

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

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*The views expressed here are solely our own and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.

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Abstract

We identify two types of monetary policy shocks that emerge from ECB communications on policy meeting days, interest rate target shocks and forward guidance shocks, by measuring high-frequency changes in interest rate futures (1) in the short window around announcements regarding the target rate and (2) during the subsequent press conference. We also assess whether there is an ECB “private information effect” that is revealed by announcements. We proceed to examine the transmission of monetary policy shocks to euro area output, inflation, interest rate and credit spreads, and the dollar-euro exchange rate. Policy is identified through a “preserve the euro” objective, with periphery–core interest rate spreads used as instruments to identify monetary policy shocks: expansionary (contractionary) policy shocks narrow (raise) these spreads. This identification assumption has important empirical content. In the VARs, expansionary ECB policy shocks lead to persistent *appreciation* of the euro, and narrowing of interest rate and credit spreads. For transmission to output and inflation, we find evidence consistent with a “private information” effect, especially from shocks in the communications window. However, other more direct evidence suggests that the information effect is weak, so that overall we conclude that the evidence for an ECB “private information effect” is mixed.

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), Gurkayanak, 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), Miranda-Agrippino (2016), Nakamura and Steinsson (2017), and Jarocinski and Karadi (2018)). 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.¹ 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”, which can arise when forward guidance is “Delphic” (Romer and Romer (2000), Nakamura and Steinsson (2017), 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.

¹It may also be that risk premia change at the time of the announcement. We find, however, that there are no significant changes in estimated term premia on ECB meeting days.

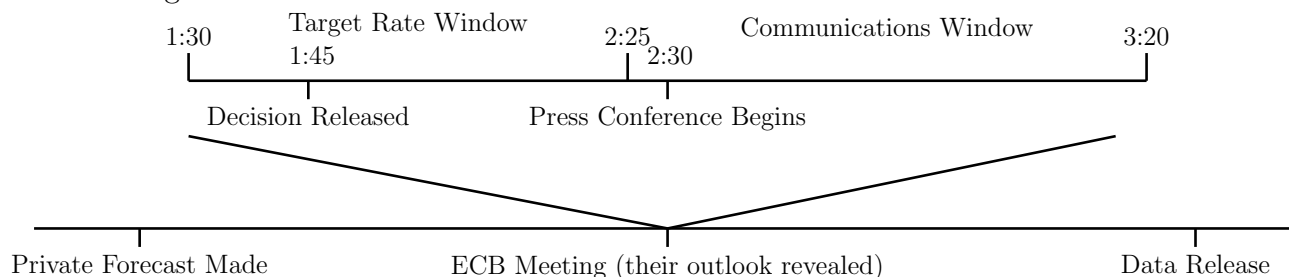
In this paper, we examine the “Fed” information effect using data from European Central Bank (ECB) monetary policy announcements. More specifically, we take up four issues. First, how are different types of ECB policy shocks transmitted? Second, is there a central bank information effect, and if so how to identify it? Does it come from changes in the policy rate? From the statement read after each meeting or the press conference? Third, where does evidence of an information effect appear? In asset prices? Private sector forecasts of GDP or inflation? In responses to policy shocks? Finally, is the information effect related to uncertainty about monetary policy? What is happening to uncertainty and risk premiums during the events that are seen to be giving rise to the information effect?

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 communicates 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.² Because the decision contains nothing on the ECB’s future policy or outlook, it is reasonable to believe that market movements immediately after its release reflect information related only 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

²Starting with the March 2016 meeting, the ECB began to include basic information on asset purchases and forward guidance during this window (which was elaborated upon later).

Figure 1: ECB Communication and Macroeconomic Data Forecast Timeline



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 much of our January 2008 to April 2017 sample period comprises the Euro Crisis, we model ECB policy as having a “preserve the euro” objective.³ We thus use as our baseline case periphery–core interest rate spreads as instruments to identify monetary policy shocks. Contractionary monetary actions are identified by a widening spread in the high-frequency movements around ECB announcements, while expansionary actions are identified by a narrowing spread. In our implementation, we use 2-year interest rate spreads between Italy and Germany as the monetary policy instrument. We control for the response of the EONIA rate in the VARs.

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. We test for the presence of ECB private information by constructing an information revelations time-series based off differences in private sector forecast errors and ECB forecast errors. We then orthogonalize the high-frequency monetary policy surprises with respect to these information revelations. The residual from this

³This was perhaps nowhere more evident than in Mario Draghi’s “whatever it takes” speech in July 2012.

regression is the “pure” or orthogonalized monetary policy surprise (after having cleansed out the information revelation effect of the announcements).⁴ We then produce impulse responses using the raw and orthogonalized series as an external instrument in a VAR.

As detailed below, we find mixed evidence on the importance of the ECB information effect. For example, we show that the percentage of private forecasters whose outlook for one-year ahead GDP growth goes in the “wrong direction” following ECB monetary policy communications, that is, those increase forecasts after a surprise contractionary action, is relatively small. On the other hand, our VAR results suggest that information revelations during the communications window substantially influence the intraday bond price movements. Output and inflation display counterintuitive responses to raw communications surprises, but less significantly to orthogonalized communication surprises. In addition, the euro consistently appreciates following an expansionary monetary policy shocks, while interest rate and credit spreads narrow. Our hypothesis in modeling the ECB’s “preserve the euro objective” thus has empirical content.

2 Data: High-Frequency Surprises and Macro Forecasts

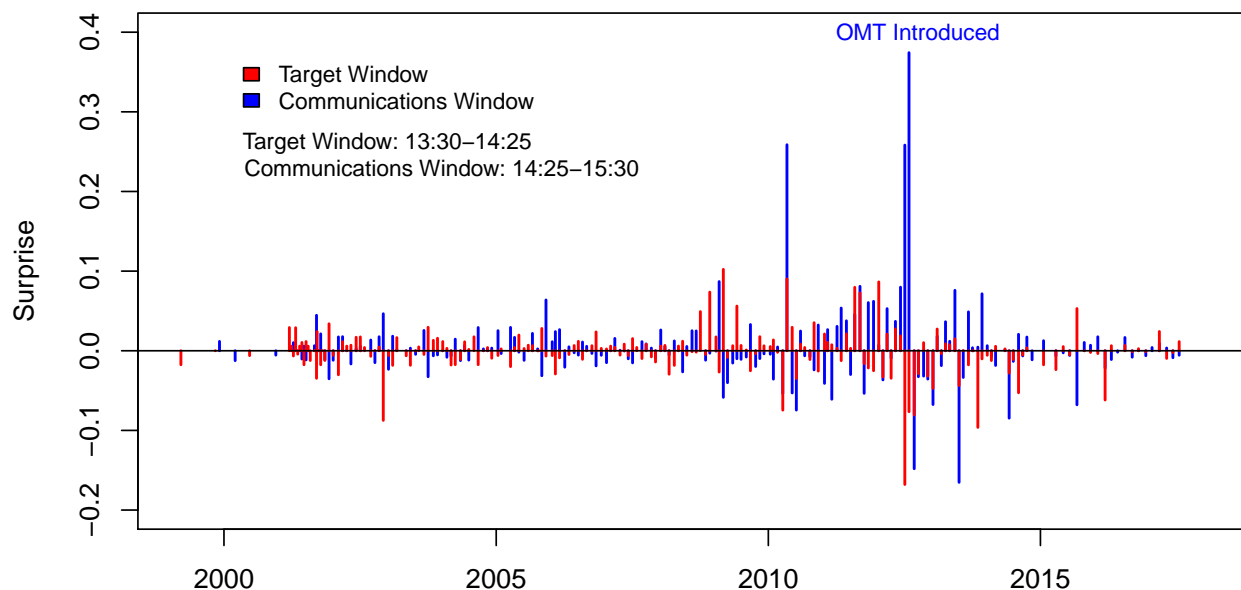
For the intraday prices of government bonds, we turn to the Thomson Reuters Tick History. We record bid prices for Italian and German bonds at the beginning of the target rate window, the end of the target rate window/beginning of the communications window, and end of the communications window.⁵ We then 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 these surprises in Figure 2. We further divide the communication surprises 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).⁶ As

⁴This is akin to computations by Miranda-Agrippino (2016) for the U.S. and U.K.

⁵We record the the price of the transaction that occurred 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 we 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.

⁶Caldara 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

Figure 2: Intraday Italian-German Spread Movements



seen in the figure, the changes in spreads around target announcements are typically smaller than those that occur during the communications window. The latter are especially noteworthy during the Euro debt crisis, when announcements about major changes in policy such as the introduction of the OMT program moved markets considerably.

2.1 Private forecasts and ECB forecasts

In order for the central bank information effect to be relevant, it must be that the private sector's outlook is influenced by that of the ECB. We collect data from Consensus Economics, which interviews fifty-eight private sector forecasters each month on current and next-year GDP growth, industrial production growth, inflation, and unemployment. We obtain the ECB's forecasts from 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.

To investigate whether private forecasters' expectations are influenced by ECB announcements, we use 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, surprises.

we first measure the mean absolute error of the forecasts for the two groups.

Table 1:

Forecast	Private Sector	ECB
GDP Nowcast	0.60	0.52
GDP 1 Year Ahead	1.48	1.36
Inflation Nowcast	0.28	0.24
Inflation 1 Year Ahead	0.91	0.87

Mean absolute errors for the private sector and ECB forecasts. Errors were constructed by subtracting forecasts of GDP growth made by private forecasters and those of the ECB from realized GDP growth in the forecasted year. For example, the private sector’s forecasts of next year’s GDP growth are on average off by 1.48 basis point, while the ECB is on average off by 1.36 basis points.

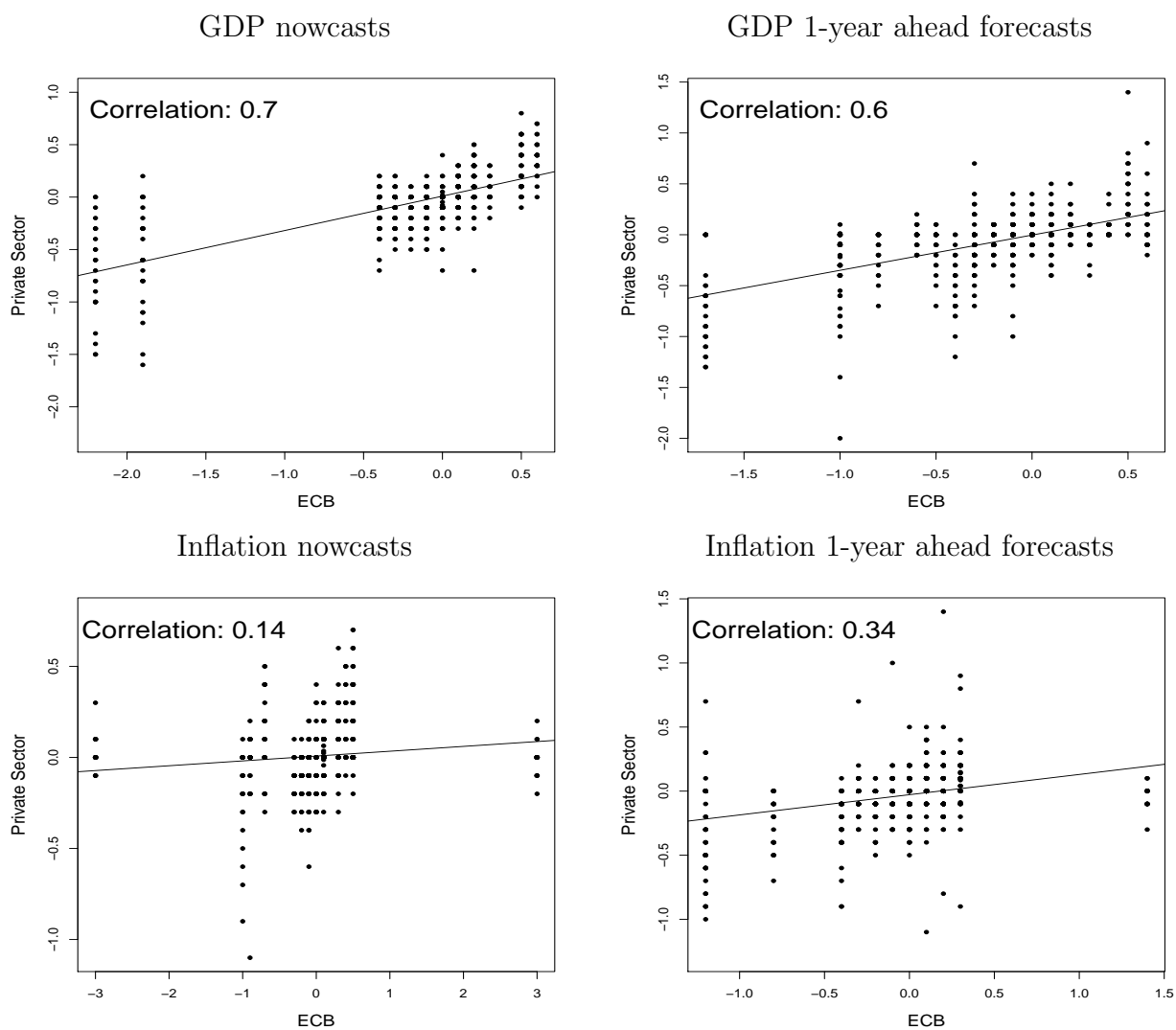
As shown in Table 1, the ECB’s forecasts are on average more accurate than the private forecasters’ for nowcasts and next-year forecasts. Given this finding, we can expect private forecasters to consider the ECB a reliable source for macroeconomic information. To investigate this claim more fully, we construct a series of changes in private forecasts around ECB meeting days. In Figure 3, we display a scatter plot of these changes. These plots demonstrate a strong, positive relationship between ECB and private forecasts for both horizons. The finding that private forecasters change their forecasts in the same way the ECB does suggests that these forecasters use the ECB’s forecasts to update their own.

In addition, we run the following regression:

$$\Delta private\ forecast_{i,t+\delta,t-\delta} = \beta \Delta ECB\ forecast_{t,t-1} + \epsilon_{it} \quad (1)$$

Denote the day of an ECB general council meeting as t and let $\Delta ECB\ forecast_{t,t-1}$ be 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 $private\ forecast_{i,t-\delta}$. Similarly, $private\ forecast_{i,t+\delta}$ denotes the first forecast made by forecaster i after the ECB meeting at t . Thus, $\Delta private\ forecast_{i,t+\delta,t-\delta}$ is the change in the outlook of private forecaster i 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).

Figure 3: Private Sector Forecast Change vs ECB Forecast Change



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 are monthly, ECB forecast changes are quarterly.

Table 2: Private sector GDP forecast changes regressed on ECB forecast changes

ECB Forecasts	Private Sector Forecasts			
	GDP Nowcast	GDP Forecast	Inflation Nowcast	Inflation Forecast
GDP Nowcast	0.328*** (0.011)			
GDP Forecast		0.346*** (0.016)		
Inflation Nowcast			0.027*** (0.007)	
Inflation Forecast				0.158*** (0.015)
Constant	0.009 (0.006)	-0.003 (0.008)	0.007 (0.005)	-0.028*** (0.007)
Observations	855	854	852	849
Adjusted R ²	0.489	0.354	0.017	0.116

*p<0.05; **p<0.01; ***p<0.001

The private sector forecast change around an ECB meeting is the difference between the first forecast survey after that meeting and the last forecast survey before the meeting. ECB forecast changes are quarterly.

In this context, a significant coefficient on $\Delta ECBforecast_{t,t-1}$ provides evidence that the private sector updates its information using the ECB's forecast changes. In our regressions, we use nowcasts and next-year forecasts of GDP growth. As shown in Table 2, we find that private sector forecasts change in response to ECB forecast changes. The relationship is both positive and significant, indicating that private forecasters update based on the ECB's outlook.

2.2 Forecast error surprises

Denote the private sector's information about a future-date (τ) economic state 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 Ω_τ denotes the true economic state at time τ . 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. To do so, we average next-year GDP projections across forecasters for each month, and then regress this series on the ECB forecast. Months without ECB forecasts are set to 0.

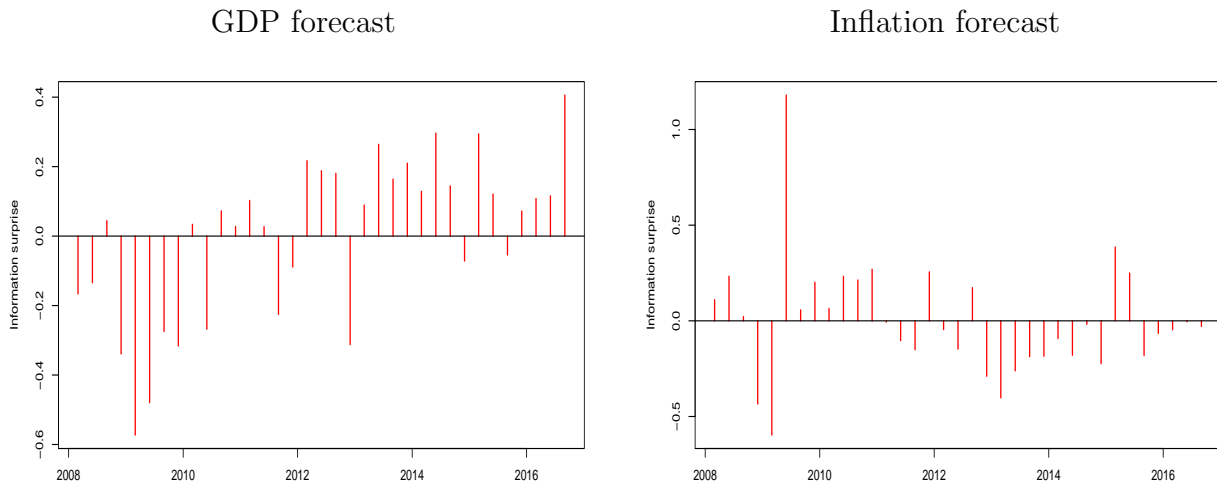
$$(data_\tau - privateforecast_{\tau,t-\delta}) = \beta_0 + \beta_1(ecbforecast_{\tau,t}) + \omega_t \quad (2)$$

We find that $\beta_1 = 0.97$. The residuals of this regression, ω_t , are shown in Figure 4. The residuals are the part of the information the private sector lacks that is unexplained by the information the ECB lacks, thus representing the information surprises the private sector can derive from the ECB announcements. The residuals are 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.

2.3 Forecast revisions and monetary policy surprises

We examine forecaster responses to surprises around ECB communications and count for each meeting how many of them go in the counterintuitive direction. Each month, Consensus Economics interviews fifty-eight forecasters on their expectations for the Eurozone economy. From this, we obtain the number of forecasters each month that alter their next-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 “perverse” response. In Figure 5, we show the percent of each month’s forecasters that exhibited these. These values are not large, on the whole, but were upward of one-third

Figure 4: Forecast error surprises



The residuals from Equation (2).

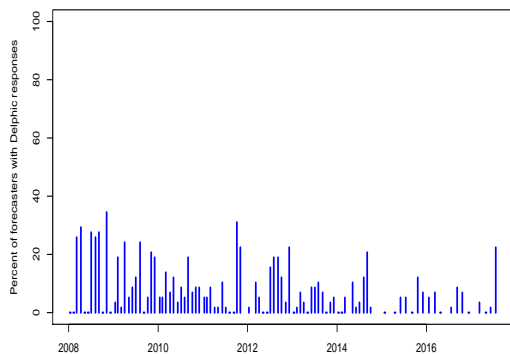
during the crisis years at the start of the sample. More forecasters responded in a perverse way during the financial crisis and after major ECB announcements to combat the Eurocrisis, such as the decision to buy Spanish and Italian bonds in August 2011, Mario Draghi’s “Whatever it Takes” speech in July 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 the “wrong” way, as found by, e.g., Nakamura and Steinsson for the United States.

2.4 “Preserve the euro” effect?

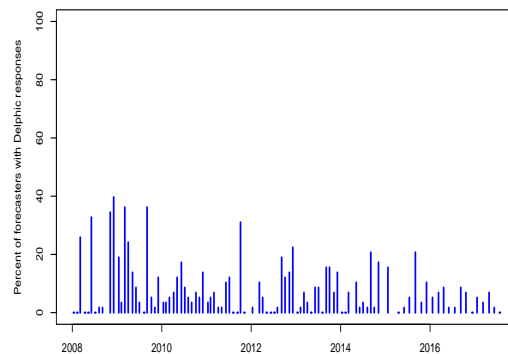
The literature has produced no specific consensus concerning where the information effect is to be manifest. In this section, we look for it in the exchange rate. In Figure 6, we display the relationship between high-frequency responses of bond yield spreads relative to the dollars/euro exchange rate. Narrowing spreads coincide with euro appreciation, especially in communications window, the figures show, and this effect is stronger for “more peripheral” countries. This effect is opposite of that found for Fed policy changes and the dollar, in which contractionary

Figure 5: “Delphic” Responses in GDP and Inflation 1-year ahead forecasts with respect to Target Rate and Communication Surprises

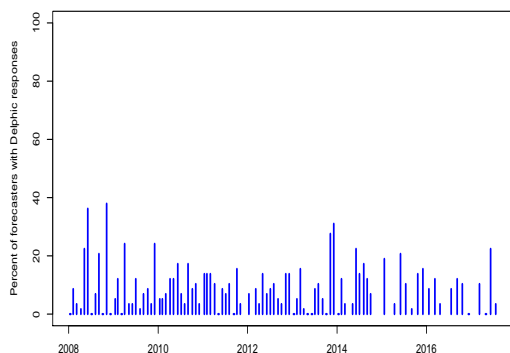
GDP Response to Target Rate Surprises



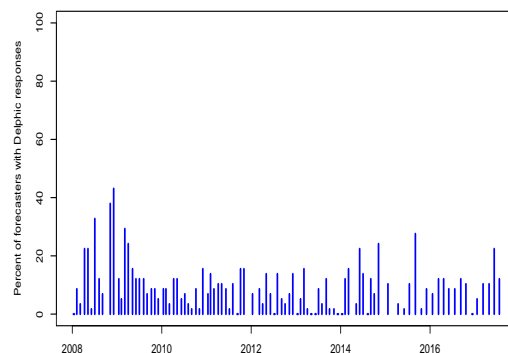
GDP Response to Communications Surprises



Inflation Response to Target Rate Surprises



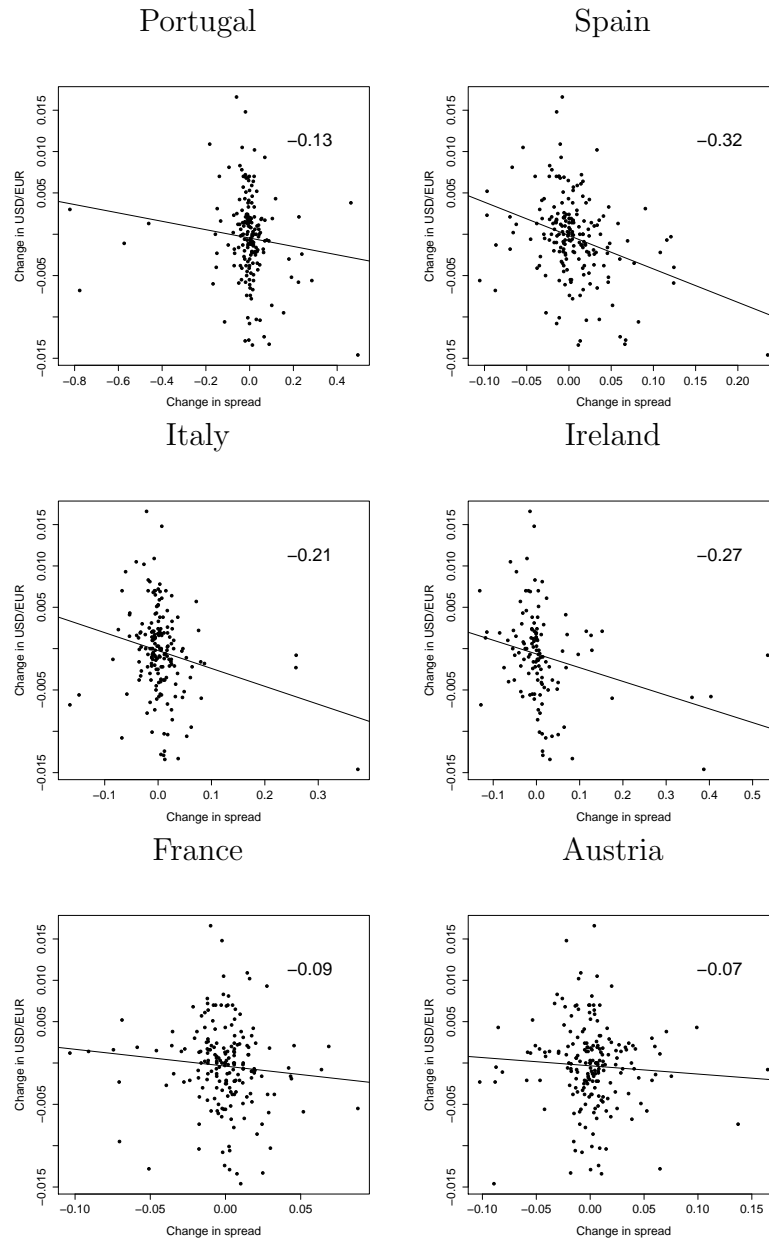
Inflation Response to Communications Surprises



Each bar shows the percent of private forecasters that responded in a way that moves the GDP growth or inflation forecast in the same direction as the high-frequency policy surprise.

monetary policy is associated with dollar appreciation. Thus our assumption that there was an important “preserve the euro” element to ECB monetary policy, especially during the euro crisis, has empirical content.

Figure 6: Change in 2-Yr Interest Rate Spread and Exchange Rate



3 VARs

3.1 External instruments 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 \mathbf{Y}_t be a vector of economic and financial variables, \mathbf{A} and $\mathbf{C}_j \forall j \geq 1$ conformable coefficient matrices, and ϵ_t a vector of structural shocks. The general structural form of the VAR we consider is given by

$$\mathbf{A}\mathbf{Y}_t = \sum_j \mathbf{C}_j \mathbf{Y}_{t-j} + \epsilon_t \quad (3)$$

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

$$\mathbf{Y}_t = \sum_j \mathbf{B}_j \mathbf{Y}_{t-j} + \mathbf{u}_t, \quad (4)$$

where $\mathbf{u}_t = \mathbf{S}\epsilon_t$ is the reduced form shock, with $\mathbf{B}_j = \mathbf{A}^{-1}\mathbf{C}_j$, $\mathbf{S} = \mathbf{A}^{-1}$.

Let \mathbf{s} denote the column in matrix \mathbf{S} corresponding to the impact on each element of the vector of reduced form residuals \mathbf{u}_t of the structural shock ϵ_t . To compute the impulse responses to a structural shock, we estimate

$$\mathbf{Y}_t = \sum_j \mathbf{B}_j \mathbf{Y}_{t-j} + \mathbf{s}\epsilon_t \quad (5)$$

As is well-known, the necessary timing restriction that all the elements of \mathbf{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 \mathbf{Z}_t as a vector of instrumental variables and ϵ_t^q a vector structural shocks other than the policy shock, the identification approach requires that:

$$E[\mathbf{Z}_t \epsilon_t'] = \psi, E[\mathbf{Z}_t \epsilon_t^{q'}] = \mathbf{0} \quad (6)$$

That is, \mathbf{Z}_t must be correlated with ϵ_t , the structural shock of interest, but orthogonal to all of the other shocks.

To estimate the elements in \mathbf{s} , we follow GK and proceed as follows. First, estimate \mathbf{u}_t from the ordinary least squares regression of the reduced form VAR (2). Second, let u_t be the reduced form residual from the equation for the policy indicator of interest and let \mathbf{u}_t^q be the reduced form residual from the equation for variables q other than the policy indicator. Let $s^q \in \mathbf{s}$ be the response of \mathbf{u}_t^q to a unit increase in the policy shock ϵ_t . Then obtain an estimate of the ratio s^q/\mathbf{s} from the two stage least squares regression of \mathbf{u}_t^q on u_t , using the instrument set \mathbf{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.

3.2 Decomposing monetary policy surprises

Motivated by the considerations above, we identify the “true” monetary policy shock in the high-frequency movement around ECB announcements by orthogonalizing raw monetary policy surprises from the “Delphic” component of the announcement. Formally, we regress raw high-frequency surprises on the ECB’s and private sector’s one-year ahead GDP forecast:

$$MPS_{c,t} = \beta_0 + \beta_1 \text{ecbforecast}_{\tau,t} + \beta_2 \text{privateforecast}_{\tau,t-\delta} + \epsilon_t$$

where c denotes the communications window.⁷ The private forecasts are those made before the ECB meeting. The fitted values from this regression represent the component of the high-frequency movement owing to the differences in the ECB’s and private sector’s information set. The residuals from this regression ϵ_t are the orthogonalized monetary policy surprises. For

⁷We restrict $\beta_1 = -\beta_2$. We perform this decomposition for the communications window only because the ECB outlook is not (yet) known during the target window.

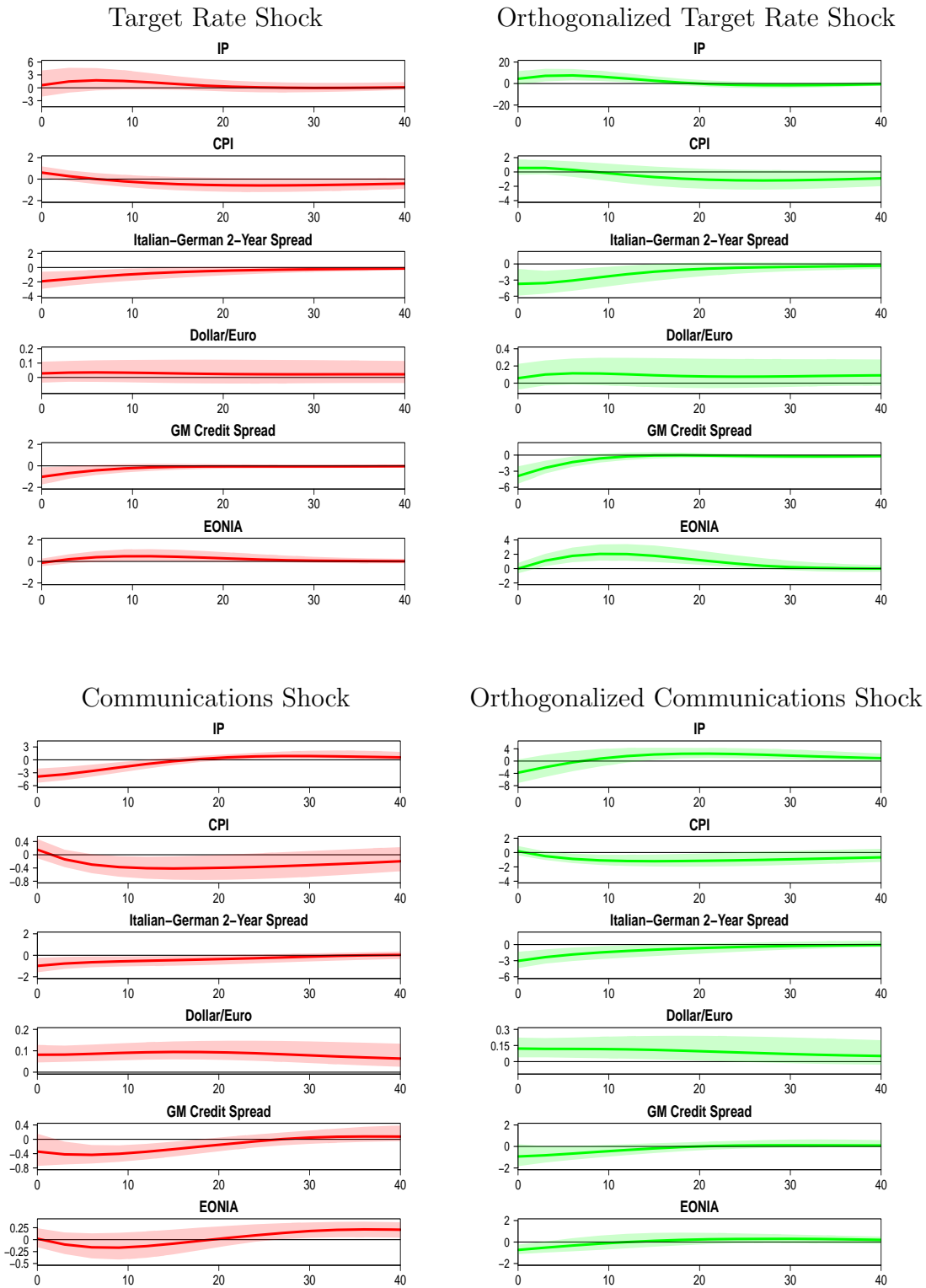
months without ECB forecasts, the surprise takes a value of 0. In what follows below, we use these as external instruments in a VAR to estimate the transmission effects of different types of ECB monetary policy shocks.

3.3 Responses to raw and orthogonalized monetary policy shocks

Figure 7 displays the impulse responses using the external instruments identification outlined above, controlling for movements in the Eonia rate. To begin, we display the responses to raw target rate shocks. An expansionary shock, which reduces the two-year IT-DE interest rate spread, leads to a reduction in the Gilchrist-Mojon credit spread and on impact increase output and inflation, although these effects are not always statistically significant. The expansionary shock appreciated the euro at all horizons, again consistent with our assumption about the ECB's policy indicator(s) during the sample period.

In the bottom two panels, we display the responses to communications shocks, identified using both raw and orthogonalized (“cleansed”) monetary policy surprises as instruments. The responses to the raw communication shocks appear to be perverse: an expansionary monetary policy shocks lowers the two-year IT-DE spread, reduces the excess bond premium yet also lowers industrial production and (after a short lag) CPI. Once again, the euro appreciates. The panel on the right, depicting the effects of the orthogonalized communications shock, indicates the these perverse transmission effects become less significant but are by no means reversed. The patterns are robust to including the Eonia rate in the VAR. The Eonia rate falls in the communications window, though not always significantly. This result suggests that part of the change in futures prices around ECB announcements is due to the ECB revealing private information on the economy, yet that cannot be the full explanation.

Figure 7: Impulse Responses



The orthogonalization is done using the following regression: $MPS_{c,t} = \beta_0 + \beta_1(ecbgdpforecast_{\tau,t} - privategdpforecast_{\tau,t-\delta}) + \beta_2(ecbinflationforecast_{\tau,t} - privateinflationforecast_{\tau,t-\delta}) + \epsilon_t$.

4 Conclusion

In this paper, we find mixed evidence on the importance of the ECB information effect. For example, we show that the percentage of private forecasters whose outlook for one-year ahead GDP growth goes in the “wrong direction” following ECB monetary policy communications, that is, those increase forecasts after a surprise contractionary action, is relatively small. On the other hand, our VAR results suggest that information revelations during the communications window substantially influence the intraday bond price movements. Output and inflation display counterintuitive responses to raw communications surprises, but less significantly to orthogonalized communication surprises. In addition, the euro consistently appreciates following an expansionary monetary policy shocks, while interest rate and credit spreads narrow. Our hypothesis in modeling the ECB’s “preserve the euro objective” thus has empirical content.

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