - (\Omega_{\tau} - \Omega_{ecb,\tau,t})$, where $\Omega_{\tau}$ denotes the true state of time $\tau$. Intuitively, the information surprise is equivalent to the difference between the information the private sector lacks and the information the ECB lacks. We can compute these “lack of information” values by comparing the private sector’s forecast errors to the ECB’s.

The information surprises series is constructed by averaging next-year GDP projections across forecasters for each month, and then regressing this series on the ECB forecast. Months without ECB forecasts are set to 0. The responses to these shocks are the residuals of the following regression:

$$
(data_{\tau} - private\,forecast_{\tau,t-\delta}) = \beta_0 + \beta_1(data_{\tau} - ecb\,forecast_{\tau,t}) + \omega_t
$$

We find that $\beta_1 = 0.97$, which is not significantly different from 1. The residuals of this regression, $\omega_t$, form the series shown in Figure 3. Information shocks were consistently negative in the immediate aftermath of the 2008 financial crisis. During the Eurozone crisis the shocks are more mixed, but a glaring example of the ECB revealing negative information on the economy.
occurred in the third quarter of 2012. This is likely due to Mario Draghi’s “whatever it takes speech”, which simultaneously committed the ECB to strong action and hinted at how dire the Eurozone’s situation was.

Figure 7: Information Shocks

Information surprises: residuals of equation 2.

4 VARs

4.1 External Instrument Methodology

We employ the external instruments approach developed by Stock and Watson (2012) and Mertens and Ravn (2013) and employed by Gertler and Karadi (2015). We follow them in undertaking a high frequency identification of the policy shocks. Let $Y_t$ be a vector of economic and financial variables, $A$ and $C_j \forall j \geq 1$ conformable coefficient matrices, and $\epsilon_t$ a vector of structural shocks. The general structural form of the VAR we consider is given by
\[ AY_t = \sum_j C_j Y_{t-j} + \epsilon_t \]  

(3)

Multiplying each side by \( A^{-1} \) yields the reduced form VAR

\[ Y_t = \sum_j B_j Y_{t-j} + u_t, \]  

(4)

where \( u_t = S \epsilon_t \) is the reduced form shock, with \( B_j = A^{-1} C_j, S = A^{-1} \).

Let \( s \) denote the column in matrix \( S \) corresponding to the impact on each element of the vector of reduced form residuals \( u_t \) of the structural shock \( \epsilon_t \). To compute the impulse responses to a structural shock, we estimate

\[ Y_t = \sum_j B_j Y_{t-j} + s \epsilon_t \]  

(5)

As is well-known, the necessary timing restriction that all the elements of \( s \) are zero except the one that corresponds to the policy indicator of interest is in general problematic, especially when financial variables are included in the VAR such as in our application and GK’s. The external instrument approach is well-suited to address this problem. Denoting \( Z_t \) as a vector of instrumental variables and \( \epsilon^q_t \) a vector structural shocks other than the policy shock, the identification approach requires that:

\[ E[Z_t \epsilon'] = \psi, \quad E[Z_t \epsilon' \epsilon'] = 0 \]  

(6)

That is, \( Z_t \) must be correlated with \( \epsilon_t \), the structural shock of interest, but orthogonal to all of the other shocks.

To estimate the elements in \( s \), we follow GK and proceed as follows. First, estimate \( u_t \) from the ordinary least squares regression of the reduced form VAR (2). Second, let \( u^q_t \) be the reduced form residual from the equation for the policy indicator of interest and let \( u^q_t \) be the reduced form residual from the equation for variables \( q \) other than the policy indicator. Let \( s^q \in s \) be the response of \( u^q_t \) to a unit increase in the policy shock \( \epsilon_t \). Then obtain an estimate of the ratio \( s^q/s \) from the two stage least squares regression of \( u^q_t \) on \( u_t \), using the instrument set \( Z_t \).
Our analysis requires monthly macroeconomic variables for the VAR, including MPU. Our monthly VAR data consist of industrial production, the consumer price index (CPI), bond yields for Italy and Germany, credit spreads, and the US dollar to euro exchange rates. Industrial production is from the Statistical Office of the European Communities and is aggregated across the 19 countries currently in the Eurozone. CPI, released by the ECB, is also computed across these 19 countries, and holds taxes constant. The bond yields for Italy and Germany are from, respectively, the Bank of Italy and Bloomberg. Credit spreads for the Euro Area are from Gilchrist and Mojon (2017), and are similar to the credit spreads of Gilchrist and Zakrajsek (2012). The exchange rate is from the ECB and is the end-of-month value.

4.2 Orthogonalized Monetary Policy Shocks

In response to good news on the economy revealed through ECB announcements, output rises and inflation falls. The core-periphery spread rises, indicating the monetary policy tightens. In turn, this tightening raises credit spreads.

We isolate the true monetary policy shock in the high-frequency movement around ECB announcements from the information content of the announcement. To do so, we orthogonalize the target rate and communication surprises with respect to the information shocks computed in equation 2. Formally, we run the following regression:

\[ \Delta MP_{m,t} = \beta_0 + \beta_1 \omega_t + \epsilon_t \]  \hspace{1cm} (7)

The inclusion of private sector and ECB forecasts accounts for the differing information sets between the ECB and private sector, and thus “cleans” the information component of the high-frequency movement. The residuals are the orthogonalized monetary policy shock. For months without ECB forecasts, the instrument takes a value of 0. The IRFs constructed by using the \( \epsilon_t \) series as an instrument are as follows.

The responses to the orthogonalized shocks are more certain and more economically consistent than the responses to the raw instruments. In particular, a communication shock that indicates higher future interest rates would seem to raise output using the raw instrument, but is actually shown to lower output using the orthogonalized instrument. This result strongly suggests that part of the change in futures prices around ECB announcements is due not to the change in monetary policy, but to the ECB revealing private information on the economy.
4.3 MPU response to ECB policy and communication

We first examine the effect of information shocks, computed from Equation 2, on monetary policy uncertainty by including MPU in the VAR. In response to a positive information shock, monetary policy uncertainty initially behaves ambiguously, but after 7-8 months significantly falls.

We now examine how MPU responds to orthogonalized target rate and communication shocks. Recall that in Figure 9, orthogonalized positive target rate shocks to the Italian-German spread produced unambiguously contractionary responses in CPI and output, while communication shocks produced less clear responses. We now examine the same responses, but include MPU in the VAR. Target rate shocks have no effect on MPU. However, communication shocks have a negative and significant effect. This behavior suggests a possible channel for why communication shocks that increase the spread do not lower CPI or output.
Figure 8: Information Shocks

Impulse responses to information shocks, including MPU. Information shocks are computed from equation 2.
The left IRFs use raw high-frequency movements as the external instrument. The IRFs on the right use as their instrument $\epsilon_t$, the residual of the raw high-frequency movements regressed on the information shocks $\omega_t$. The high-frequency data are constructed around regular ECB meetings only.
References


