Monetary Transmission with Frequent Policy Events

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Abstract

This paper examines the role of both official policy meetings and policymakers' speeches as key signals of monetary policy in measuring the transmission of monetary policy to financial markets and the real economy. Leveraging high-frequency tick-by-tick data, we construct an extensive dataset for the euro area that by also including policymakers' speeches expands the number of policy events tenfold compared to those based solely on official rate-setting meetings. Using the resulting Euro Area Extended Monetary Policy Event-Study Database (EA-EMPD) we reach two key findings. First, policymakers' speeches can significantly influence the price of financial assets at different maturities, mirroring the effects of official monetary policy announcements. Second, while official rate-setting meetings are valuable for assessing how policy changes affect the real economy, broadening the scope of policy events is essential for understanding the overall contribution of monetary policy shocks in explaining real economic fluctuations. Our findings highlight the crucial role of policymakers' speeches in complementing official policy signals and providing a deeper understanding of how monetary policy is transmitted to financial markets and the real economy.

JEL Classification: E43, E44, E52, E58, G14

Keywords: ECB Policy surprise, Speeches, Event-study, Intraday

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1 Introduction

Central banks increasingly communicate monetary policy outside official meetings. This trend is driven by three main factors. First, there has been a significant shift from the more opaque communication practices of the 1980s and 1990s to a more transparent approach. Modern policymaking entails active communication of policy actions, their anticipated effects, and the expected direction of policy rates to shape market expectations, particularly at the effective lower bound. Second, the expansion of policy tools following the global financial crisis has required more frequent updates on their implementation, effectiveness and side effects. In other words, central banks had to make extra efforts to explain the functioning and expected implications of new policy measures adopted after the Lehman collapse such as credit easing and quantitative easing. Third, a combination of improved financial literacy and central banks' efforts to make their deliberations more accessible to the public has led to increased media attention on monetary policymaking. As a result, measuring the effects of monetary policy by focusing solely on official meetings may fail to capture the full extent of its impact on financial markets and the broader economy.

In this paper, we extend the traditional approach to measuring monetary policy surprises that focuses solely on official policy meetings by augmenting the policy event set with speeches delivered by policymakers. There is increasing evidence that policymaker speeches can enhance our understanding of the transmission mechanisms of monetary policy (Swanson (2023); Ahrens, Erdemlioglu, McMahon, Neely, and Yang (2024); Swanson and Jayawickrema (2023)). This is particularly relevant when monetary authorities aim to shape market expectations to enhance the predictability of decisions made during policy meetings (Swanson (2006); Bauer and Swanson (2023)). Notably, significant changes in monetary policy are often communicated to markets through speeches that provide valuable insights into the intended policy stance. These speeches could therefore serve as a key complement to the signals derived from the official communication following official rate-setting meetings and help clarify the intended direction of monetary policy.

Concretely, our analysis proceeds in three steps. First, we construct a comprehensive dataset using tick-by-tick data, extending the datasets by Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019) to include all speeches delivered by the executive board members of the ECB since the inception of the euro area, to obtain the new extended monetary policy event-study database (EA-EMPD). Significant effort has been devoted to carefully analyzing each event window, eliminating outliers and misquotes—particularly prevalent in the early part of the sample—to ensure that the reported results accurately capture market reactions. Second, we analyze and charac-

terise the impact of policy actions on financial markets by leveraging high-frequency monetary policy surprises around both official rate-setting meetings and speeches. Third, we assess the transmission of monetary policy to the real economy by integrating these more frequent surprises into standard macroeconomic models. This approach enables us to track the effects of a large number of policy events over time, ten times larger than the ones typically analysed when not considering policymakers' communications over time.

Concerning the impact of policy actions on financial markets, there is a consolidated literature on the use of high-frequency changes in asset prices around policy announcements by the Federal Reserve (Kuttner (2001); Gürkaynak, Sack, and Swansonc (2005); Bernanke and Kuttner (2005); Swanson (2021)) and the European Central Bank (Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019); Brand, Buncic, and Turunen (2010); Jardet and Monks (2014); Andrade and Ferroni (2021); Leombroni, Vedolin, Venter, and Whelan (2021); Cieslak and Schrimpf (2019); Kane, Roger, and Sun (2018); Rogers, Scotti, and Wright (2018)).

A more recent literature focuses on policy communication outside official meetings, such as speeches by the president or board members, and highlights how they can serve as an important source of information that markets can use and respond to, complementing their assessment of monetary policy actions. Recent studies have analyzed the importance of monetary policymakers' speech content in influencing financial markets (Ahrens and McMahon (2021); Ahrens, Erdemlioglu, McMahon, Neely, and Yang (2024)). In addition, research using U.S. data has recently shown that the Fed Chairman's speeches can have an even greater impact on financial markets than FOMC announcements (Swanson and Jayawickrema (2023)). For the euro area, there is scant evidence on the impact of ECB communication on financial markets with one paper (Istrefi, Odendahl, and Sestieri (2024)) finding that markets respond to all forms of ECB communication, not just Governing Council events. Recent studies have also introduced novel methods to analyze central bank communication ranging from natural language approach to identify monetary policy shocks using Federal Reserve staff documents (Aruoba and Drechsel (2025)) to Fed's communication on social media and the associated real-time insights into inflation expectations (Gorodnichenko, Pham, and Talavera (2024)).

Concerning instead the impact of policy actions on the real economy, the industry standard for identifying monetary policy shocks rests on the use of high-frequency surprises. Indeed, many studies have used high-frequency changes in interest rates around central bank announcements as an instrument to estimate the effects of monetary policy on lower-frequency macroeconomic variables such as output, unemployment, and inflation (e.g., Stock and Watson (2012); Cochrane

and Piazzesi (2002); Faust, Swanson, and Wright (2004); Gertler and Karadi (2015); Ramey (2016); Jarociński and Karadi (2020); and Swanson (2023)).

Our paper complements these studies by expanding the policy event set and focusing not only on the impact of monetary policy on financial markets but also, crucially, on its macroeconomic effects - a topic that is underexplored using euro area data. We reach two main findings. First, we show that policymakers' speeches significantly influence the term structure of risk-free interest rates in the euro area, highlighting their value as supplementary signals of intended monetary policy actions. Unlike findings for the U.S., we find that in the euro area, Governing Council meetings remain the most significant source of information on monetary policy and also account for a substantial share of intraday asset price variations. Second, we find that incorporating speeches into the policy event timeline improves the depth and precision of the assessment of monetary policy's impact on the real economy.

High-frequency monetary policy surprises are a valuable tool for estimating the effects of monetary policy on asset prices and macroeconomic variables (e.g. Gürkaynak, Sack, and Swansonc (2005)). However, concerns have arisen regarding their effectiveness as instruments for capturing monetary policy-induced changes in interest rates. These concerns revolve around two key issues: exogeneity and relevance. On exogeneity, research has shown that monetary policy surprises are often predictable using macroeconomic and financial data available before FOMC announcements (Miranda-Agrippino (2016); Miranda-Agrippino and Ricco (2021); Karnaukh (2020); Sastry (2022); Bauer and Swanson (2021); Bauer and Chernov (2024)). On relevance, various studies found that as monetary policy surprises represent only a small fraction of monthly interest rate changes their use in a macro model as proxy for monetary policy shocks might be subject to a weak instrument bias (Stock and Watson (2012); Ramey (2016); Bauer and Swanson (2021)). In this paper, we address the exogeneity concern by incorporating real-time information flows from macroeconomic surprises. To tackle the relevance concern, we expand the set of monetary policy announcements to include speeches by all executive board members, ensuring a broader and more representative dataset. More in detail, our results indicate that expanding the set of policy events used to analyze the effects of monetary policy on asset prices improves substantially the explanatory power and relevance of policy surprises as proxies for monetary policy actions. This approach helps mitigate the weak instrument problem identified in previous studies that restrict the policy event set to official monetary policy decision meetings.

We establish new results concerning the transmission of monetary policy to the real economy in the euro area. We find that while official rate-setting meetings are valuable for predicting how

policy changes affect the real economy, expanding the policy event set to include also speeches is important for understanding the contribution of monetary policy shocks in explaining real economic fluctuations. Concretely, simulation analysis based on impulse response functions reveals that when using the expanded set of policy events, which also includes policy speeches, the peak impact of macroeconomic variables to monetary policy shocks tends to be larger. Finally, we show that including policy communications outside official meetings increases the share of variance in real economic variables explained by monetary policy shocks, providing a more comprehensive understanding of monetary policy's transmission to the economy.

The remainder of the paper proceeds as follows. Section 2 presents the novel dataset that expands the Euro Area Monetary Policy Event-Study Database (EA-MPD) by Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019) to include policy communications beyond Governing Council events. Section 3 measures the impact of this expanded policy event set on financial markets and highlights the differences among various types of communications. Section 4 evaluates the effects of monetary policy on the real economy. Section 5 concludes.

2 Euro area monetary policy event-study database

One of the contributions of this paper is to expand the Euro Area Monetary Policy Event-Study Database (EA-MPD) by Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019) to include official policy communications outside the governing council events. This section serves as an introductory guide to this new dataset, the euro area extended monetary policy event-study database (EA-EMPD), which will be periodically updated and made publicly available. The dataset is based on tick-by-tick data from the Thomson Reuters Tick History database, enabling the measurement and reporting of asset price changes during relevant policy and communication windows. We begin by outlining the monetary policy communication process in the euro area, followed by a detailed overview of the dataset's features developed to capture monetary policy surprises. Technical details of the dataset construction are provided in online appendices. On the day of a policy event, such as a speech, we record the event's start and end times and define two intervals around it: the pre-event and post-event windows. Specifically, we first cleanse the data to remove misquotes, then discretize it by taking the last quote of each minute within each window. The pre-event quote is calculated as the median price within the 10–20 minute interval before the event, while the post-event quote is the median price within the 10–20 minute interval after the event. Using intervals instead of a specific minute helps minimize the risk of selecting an

unrepresentative quote. The changes recorded in the database represent the difference between the pre-event and post-event quotes for each communication window. We define a "change due to monetary policy" as the change in asset prices caused by the event, measured as the difference between the pre-event and post-event window quotes. Figure 1 provides a stylized illustration of this timeline.

Figure 1: Policy event timeline

The figure illustrates the typical structure of policy communication on the day of a policy event, whether it involves a speech or a Governing Council meeting of the ECB.

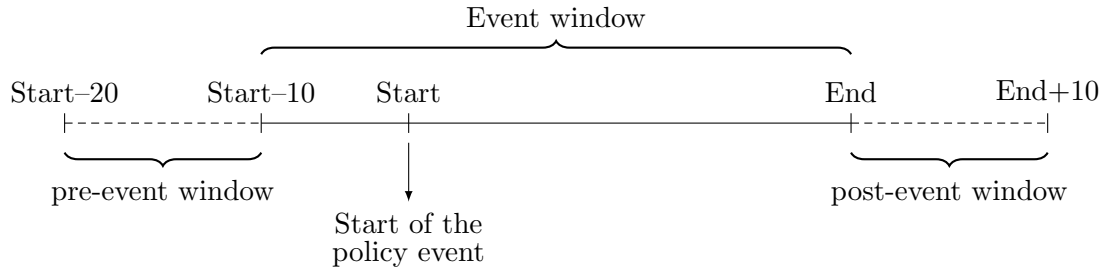
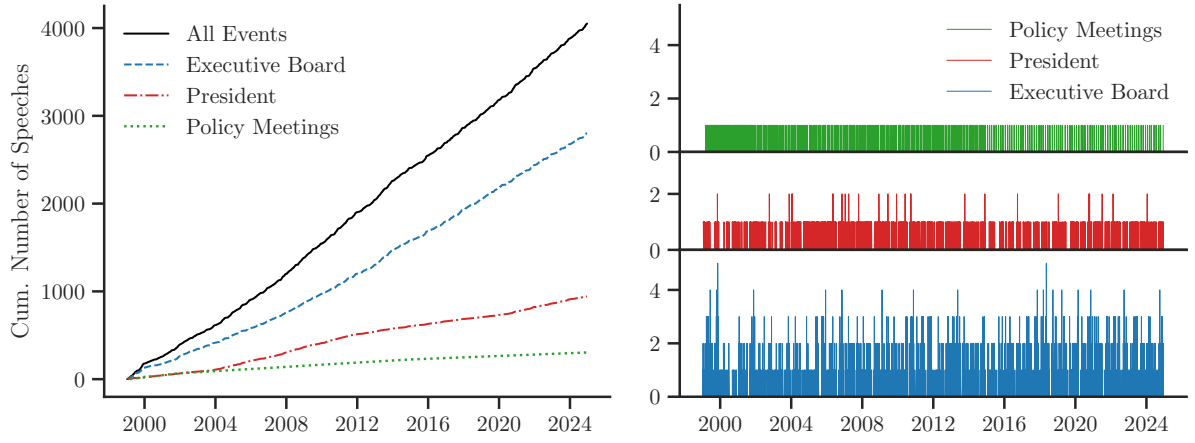


Figure 2 depicts the number of policy events over time. Panel (a) shows the cumulative number of speeches by Executive Board members and the president in comparison to the number of monetary policy decisions. Panel (b) illustrates the rise in policy communications outside of decision days, as well as the growing number of speeches per day, with many days seeing multiple speeches by ECB Executive Board members.

Figure 2: Policy events over time

This figure plots the cumulated number of events and their daily distribution.



(a) Cumulative number of events

(b) Monthly number of speeches

The assets covered in the EA-EMPD are: OIS rates with 1, 3, 6 month, 1 to 10, 15, and 20 year maturities; German, French, Italian, and Spanish sovereign yields with 2, 5, and 10 year maturities, the STOXX50E and the stock price index comprising banks (SX7E), and the exchange rate of

the euro. The EA-EMPD is made available as a supplement to this paper and will be regularly updated. Table 1 highlights the importance of the different event types for the risk-free rates, exchange rates and the stock market.

Table 1: Importance of different policy events

This table reports the impact of different policy events on risk-fee rates, exchange rates and the European stock market. Panel A computes the total sum of all absolute changes around each policy event in percentage points. Panel B scales the results by the number of observations and details the average absolute change in basis points.

	risk-free rates					**other assets**	
	1m	3m	2y	5y	10y	EXR	stock
Panel A: Sum of absolute changes [pp]							
Policy Meetings	4.11	3.25	3.74	2.35	2.01	44.17	100.04
President	0.73	1.07	2.39	1.13	1.16	28.94	66.59
Executive Board	1.98	1.96	3.78	2.46	3.00	58.53	137.48
Panel B: Mean absolute change [bp]							
Policy Meetings	1.58	1.25	1.44	1.94	1.66	16.99	38.48
President	0.29	0.43	0.95	1.00	1.02	11.48	26.42
Executive Board	0.29	0.29	0.56	0.56	0.69	8.68	20.40

3 The impact of monetary policy on financial markets

In this section, we assess the effects of monetary policy on financial markets. Leveraging the EA-EMPD, we track changes in asset prices for numerous variables within a narrow window surrounding a comprehensive set of policy events.

Many studies have used high-frequency changes in asset prices around the Federal Reserve's Federal Open Market Committee (FOMC) announcements to measure the effects of US monetary policy on financial markets (e.g., Kuttner (2001); Gürkaynak, Sack, and Swansonc (2005); Bernanke and Kuttner (2005); Swanson (2021)). For the euro area, work on related questions have been done by Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019), Brand, Buncic, and Turunen (2010), Jardet and Monks (2014), Andrade and Ferroni (2021), Leombroni, Vedolin, Venter, and Whelan (2021), Cieslak and Schrimpf (2019), Kane, Roger, and Sun (2018), Rogers, Scotti, and Wright (2018), and Jarociński and Karadi (2020), among others.

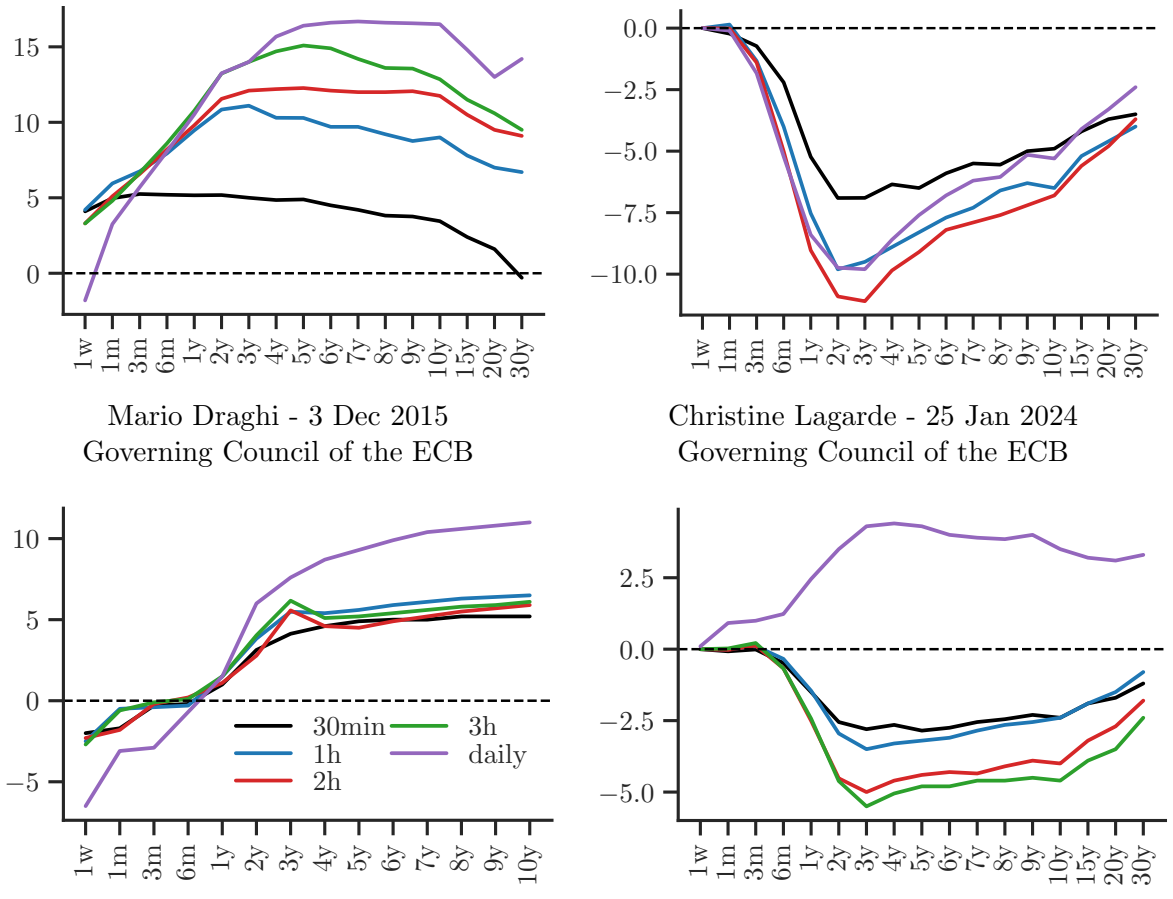
When expanding the set of policy events to include speeches, three immediate challenges arise. First, the event window may vary depending on the timing and structure of each speech. Second, speeches often occur at different times of the day, and in some cases, outside of trading hours. Third, concurrent events, such as significant macroeconomic data releases, can act as confounding factors, complicating identification efforts.

In order to mitigate the concern of confounding factors, we use the Bloomberg Economic Calendar (ECO) to replicate the real-time information available to market participants. For each macroeconomic release, the dataset includes both the realized value and predictions provided by a panel of market participants. ECO survey forecasts typically begin one to two weeks before the release and are updated in real-time until the official announcement. In the empirical analysis, the median (consensus) forecast is used as the survey value.

In practice, we account for all euro area and US macroeconomic news that overlaps with our event windows. These news events are quantified as the difference between the official release and the corresponding forecast. This approach effectively controls for changes in financial asset prices driven by macroeconomic news affecting the market at any given time (e.g., Altavilla, Giannone, and Modugno (2017)).

Figure 3: Selected policy events

The chart shows the reaction of OIS rates at various maturities (x-axis) in basis points (y-axis).



Mario Draghi - 3 Dec 2015
Governing Council of the ECB

Christine Lagarde - 25 Jan 2024
Governing Council of the ECB

Jürgen Stark - 12 Oct 2011
Economic adjustment in a monetary union

Philip R. Lane - 26 May 2023
How quickly will inflation return to target?

One of the most iconic speeches delivered by a policymaker is the "whatever it takes" speech

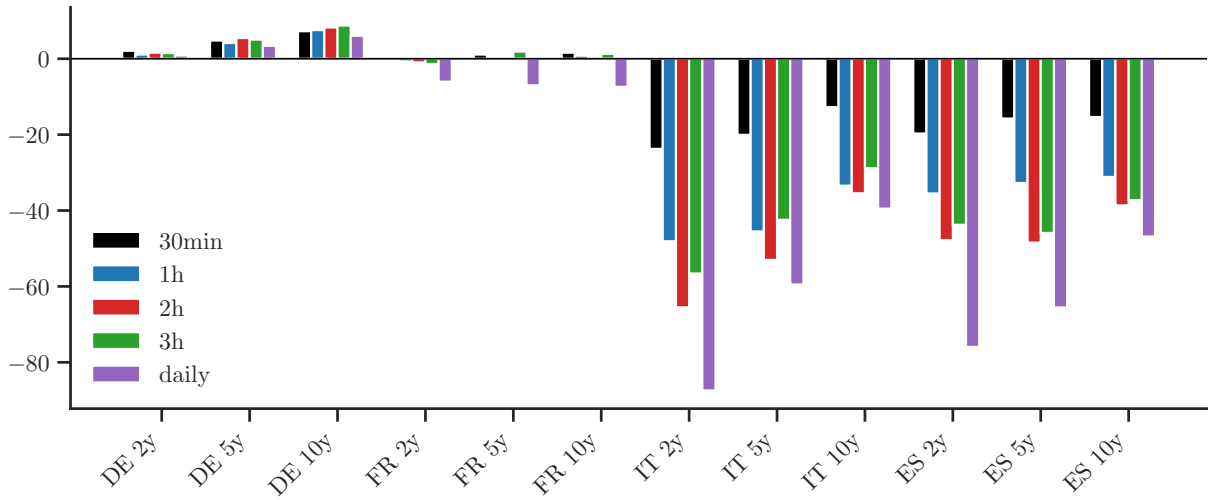
by European Central Bank (ECB) President Mario Draghi on July 26, 2012. The speech is widely recognized as a turning point in the euro area sovereign debt crisis. Draghi's declaration that the ECB was prepared to do "whatever it takes to preserve the euro," followed by the assertion, "and believe me, it will be enough", had a profound and immediate impact on financial markets. Figure 3 illustrates this impact.

The speech triggered a sharp decline in sovereign bond yields for crisis-hit euro area countries such as Spain and Italy, with yields dropping by 20 basis points immediately after the speech and by nearly 100 basis points by the end of the day[1].

Overall, the speech is credited with restoring investor trust in the euro area, driving increased capital inflows and improving funding conditions for eurozone banks and governments. It also set a precedent for the critical role of central bank communication as a policy tool, demonstrating that credible verbal commitments can produce tangible and lasting effects on financial markets.

Figure 4: The footprint of "whatever it takes"

The chart depicts the changes in sovereign yields at intervals of 30 minutes, 1 hour, 2 hours, 3 hours, and 1 day following ECB President Draghi's "whatever it takes" speech on July 26, 2012.



3.1 The footprint on financial markets

We characterise the impact of policy events (both speeches and official announcements) according to their footprint on the term structure of interest rates.

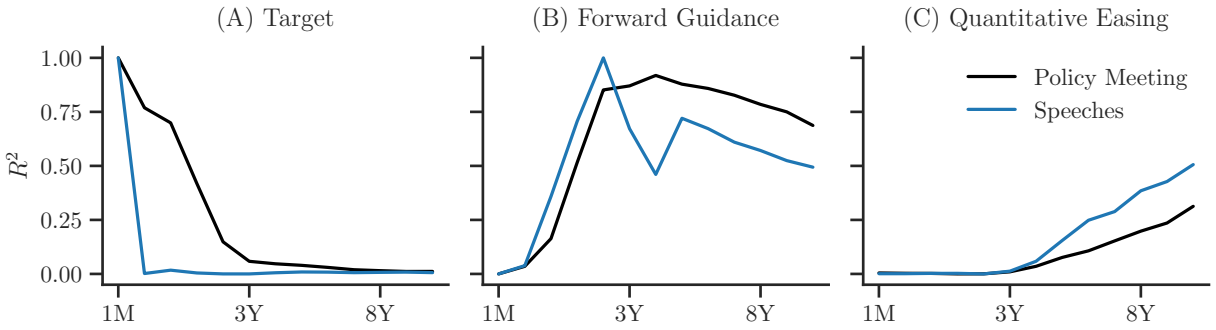
[1]The impact of the "whatever it takes" speech extended beyond sovereign yields. The euro appreciated against major currencies. European equity markets rallied, reflecting increased investor confidence. Market volatility decreased significantly, signaling reduced uncertainty. Financial sector stocks, particularly those of banks in peripheral eurozone countries, experienced substantial gains as systemic risks diminished (see Altavilla, Giannone, and Lenza (2016)).

Instead of employing a full factor analysis (Gürkaynak, Sack, and Swansonc (2005); Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019)), we define the target factor as the surprise change in the 1-month OIS rate itself, the forward guidance factor as any additional movement in the 2-year OIS yield orthogonal to the change in the target factor, and the QE factor as any additional movement in the 10-year OIS yield orthogonal to the first two factors. This straightforward set of identifying assumptions, used in prior studies Rogers, Scotti, and Wright (2018); Gilchrist, Yue, and Zakrajšek (2019); Swanson (2021)), produces empirical factors that exhibit a correlation exceeding 90% with the three rotated factors obtained from the comprehensive factor analysis of Altavilla, Brugnolini, Gürkaynak, Motto, and Ragusa (2019).

Figure 5 illustrates that (A) changes in short-term interest rates are primarily driven by the Target surprise; (B) the Forward Guidance factor influences interest rates across all maturities beyond one month, typically exhibiting a hump-shaped pattern; and (C) the QE factor differs from Forward Guidance, exerting a stronger impact as maturity increases.

Figure 5: Empirical Factors

The target factor is defined as changes in 1-month OIS rates; forward guidance are changes in the 2-year OIS rate orthogonalized with respect to target surprises; Quantitative easing are changes in 10-year OIS yields orthogonalized with respect to target and forward guidance surprises.



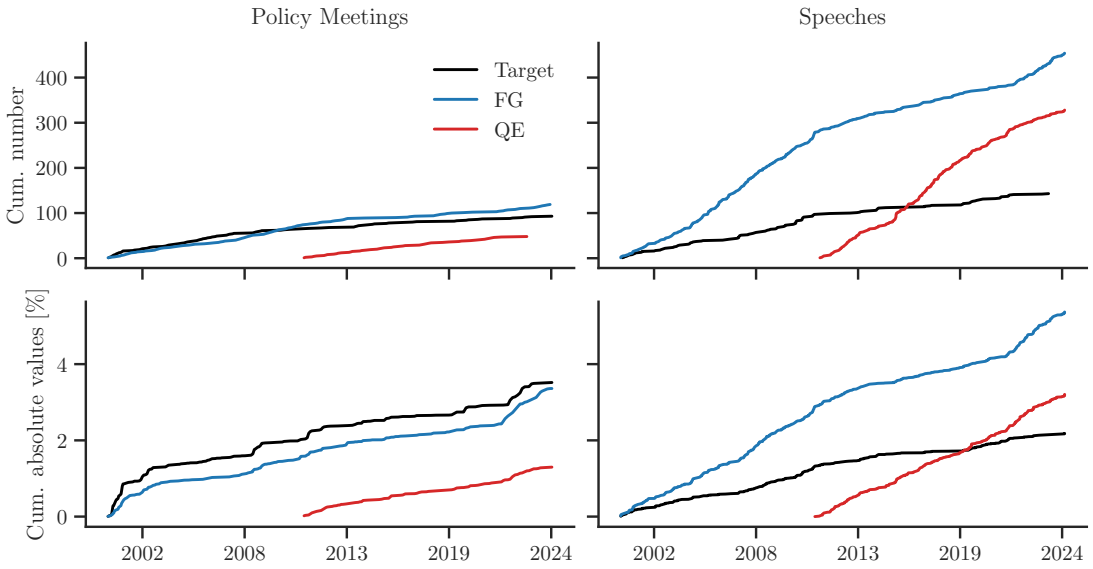
3.2 Share of variance explained by speeches and policy meetings

A compelling question in evaluating the relative importance of speeches and policy meetings is how much of the daily variance in yields can be attributed to these policy events. Figure 7 illustrates the share of daily variance in various yields attributable to announcements made during governing council meetings (Panel A) and speeches by executive board members (Panel B). The results are striking: governing council events account for a significantly larger share of the variance in the selected financial assets.

Specifically, intraday movements in yields driven by governing council announcements reach

Figure 6: Importance of Empirical Factors over Time

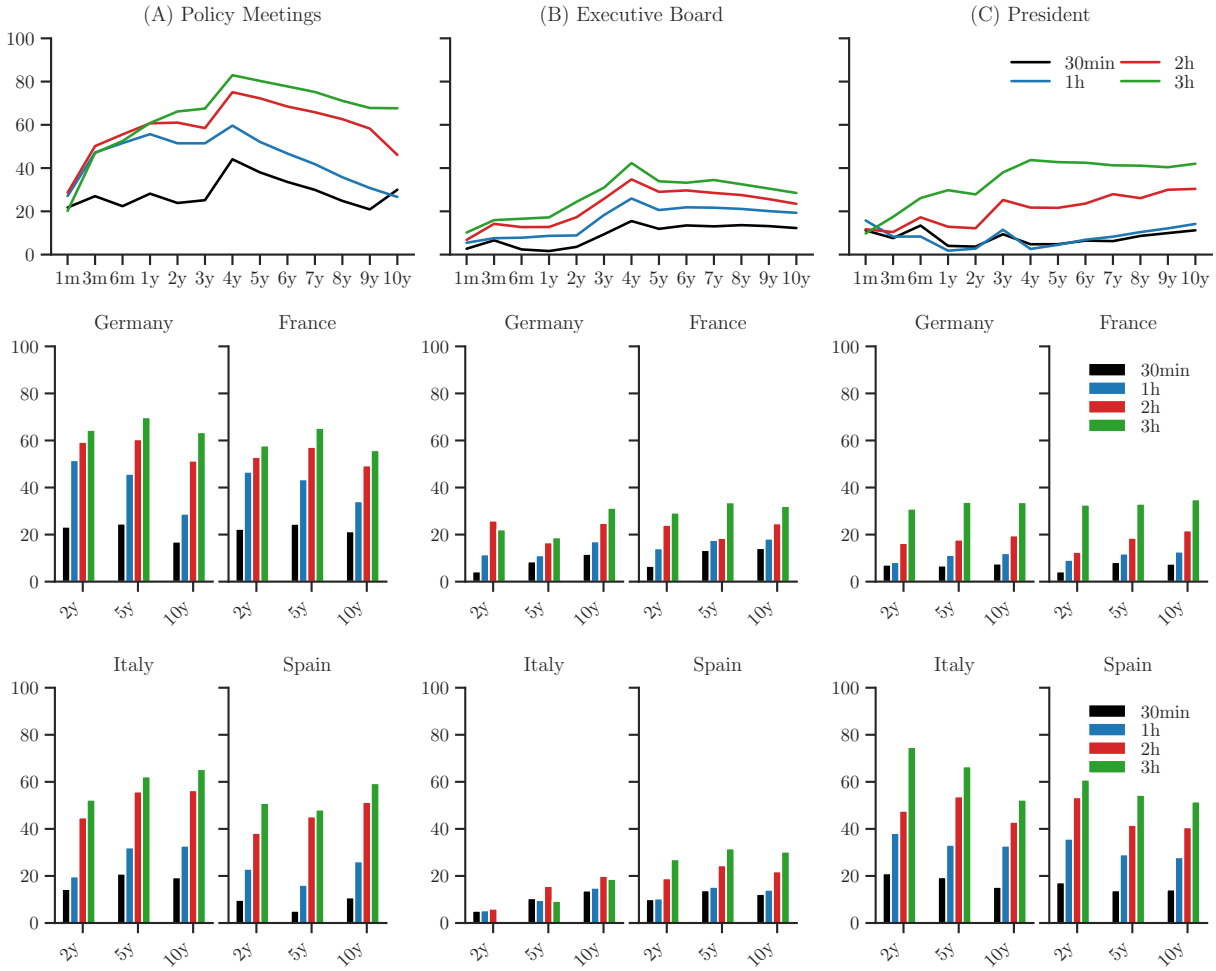
The first row shows the cumulative number of policy events classified as Target, Forward Guidance, and Quantitative Easing, based on the event with the largest absolute empirical factor movement. The second row presents the cumulative absolute changes of the empirical factors across policy meetings and speeches.



as high as 80%, whereas the corresponding share for speeches is substantially smaller, peaking at around 40%. These results hold consistently across the entire maturity spectrum of the risk-free interest rate curve.

Figure 7: Share of daily variance explained by policy events

The figure shows the share of variance of OIS rates and sovereign yields at difference maturities explained by Governing Council meeting (column 1), EB member speech (column 2) and speeches by the president (column 3).



4 The transmission to the real economy

In this section, we evaluate the impact of monetary policy on the real economy. To measure its effects on inflation and output, we utilize the expanded dataset of policy events (EA-EMPD). Having identified the high-frequency changes in financial assets associated with policy actions, we can now incorporate these insights into a dynamic macroeconomic model. Specifically, we employ a Bayesian Vector Autoregression (BVAR) model augmented with monetary policy surprises, which capture policy-induced changes in interest rates.

Our analysis addresses three key issues. First, we examine how the informational content of central bank speeches enhances the relevance of monetary policy surprises as proxies for policy-driven changes in yields. Second, we discuss methods to disentangle the effects of monetary policy

from those arising from the central bank's assessment of the economic outlook. Third, we analyze how the inclusion of speeches as policy events alters the share of variance in real economic variables that can be attributed to monetary policy.

4.1 Relevance of surprises

Many studies have used high-frequency changes in interest rates around FOMC announcements as an "external instrument" (Stock and Watson (2012)) to estimate the effects of monetary policy on lower-frequency macroeconomic variables such as output, unemployment, and inflation (e.g., Cochrane and Piazzesi (2002); Faust, Rogers, Swanson, and Wright (2003); Faust, Swanson, and Wright (2004); Gertler and Karadi (2015); Ramey (2016); Bauer and Swanson (2023)).

A potential issue with using high-frequency surprises around monetary policy announcements as a proxy for policy-driven changes in interest rates is that they may capture only a small portion of the variation in policy rates, limiting their effectiveness as instruments for the variables they aim to represent. This weak-instrument risk has been extensively documented in the literature, particularly in VAR settings like ours Stock and Watson (2012); Ramey (2016)).

To address this concern, we explore whether expanding the set of monetary policy events to include policymakers' speeches can mitigate potential weak-instrument problems. Specifically, we test whether augmenting the dataset with high-frequency interest rate responses to speeches improves the power of our high-frequency instrument. To do so, we estimate the following monthly regression:

$$\Delta i_t = \alpha + \beta MPS_t + \varepsilon_t \tag{1}$$

where MPS_t represents monetary policy surprises measured as changes in yields around either Governing Council announcements or policymakers' speeches.

According to the rule of thumb proposed by Stock and Watson (2012), an instrument is considered weak if the first-stage F-statistic in a two-stage least squares regression is below 10. Our results show that incorporating both Executive Board speeches and Governing Council announcements significantly increases the first-stage F-statistics, therefore avoiding a potential weak-instrument problem. These findings are consistent with Bauer and Swanson (2023), who highlighted the importance of policymakers' speeches as a source of monetary policy information.

Figure 8: First Stage Regression

The figure reports the first stage regression of daily changes in the one-month OIS on the high-frequency monetary policy shocks of the same underlying asset.

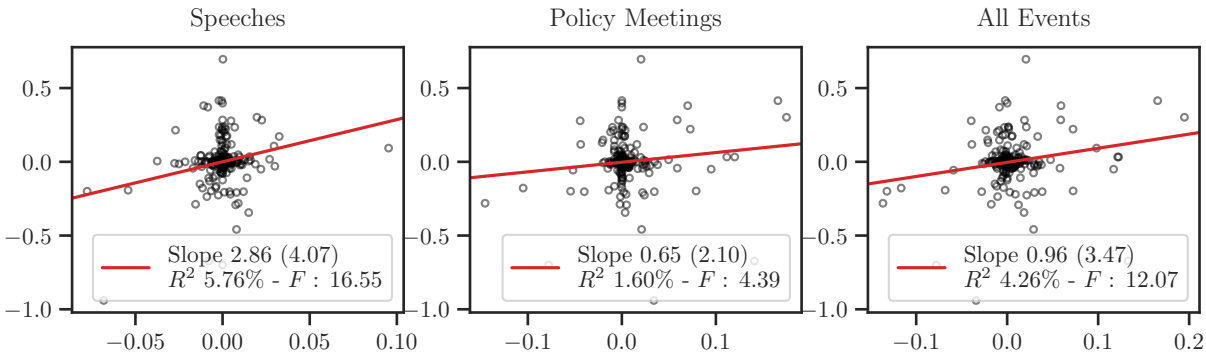
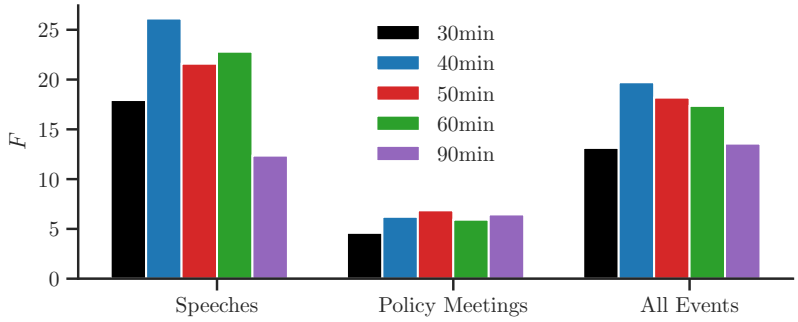


Figure 9: First Stage Regression

The figure reports the F-test statistics for the first stage regression of daily changes in the one-month OIS on the high-frequency monetary policy shocks of the same underlying asset.



4.2 Exogeneity of surprises

To assess exogeneity, we first examine whether monetary policy surprises are predictable in-sample based on macroeconomic news. We construct an economic surprise index by calculating the difference between the actual data release and the Bloomberg median forecast. To ensure comparability across different macroeconomic announcements, we standardize each macro series over time. The index is then computed as a relevance-weighted moving average over the past six weeks:

$$I_t = \sum_{i \in [t-s,t)} w_i \frac{Release_t^i - Forecast_t^i}{\sigma^i},$$

where w_i represents the weight determined by the Bloomberg relevance score and σ^i denotes the standard deviation of each macroeconomic series. Figure 10 presents the economic surprise index. In Table 2, we estimate a predictive regression for the high-frequency monetary policy surprises

on the economic surprise index:

$$\Delta i_t = \alpha + \beta I_{t-1} + \varepsilon_t.$$

The in-sample coefficients for the target rate (measured as one-month OIS changes) are insignificant, with an R^2 close to zero, suggesting that monetary policy surprises are exogenous to macroeconomic news shocks.

Figure 10: Surprise Index

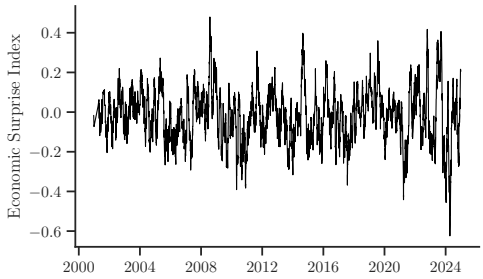


Table 2: Predictive regression

	OIS 1M	OIS 3M	OIS 1Y	DE 2Y	IT 2Y	FR 2Y	ES 2Y
A: Policy Meetings							
β	1.42	0.91	−0.72	−1.33	−2.58	−0.83	−1.66
R^2	0.29%	0.18%	0.13%	0.34%	0.68%	0.14%	0.44%
A: Speeches							
β	−0.09	−0.22*	−0.17	−0.13	−0.60*	−0.12	−0.07
R^2	0.03%	0.17%	0.06%	0.01%	0.14%	0.01%	0.00%

Motivated by Bauer and Swanson (2023), we extend the initial univariate regression by incorporating six-week changes in the slope of the yield curve (Dslope), the Bloomberg Commodity Index (DBCI), and the stock market (Dstoxx). Table 3 demonstrates that monetary policy surprises by speeches remain exogenous. However, changes in the target rate around policy meetings appear predictable, primarily driven by stock market fluctuations.

Table 3: Extended predictive regression

	OIS 1M	OIS 3M	OIS 1Y	DE 2Y	IT 2Y	FR 2Y	ES 2Y
A: Policy Meetings							
β(Dslope)	−0.0448	−0.146	−0.0734	0.0115	0.0882	0.0212	−0.164
β(DBCI)	−0.437*	−0.217	−0.0546	−0.112	0.0917	−0.187	0.225
β(Dstoxx)	−0.946***	−0.44**	−0.443**	−0.36*	−1.15***	−0.398*	−0.616***
β(ESI)	−0.0602	−0.0362	−0.315*	−0.353*	−0.744***	−0.306	−0.411*
R^2	10.24%	3.87%	3.66%	2.63%	9.63%	3.29%	4.20%
A: Speeches							
β(Dslope)	0.014	0.0229	−0.00947	−0.0494	−0.0993	−0.076	−0.0164
β(DBCI)	0.0115	0.033	0.074**	0.059	0.0228	0.0476	0.03
β(Dstoxx)	−0.00783	−0.0413	−0.063*	−0.0256	−0.0906	−0.0307	−0.0398
β(ESI)	−0.0241	−0.0412*	−0.0396	−0.0225	−0.222***	−0.00764	−0.107
R^2	0.19%	0.78%	0.72%	0.21%	0.96%	0.24%	0.26%

This finding holds out-of-sample, where we observe a statistically significant correlation (t-stat

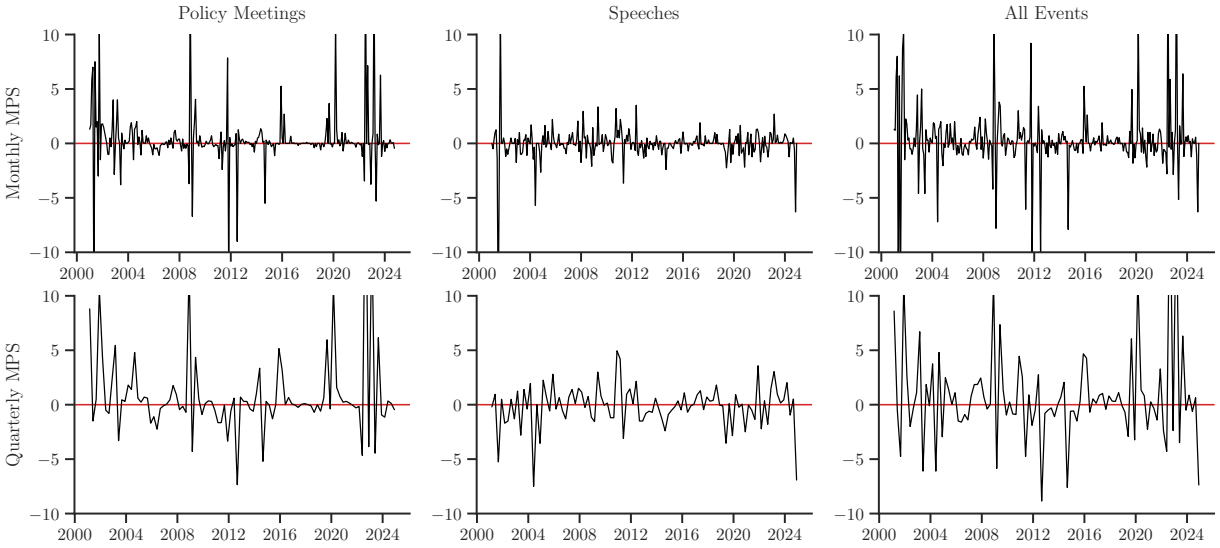
= 2.26) of approximately 20% between predicted and realized monetary policy shocks. Consequently, we adjust policy meeting shocks by taking the residuals from the predictive regression.

4.3 The response of macroeconomic variables to monetary policy shocks

To study the dynamic impact of monetary policy on the real economy, we embed the monetary policy surprise in a monthly VAR. Let y_t denote a vector of macroeconomic and financial variables observed in month t, and mps_t a vector of surprises in month t (figure 11).

Figure 11: Monetary policy series

This figure plots the monetary policy series of the short-term OIS rate sampled at a monthly and quarterly frequency.



To construct mps_t, we aggregate intraday surprises from days in month t that feature Governing Council meetings or speeches by Executive Board members. Importantly, mps_t is set to zero for months without such announcements or speeches. Also, as we have end-of-the month data, we do not have the issue highlighted by Kilian (2024). Our baseline model is a VAR in which the vector y_t includes industrial production, inflation, and loan volumes. The model imposes a restriction that mps_t is exogenous, meaning it does not depend on the lags of either y_t and mps_t.

$$\begin{pmatrix} mps_t \\ y_t \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ A_{y,mps}(L) & A_{y,y}(L) \end{pmatrix} \begin{pmatrix} mps_{t-1} \\ y_{t-1} \end{pmatrix} + \begin{pmatrix} u_t^{mps} \\ u_t^{y} \end{pmatrix} \tag{2}$$

The identification imposes zero restrictions on the contemporaneous responses of mps_t and y_t to other variables, and sign restrictions requiring that a monetary policy shock moves mps_t and the exchange rate in the opposite directions (i.e., a monetary tightening by the ECB is associated

with an appreciation of the euro), while a central bank information shock moves them in the same direction.

The identification has been used in previous studies (e.g., Jarociński and Karadi (2020)). Alternative approaches in the literature use mps_t as "external instruments" in VARs or in local projections (e.g., Stock and Watson (2012); Mertens and Ravn (2013); Gertler and Karadi (2015)). These two approaches, however, can be used interchangeably as they yield asymptotically the same impulse responses up to a constant scaling factor (Stock and Watson (2018); Plagborg-Møller and Wolf (2021)).

Figure 12: The transmission of monetary policy shocks

This figure plots the impulse response functions for industrial production, inflation, and loans. The first row includes all policy events, while the second and third rows focus exclusively on policy meetings and speeches, respectively.

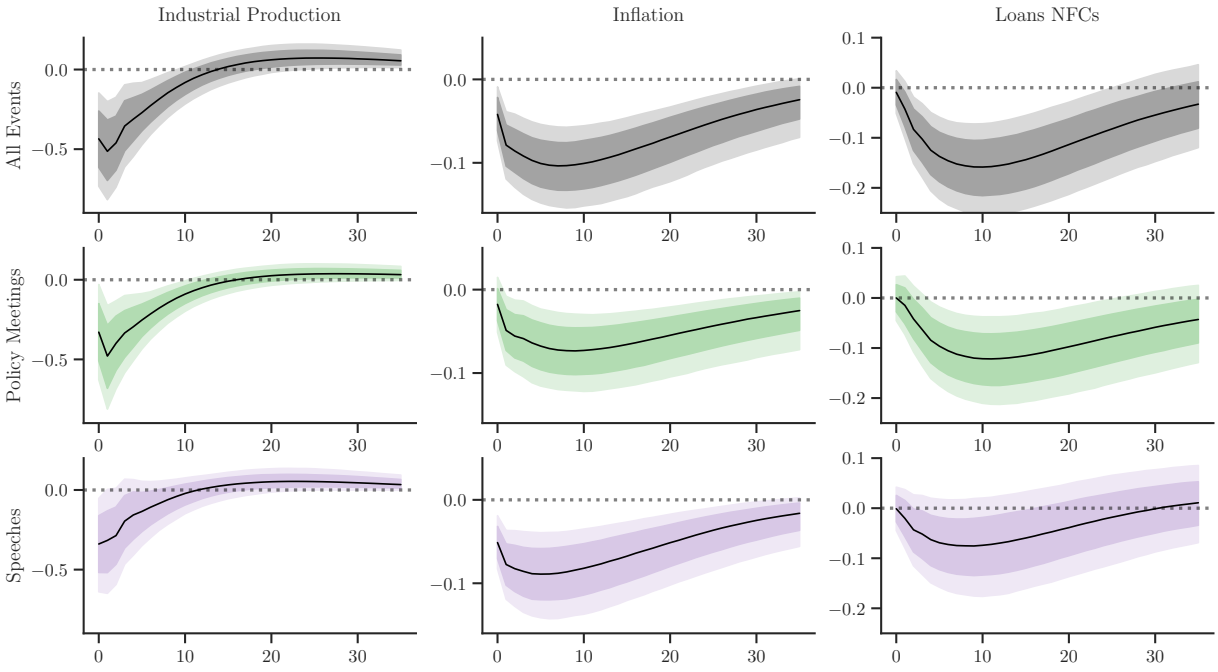


Figure 12 shows that monetary shocks identified through both policy meetings and speeches have a greater impact on industrial production and prices compared to those identified solely through policy meetings.

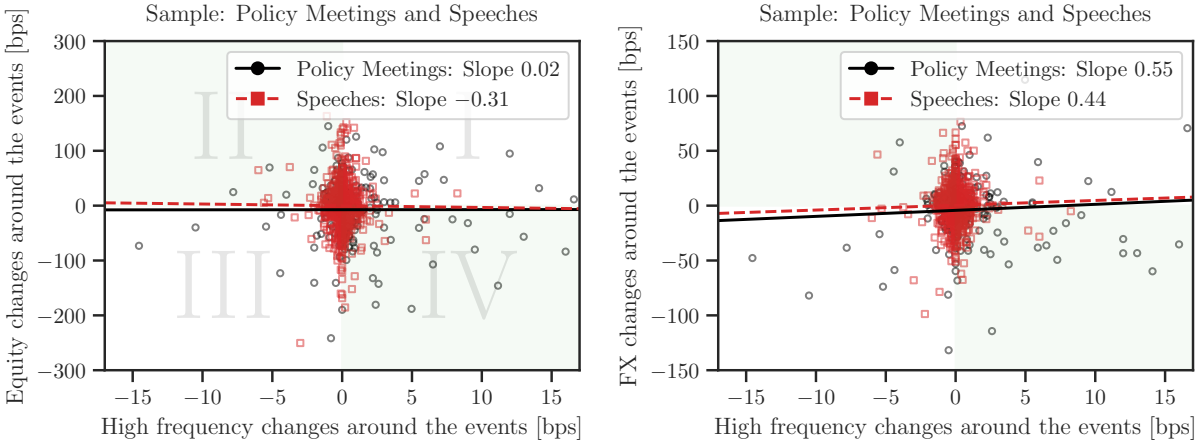
4.4 Separating monetary policy from information effects

Studies utilizing the VAR framework (e.g., Miranda-Agrippino and Ricco (2021); Jarociński and Karadi (2020)) and high-frequency analysis (e.g., Nakamura and Steinsson (2018); Cieslak and Schrimpf (2019); Lunsford (2020); Andrade and Ferroni (2021)) have significantly advanced our

understanding of the importance of this information channel. Almost all of them, however, focus on a limited set of policy events and measure monetary policy surprises based on yield changes within a narrow window around official policy meetings. In the empirical analysis, we differentiate between monetary policy shocks and information shocks by leveraging our expanded set of policy events. The analysis will use both official governing council meetings and policymakers' speeches, considered either individually or in combination, as indicators of monetary policy actions. Previous studies have demonstrated that central bank announcements simultaneously convey information about monetary policy decisions and the central bank's assessment of the economic outlook (e.g., Nakamura and Steinsson (2018)). Building on this insight, we disentangle these two components by applying alternative cross-asset restrictions and analyzing their effects on the economy using a Bayesian vector autoregression model. Concretely, the macroeconomic impact of the policy surprises is assessed by separating positive and negative correlations between changes in risk-free interest rates and simultaneous changes in equity prices (Jarociński and Karadi (2020)), inflation-linked swaps (Andrade and Ferroni (2021)), and exchange rates (Gürkaynak, Kara, Kısacıkoğlu, and Lee (2021)).

Figure 13: Monetary policy and information effects

This figure plots the impulse response functions for industrial production, inflation, and loans. The first row includes all policy events, while the second and third rows focus exclusively on policy meetings and speeches, respectively.



4.5 Forecast error variance

In this subsection, we assess the contribution of monetary policy shocks to changes in real economic variables using Forecast Error Variance Decomposition (FEVD). FEVD helps quantify the relative importance of monetary policy shocks in driving uncertainty in the real economy over time. Figure 15 highlights the improvements from incorporating speeches into the unconditional and conditional BVAR.

Figure 14: The transmission of monetary policy shocks: Conditional on equity movements

This figure displays the impulse response functions for industrial production, inflation, and loans. The first row includes all policy events, while the second and third rows focus exclusively on policy meetings and speeches, respectively. The IRFs are in response to a positive monetary policy shock that simultaneously causes a decline in equities.

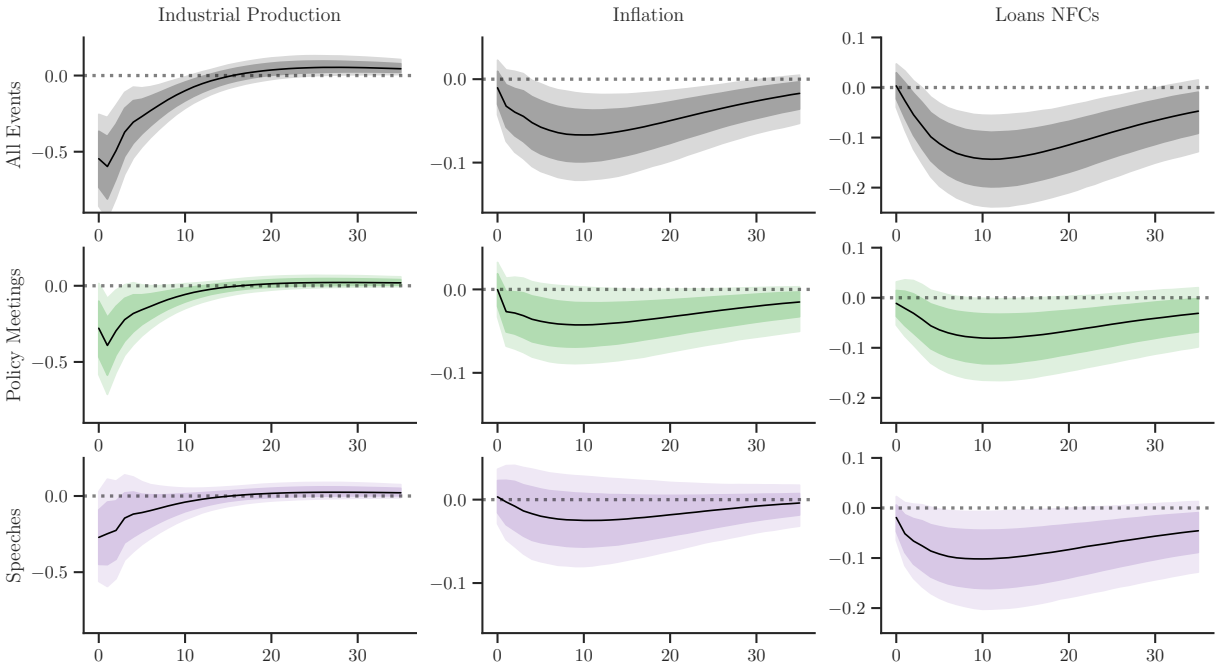
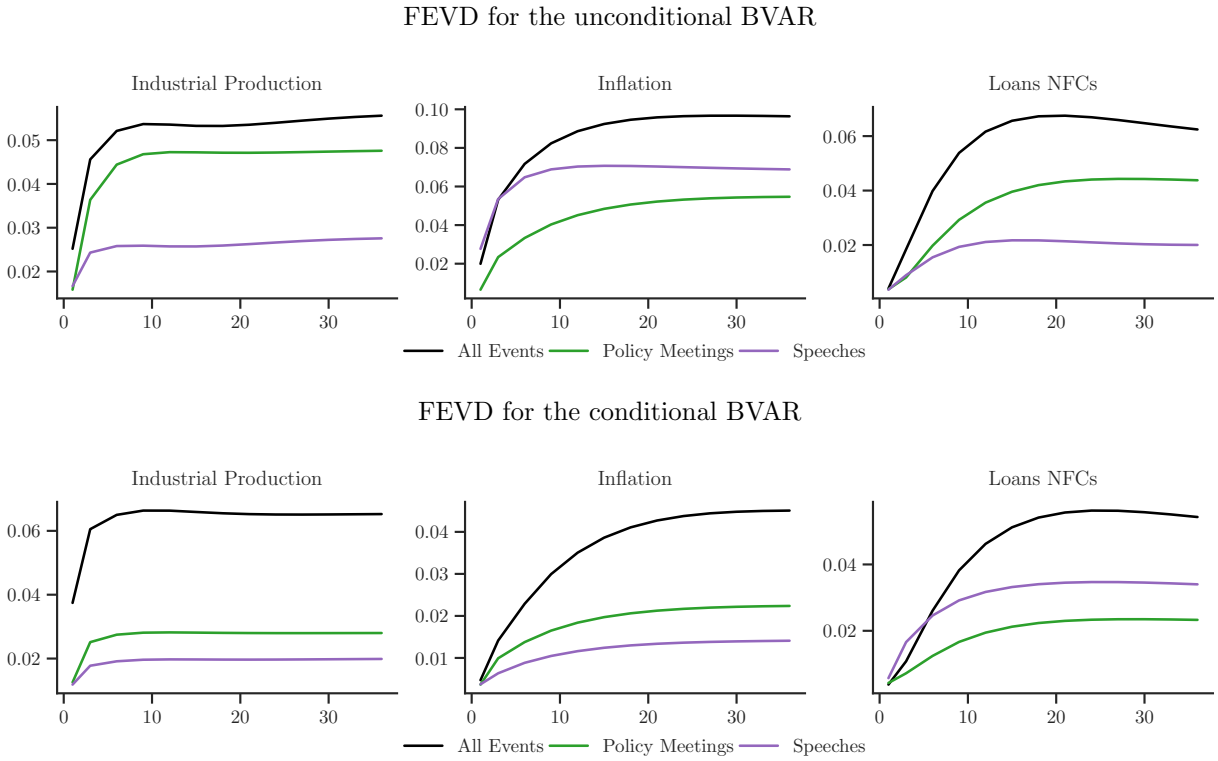


Figure 15: FEVD for monetary policy shocks

This figure reports the FEVD for industrial production, inflation and loans for different horizons.



5 Conclusion

We show that monetary surprises resulting from speeches provide additional explanatory power beyond those associated with official rate-setting policy meetings. Our analysis starts with a high-frequency analysis of asset price changes in a policy-event-rich environment. We then integrate the insights from this analysis into a standard macroeconomic model to assess how the expanded set of policy events affects the transmission of monetary policy to the real economy.

Our findings lead to two key conclusions. First, policymakers' speeches significantly influence the term structure of risk-free interest rates across all maturities, mirroring the impact of official monetary policy announcements. This underscores the value of speeches as additional signals of intended monetary policy actions. Second, incorporating speeches into the policy event timeline enhances the assessment of monetary policy's effects on the real economy.

Broadening the scope of policy events used to assess monetary policy effects on the real economy increases the relevance of policy surprises as proxies for monetary policy actions and helps address the so-called weak instrument problem. We show that the dynamic response of macroeconomic variables to monetary policy shocks that uses a restricted policy event set is still well-identified even without fully disentangling monetary policy effects from information effects but produces effects that are smaller with respect to the ones obtained when using the expanded set of policy events. Importantly, we also show that including policy communications outside official meetings increases the share of the variance in real economic variables explained by monetary policy shocks. Overall, our results highlight the importance of integrating communication into monetary policy analysis to improve both the precision and depth of economic assessments.

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Appendix A A simple explanation of the results

This subsection formally shows why increasing the number of independent and identically distributed (i.i.d.) news events improves the relevance of an instrument used to summarize monetary policy surprises and helps better capture the true dynamics. Let the true model for a macroeconomic variable Y_t (e.g., inflation or output) be:

$$Y_t = \alpha + \beta S_t + \varepsilon_t$$

where S_t is the true monetary policy shock, an unobservable variable; β captures the response of Y_t to S_t; and $\varepsilon_t \sim \mathcal{N}(0, \sigma_\varepsilon^2)$ is an i.i.d. error term.

Suppose we observe a proxy Z_t for S_t, derived from monetary policy surprises during a set of N policy events. The proxy is defined as:

$$Z_t = S_t + \eta_t$$

where $\eta_t \sim \mathcal{N}(0, \sigma_\eta^2)$ represents measurement error, assumed to be i.i.d. and independent of S_t. The relevance of Z_t as an instrument for S_t depends on the signal-to-noise ratio, which can be improved by increasing the number of i.i.d. policy events used to construct Z_t . Suppose Z_t is derived from N policy events, and each event i provides an independent signal, $z_{t,i}$:

$$z_{t,i} = S_t + \eta_{t,i}$$

where $\eta_{t,i} \sim \mathcal{N}(0, \sigma_\eta^2)$ are i.i.d. across events. The aggregated surprise Z_t is given by:

$$Z_t = \frac{1}{N} \sum_{i=1}^{N} z_{t,i}$$

The total variance of Z_t can be decomposed into two components: the signal component (S_t) and the noise component ($\eta_{t,i}$). Since S_t is common across all events, its variance in Z_t remains unchanged as $Var(S_t) = \sigma_S^2$. The noise component is instead obtained by aggregating over N i.i.d. noise terms: $Var\left(1/N \sum_{i=1}^{N} \eta_{t,i}\right) = \sigma_\eta^2/N$. The total variance of Z_t is therefore equal to $Var(Z_t) = \sigma_S^2 + (\sigma_\eta^2)/N$. The signal-to-noise ratio (SNR) of Z_t is:

$$SNR = \frac{\sigma_S^2}{\frac{\sigma_\eta^2}{N}} = N \times \frac{\sigma_S^2}{\sigma_\eta^2}$$

As N increases, the SNR improves linearly, making Z_t a more accurate proxy for S_t. This higher relevance strengthens the instrument's ability to capture the true monetary policy shock dynamics. It is also straightforward to show that increasing N rises the relevance of the instrument in econometric estimation. In a two-stage least squares (2SLS) framework where Z_t is used as an instrument for S_t, the first stage regression is:

$$S_t = \gamma Z_t + u_t$$

where u_t is an error term orthogonal to Z_t. The relevance of the instrument depends on the correlation between Z_t and S_t:

$$Corr(Z_t, S_t) = \sqrt{\frac{\sigma_S^2}{Var(Z_t)}} = \sqrt{\frac{\sigma_S^2}{\sigma_S^2 + \frac{\sigma_\eta^2}{N}}}$$

As $N \to \infty$, $Corr(Z_t, S_t) \to 1$, indicating that Z_t becomes a perfect proxy for S_t. . For finite N, the relevance improves as N increases because the noise component σ_η^2/N diminishes. Overall,

with a higher SNR and stronger relevance of Z_t i) the estimation of β in the second stage becomes more precise, reducing weak instrument bias, and ii) the identified monetary policy shocks S_t better reflect true policy dynamics, enhancing the accuracy of variance decomposition and impulse response functions. To conclude, increasing the number of i.i.d. policy events reduces the noise in the instrument Z_t, improves its correlation with the true monetary policy shockS_t, and enhances the precision of econometric estimates. This approach helps better capture the true dynamics of monetary policy impacts on the real economy.