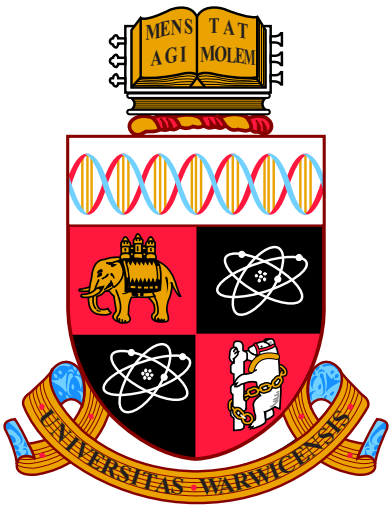

The Differential Market Impact of ECB Narrative Tone Across Communication Channels

by

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Abstract

In this dissertation, I examine the market impact of narrative tone in European Central Bank (ECB) communications across multiple channels. Using a hawk–dove tone index constructed from Monetary Policy Statements, press conferences, Monetary Policy Accounts, and Executive Board speeches, I assess its effect on euro area financial markets at both intraday and daily frequencies. The findings show that intraday reactions are driven primarily by substantive policy news, with tone exerting a modest positive effect on equities in the press-conference channel. At the daily horizon, tone effects fade or even reverse, with sensitivity limited to speeches and to the Monetary Policy Accounts, where tone influences returns under average systemic stress but loses traction as stress rises. Overall, I conclude that tone can influence asset prices in specific contexts, but its role remains secondary to the hard policy signals embedded in monetary decisions.

Keywords: Central Bank Communication, Monetary Policy, Narrative Tone, Eurozone, Event Study, ECB.

JEL Classification: E52, E58, G14.

*I am deeply grateful to my supervisor, Professor Philippe Mueller, for his guidance, patience, and constructive feedback throughout this work. All remaining errors are my own responsibility.

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1 Introduction

Central bank communication has moved from opaque signalling to a deliberately structured policy instrument that shapes expectations and transmission. This evolution reflects a broader drive for transparency in objectives, models, and decision processes, and it gained prominence as conventional tools reached their lower bounds and balance-sheet policies took centre stage (Geraats, 2002; Filardo and Hofmann, 2014). In this setting, language itself becomes part of the toolkit, as carefully calibrated guidance on policy rates and the balance sheet can move asset prices and anchor expectations in ways that rate changes alone cannot.

The European Central Bank (ECB) exemplifies this trajectory through its multi-channel framework: Monetary Policy Statements, live Press Conferences, Monetary Policy Accounts, and Executive Board speeches. Each channel differs in timing, authorship, and institutional weight, and markets interpret them asymmetrically. From 2013 onward, the ECB also introduced explicit forward guidance, making communication an integral lever of policy. This development mirrors global evidence that guidance and narrative have become core to modern monetary policy (Jeanneau, 2009).

Against this backdrop, my dissertation examines whether narrative tone conveys incremental information beyond policy surprises and whether such content is specific to particular channels. The analysis is structured around five central questions: (i) does tone provide explanatory power beyond policy-surprise factors (Target, Forward Guidance, QE)? (ii) do any effects differ across communication channels? (iii) which asset classes are most responsive? (iv) do tone effects observed intraday persist through to daily returns? and (v) are these effects state-dependent, particularly during crisis periods? These questions guide the empirical design and demonstrate when, where, and to what extent communication tone matters for monetary transmission.

To address these research questions, I construct a dataset that combines ECB communication events with both high-frequency and daily financial market data. Narrative tone is measured using a dictionary-based approach, following the methodology of Tadle (2022) and the ECB-specific lexicons of Kaminskas and Jurkšas (2024). These tone indices are then merged with intraday policy surprises from the Euro Area Monetary Policy Event-Study Database (EA-MPD; Altavilla et al., 2019) and the Euro Area Communication Event-Study Database (EA-CED; Istrefi et al., 2024). This design allows the role of tone to be isolated from simultaneous policy-news shocks and enables its impact to be traced across a broad set of asset classes.

The core results establish a clear hierarchy in the information content of ECB communications. Across both intraday and daily horizons, asset prices respond most systematically to structured policy surprises (Target, Forward Guidance, and QE factors), which map cleanly onto the term structure of interest rates and also drive credit and sovereign

spreads. Narrative tone, by contrast, plays a more limited and context-dependent role. It exerts a modest positive effect on equities during press-conference Q&A, consistent with the idea that investors interpret verbal nuance as conveying private information about the outlook. At the daily horizon, however, these effects fade and in some cases reverse, with tone sensitivity detected only in speeches and in the Monetary Policy Accounts. Overall, the evidence shows that tone can matter for monetary transmission, but it remains secondary to the hard policy signals embedded in decisions.

The rest of the dissertation proceeds as follows: Section 2 reviews the related literature and positions the contribution within the broader field. Section 3 introduces the data sources and Section 4 sets out the empirical methodology. Section 5 presents the core results, followed by robustness checks in Section 6. Section 7 outlines the main limitations and Section 8 concludes.

2 Literature Review and Hypothesis Development

This dissertation is built on several complementary strands of the literature.

First, it draws upon work that positions central bank communication as an active instrument of monetary policy, reflecting the broader shift from opacity to transparency as expectations management became central to monetary transmission (Blinder et al., 2008). In this context, the language of policy is crucial. Ehrmann and Talmi (2020) note that central bank statements are carefully drafted through multiple iterations, since word choice and semantic coherence can shape how markets interpret the message and the volatility that follows. The relationship is inherently two-way: authorities influence market pricing while simultaneously incorporating market signals into their decision-making (De Guindos, 2019). Within this dynamic, tone conveys incremental information about policy assessments and the economic outlook beyond what is reflected in contemporaneous quantitative releases (Hubert and Labondance, 2021). Likewise, Parle (2022) argues that tone can disclose private information about economic conditions, prompting markets to update their beliefs.

Second, it relates to the growing literature that shows the tone of central bank communication has measurable effects on financial markets. In the euro area, a more positive tone in press conferences is associated with increases in stock prices (Parle, 2022). Schmeling and Wagner (2024) confirm these findings and further show that positive tone surprises are linked to higher interest rates alongside declines in credit spreads and volatility risk premia. Earlier studies such as Kohn and Sack (2003) and Reeves and Sawicki (2007) found little evidence that ad hoc communication such as policymakers' speeches influenced markets. However, more recent research shows that a wider range of communication events does affect financial markets. Istrefi et al. (2024) report that inter-meeting communication events are linked to significant market movements, sometimes even larger

than those following ECB policy announcements, especially at longer maturities of the yield curve. Ahrens et al. (2025) also find that Executive Board speeches transmit monetary policy news that shapes bond and stock market volatility and tail risk. Recent evidence from Kaminskas and Jurkšas (2024) also shows that Executive Board speeches significantly shape movements in euro-area risk-free rates, as markets interpret them as clarifying the ECB's reaction function rather than providing commentary on the immediate economic outlook. Comparable findings emerge for the Federal Reserve: Gorodnichenko et al. (2023) document that a more optimistic tone from Fed speakers supports equity valuations, and Cannon (2015) shows that the tone of FOMC minutes correlates with contemporaneous measures of economic activity, pointing to an information channel.

A further body of work examines the different techniques that have been employed to assess the tone of central bank communication. Early contributions relied on manual approaches, such as Romer and Romer (1989), who classified policy texts along a dovish–hawkish scale and Musard-Gies (2006), who coded ECB statements to show that shifts in tone were associated with short-term interest rate movements. These studies along with Gertler and Horvath (2018) established that qualitative assessments of tone carry predictive power for markets, but their reliance on human judgement and the lack of reproducibility imposed clear limitations. More recent research has therefore turned to automated methods: Lucca and Trebbi (2009) introduced semantic scoring to quantify FOMC communication, while dictionary-based approaches such as Loughran and McDonald (2011), Banerjee et al. (2019), and Shapiro et al. (2022) classified tone in a systematic manner. However, as Picault and Renault (2017) notes, the use of general-purpose dictionaries often leads to misclassification of technical terms, and the use of field-specific lexicons improves the prediction of policy decisions. Building on this, Tadle (2022) proposed a domain-specific monetary policy dictionary for FOMC minutes, combining predefined hawkish and dovish terms with polarity rules to construct sentiment indices. Kaminskas and Jurkšas (2024) extend this approach to the ECB by developing lexicons tailored to transcripts and media coverage of ECB events. In this dissertation, I adopt Tadle's methodological framework while drawing on the ECB-specific lexicons of Kaminskas and Jurkšas (2024), thus combining a robust classification method that captures the nuances of ECB communication.

Furthermore, this dissertation is heavily based on research that disentangles the different factors embedded in monetary policy surprises using high-frequency data. Gürkaynak et al. (2005) first showed for the FOMC that financial markets react not only to the current policy rate decision (the "target" factor) but also to shifts in the expected policy path. In the euro area, this approach was formalised through the Euro Area Monetary Policy Event-Study Database (EA-MPD) developed by Altavilla et al. (2019). Their work demonstrated that surprises around ECB Governing Council announcements and

press conferences can be decomposed into four distinct factors[3]: target, timing, forward guidance, and quantitative easing. Building on these insights, Istrefi et al. (2024) were the first to introduce the Euro Area Communication Event-Study Database (EA-CED), which extends analysis beyond scheduled policy meetings to include more than 5,000 inter-meeting events such as speeches and interviews. Their work shows that these communications can move markets as strongly as formal announcements, with yield-curve responses well explained by three structural factors: target, forward guidance, and QE.

Finally, a segment of the literature emphasises that the effects of central bank communication are state-dependent and become stronger in stressed market environments. Schmeling and Wagner (2024) show that a more positive tone lowers volatility through the risk-premia channel, while Apergis and Pragidis (2019) find that such effects are amplified during crisis periods. Gertler and Horvath (2018) similarly document that signals of policy easing or a worsening outlook can trigger negative stock market and interest rate responses in stressed conditions. In sovereign bond markets, Hayo and Neuenkirch (2014) and Hubert and Labondance (2021) both find that communication effects on yields are significantly larger during episodes of financial distress. Related work shows that communication under uncertainty plays a distinct clarifying role: Ehrmann and Fratzscher (2009) find that the Q&A component of ECB press conferences becomes especially powerful when uncertainty is elevated. Likewise, Havlik et al. (2022) add further support by showing that ECB announcements during the pandemic were particularly effective in stabilising markets.

This extensive review of the literature motivates me to investigate open questions about the differential market impact of the narrative tone of the ECB across communication channels and the empirical analysis in Section 5 addresses the following hypotheses:

- **H1:** Within-channel tone has a measurable effect on financial markets.
- **H2:** The effect of tone differs systematically across communication channels.
- **H3:** Tone conveys incremental information beyond quantitative policy surprises.
- **H4:** Tone effects are amplified during periods of financial stress.

3 Data

This study is based on a novel dataset constructed by combining high-frequency textual communications from the European Central Bank (ECB) with benchmark datasets

[3]Additional extensions have also been proposed in the literature. For example, Jouvanceau and Mikaliunaite (2020) identify a perception factor capturing cross-country heterogeneity in yields, while Leombroni et al. (2021) highlight a credit-risk channel that became particularly relevant during the sovereign debt crisis.

of financial market reactions for the period spanning from **January 1, 2015, to December 31, 2024**. This section describes the two primary types of data used: textual communication data, from which the key independent variables (narrative tone indices) are derived, and financial market data, which serve as the dependent variables measuring market reactions.

3.1 Textual Communication Data

The study's key independent variables, the narrative tone indices, are derived from a comprehensive corpus of ECB textual communications. These texts were collected from the official ECB website[4]. For robustness, speeches were also sourced and cross-referenced from the Bank for International Settlements (BIS) data repository using the `gingado` Python library[5]. As detailed in Appendix A.4, the resulting tone indices show a strong correspondence across sources, which validates my measurement approach. The analysis focuses on four distinct communication channels:

1. **Monetary Policy Decisions (MPD):** The official press releases published at 13:45 CET following each Governing Council meeting.
2. **Press Conferences (PC):** The full transcripts of the press conferences that follow the MPD announcement at 14.30 CET, including both the President's introductory statement and the subsequent question-and-answer session.
3. **Monetary Policy Accounts (ACC):** The detailed minutes providing insight into the Governing Council's deliberations, published with a four-week lag.
4. **Speeches (SPEECH):** Public speeches, interviews, and testimonies given by the members of the Executive Board.

3.2 Financial Market Data

Financial market responses to ECB communication events are measured using a combination of intraday and daily return data. To ensure the highest accuracy, the analysis relies on two established, publicly available databases designed specifically for monetary policy event analysis. For scheduled policy announcements like Monetary Policy Decisions (MPD) and Press Conferences (PC), intraday asset price changes are sourced from the Euro Area Monetary Policy Event-Study Database[6] (EA-MPD) by Altavilla et al. (2019). For inter-meeting communications, including Monetary Policy Accounts (ACC)

[4] Available at: https://www.ecb.europa.eu/press/html/index.en.html
[5] See the documentation at: https://bis-med-it.github.io/gingado/
[6] Available at: https://www.ecb.europa.eu/pub/pdf/annex/Dataset_EA-MPD.xlsx

and Speeches (SPEECH), the intraday returns are taken from the Euro Area Communication Event-Study Database[7] (EA-CED) by Istrefi et al. (2024). In both cases,[8] intraday returns are defined as price changes measured in narrow pre- and post-event windows.

Table 1: Summary of Financial Market Data Sources

Data Category	Core Assets	Purpose in Study
Intraday market reactions	EURO STOXX 50 EUR/USD exchange rate OIS rates (1M, 3M, 2Y, 10Y) IT–DE 10Y government bond spread	Measure high-frequency response to ECB communication tone.
Daily market indicators	EURO STOXX 50 EUR/USD exchange rate Euro area 2Y and 10Y benchmark yields (EUSA2, EUSA10) IT–DE 10Y futures spread HY–IG CDS spread Composite Indicator of Systemic Stress (CISS)	Assess persistence of tone effects and state-dependence across various financial markets during periods of market stress.

Notes: Intraday returns are sourced from the EA-MPD (Altavilla et al., 2019) and EA-CED (Istrefi et al., 2024) databases. Daily data (equities, FX, yields, futures, CDS spreads) are from Bloomberg. The Composite Indicator of Systemic Stress (CISS) is obtained from the ECB's Open Data Portal.

This study focuses on a core set of seven financial assets that capture different dimensions of the monetary policy transmission mechanism. For intraday analysis, I follow the EA-MPD and EA-CED asset menus: the **EURO STOXX 50**, the **EUR/USD exchange rate**, four maturities of Overnight Index Swaps (1M, 3M, 2Y, 10Y), and the **10-year spread between Italian and German government bonds**. These series are benchmark choices in the event-study literature because they provide liquid, high-frequency measures of policy-sensitive market segments.

For the daily regressions, the asset menu is adjusted to focus on broader and more consistently available indicators from Bloomberg. The panel includes the **EURO STOXX 50** and **EUR/USD** as before, the **2-year and 10-year euro area benchmark yields (EUSA2, EUSA10)** to track short- and long-horizon rate expectations, the **10-year Italian–German futures spread (BTP–Bund)** as a measure of sovereign fragmentation risk, and the **HY–IG CDS spread** (iTraxx Crossover 5Y, representing high-yield credit risk, minus iTraxx Main 5Y, representing investment-grade credit risk) as a credit risk premium proxy. This set balances equity, FX, risk-free rates, sovereign spreads, and credit premia, thereby providing a comprehensive view of the channels through which

[7] Available at: https://sites.google.com/site/istrefiklodiana/ea-ced

[8] A minor methodological difference is that the EA-MPD by Altavilla et al. (2019) is constructed from cleansed tick-by-tick data, whereas the EA-CED by Istrefi et al. (2024) uses minute-by-minute quotes as its underlying data.

ECB communication affects markets. The **Composite Indicator of Systemic Stress (CISS)** from the ECB's Open Data Portal is used as the key conditioning variable for state-dependent effects.

4 Methodology

4.1 Sentiment Methodology: Dictionary-based Hawk Index

The study's key independent variables, the narrative tone indices, are derived from a comprehensive corpus of ECB textual communications. To quantify the sentiment of these documents, I employ a dictionary-based approach that follows Parle (2022), which formalizes the central-bank text methodology in Tadle (2022). The crucial departure from Parle (2022) is the lexicon: rather than using the original lists in Tadle (2022), I adopt ECB-specific lexicons developed by Kaminskas and Jurkšas (2024). Their lists are built from words that appear frequently in ECB communications and are tailored to the ECB's ad hoc style.

$$\text{sent}_{i,t} = \begin{cases} +1 & \text{if } \text{neut}_{i,t} > \text{pess}_{i,t} \text{ and } \text{pos}_{i,t} > \text{neg}_{i,t}, \\ -1 & \text{if } \text{neut}_{i,t} > \text{pess}_{i,t} \text{ and } \text{pos}_{i,t} < \text{neg}_{i,t}, \\ +1 & \text{if } \text{neut}_{i,t} < \text{pess}_{i,t} \text{ and } \text{pos}_{i,t} < \text{neg}_{i,t}, \\ -1 & \text{if } \text{neut}_{i,t} < \text{pess}_{i,t} \text{ and } \text{pos}_{i,t} > \text{neg}_{i,t}, \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

The scoring logic mirrors the sentence-level rules in Parle (2022). Each sentence is evaluated along two dimensions: (i) an economic dimension using two sets of economic terms (neutral economic and pessimistic economic) to infer whether the base content signals neutral versus downward macro pressures, and (ii) a polarity dimension using positive and negative qualifiers. Combining these dimensions classifies a sentence as *hawkish* when neutral-economic content is paired with positive polarity, or when pessimistic content is paired with negative polarity; *dovish* when neutral content is paired with negative polarity, or pessimistic content with positive polarity; and *neutral* otherwise. Sentences that contain no economic terms are excluded from the analysis, since they carry little monetary-policy information.[9].

Formally, letting $\text{pos}_{i,t}$ and $\text{neg}_{i,t}$ denote the counts of positive and negative tone words in sentence i of document t, and $\text{neut}_{i,t}$ and $\text{pess}_{i,t}$ the counts of neutral-economic and pessimistic-economic terms, the sentence score $\text{sent}_{i,t} \in \{-1, 0, +1\}$ is

[9] All pre-processing choices follow the workflow in Benoit et al. (2018) and are documented in Appendix A.1. The full ECB-adapted dictionaries (neutral-economic, pessimistic-economic, positive, negative) are reproduced in Appendix A.2 and A.3

Figure 1: Exemplar hawkish vs. dovish ECB communication, with lexicon cues

Panel A: Hawkish Exemplar

Christine Lagarde's Speech (7 Feb 2022)

*"**Inflation** has risen sharply in recent months and it further surprised on the upside in January, with the rate **increasing** to 5.1 per cent from 5.0 per cent in December."*

Score: +1 (hawkish)

Panel B: Dovish Exemplar

ECB Press Conference (22 Jan 2015)

*"Thus adoption of balance sheet measures has become warranted to achieve the price stability objective, given key ECB **interest rates** have reached the **lower** bound."*

Score: −1 (dovish)

Dictionary Cues Underlying Sentence Scores

Exemplar	NEU	PES	POS	NEG	**Implied Score**
Lagarde Speech	inflation	—	increase, increasing	—	+1
Press Conference	interest rates	balance sheet	—	lower	−1

Notes: Sentences are scored using four ECB-specific lexicons developed by Kaminskas and Jurkšas (2024): neutral-economic (**NEU**), pessimistic-economic (**PES**), positive (**POS**), and negative (**NEG**). The Tadle (2022) scoring rule assigns a sentence score of **+1 (hawkish)** when NEU > PES and POS > NEG, or when PES > NEU and NEG > POS. A score of **−1 (dovish)** is assigned when NEU > PES and NEG > POS, or when PES > NEU and POS > NEG. Sentences without any economic terms are excluded, yielding a score of 0 (neutral).

Let J_t be the number of sentences in document t that contain at least one economic term. The raw document-level index (the Dictionary Hawk–Dove Index) is

$$\mathrm{DHDI}_t = 100 \times \frac{1}{J_t} \sum_{i=1}^{J_t} \mathrm{sent}_{i,t}, \tag{2}$$

which lies in $[-100, 100]$ by construction. For comparability across channels with different styles and variances, I convert $\mathrm{DHDI}_t^{(k)}$ to a within-channel z-score.

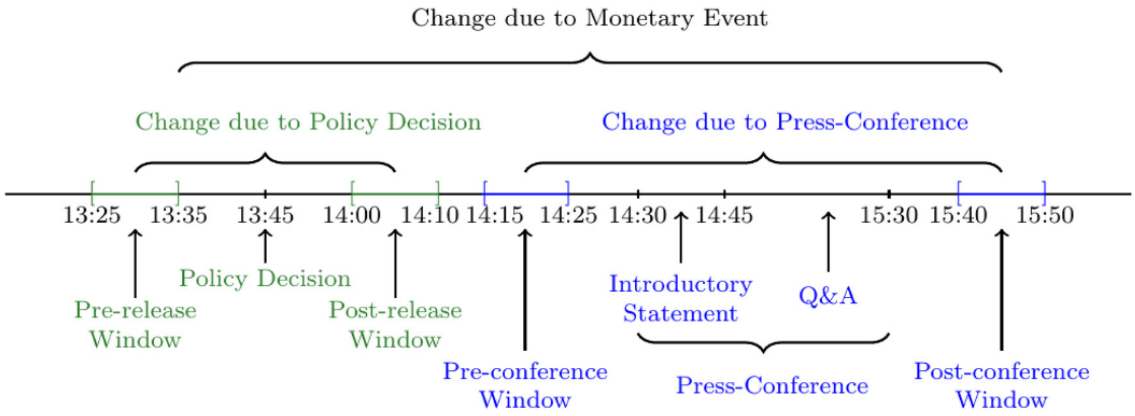
4.2 Event Definition and Window Construction

This study measures market reactions using asset returns and yield changes captured in tightly defined windows around each communication event. For Governing Council days, I use the event windows embedded in EA–MPD. The "decision" window isolates the 13:45

CET press release and the immediate adjustment that follows. The "press–conference" window covers the President's introductory statement and the subsequent Q&A.

For inter–meeting communications (Monetary Policy Accounts and speeches) I rely on EA–CED. Each event is paired with (i) a short pre–event window to check for drift, (ii) an event window that follows the published start and end time of the release or the speaking slot, and (iii) a brief post–event window. I use the event–study returns supplied by EA–CED rather than recomputing them myself.[10]

Figure 2: Event Window Construction for ECB Communication



Panel A: Governing Council Meeting Day Timeline

Panel B: Inter-Meeting Communication Event Timeline

Note: This figure illustrates the construction of intraday event windows used to measure asset price reactions to ECB communication. **Panel A**, adapted from Altavilla et al. (2019), shows the timeline for a standard Governing Council meeting day, distinguishing between the policy decision and press conference windows. **Panel B**, adapted from Istrefi et al. (2024), shows the generalized window structure for an inter-meeting communication event.

A critical feature of both databases is that they control for confounding macroeconomic news to better isolate the impact of ECB communication:

- **EA–MPD:** includes the U.S. Initial Jobless Claims surprise (IJC) as an additional control in the press–conference window. Altavilla et al. (2019) notes that including

[10] A practical advantage of EA–CED is its accurate time–stamping of speeches and accounts. This precision is not available in the BIS speech archive or on the ECB website, which makes it harder there to pin down the exact intraday window. The EA–CED time stamps allow the reaction to be measured exactly within the intended window.

or excluding IJC does not materially change the coefficients of interest as documented in the source.

- **EA–CED:** screens three sets of macro events and removes non–surprising releases: (1) major euro–area and large member–state macro releases (flash GDP and HICP, unemployment, composite PMI, industrial production flash, consumer and business surveys), (2) selected U.S. macro surprises (GDP, CPI, Non–Farm Payrolls, Initial Jobless Claims), and (3) FOMC decision days. If the Bloomberg survey equals the realized release, the macro event is dropped on the assumption that it did not generate a market surprise.

4.3 Factor decomposition of policy news

This subsection extracts structural "policy–news" shocks from high-frequency OIS yield surprises using principal components, following Swanson (2021)[11] and its ECB application in Istrefi et al. (2024).

For each channel/window $j \in \{\text{MPD, PC, ACC, SPEECH}\}$, I form a matrix of standardized surprises across seven maturities $m \in \{1\text{M}, 3\text{M}, 6\text{M}, 1\text{Y}, 2\text{Y}, 5\text{Y}, 10\text{Y}\}$. Let $\Delta y_t \in \mathbb{R}^7$ be the vector of OIS changes for event $t = 1, \ldots, T_j$ and denote by μ and s the maturity-specific mean and standard deviation in that channel. The elementwise standardization and the event-by-maturity stacking are

$$z_{t,m} = \frac{\Delta y_{t,m} - \mu_m}{s_m}, \qquad X^{(j)} = \begin{bmatrix} z_1' \\ \vdots \\ z_{T_j}' \end{bmatrix} \in \mathbb{R}^{T_j \times 7}.$$

I compute a principal-components decomposition,

$$X^{(j)} = F^{(j)} \Lambda^{(j)} + e^{(j)}, \tag{3}$$

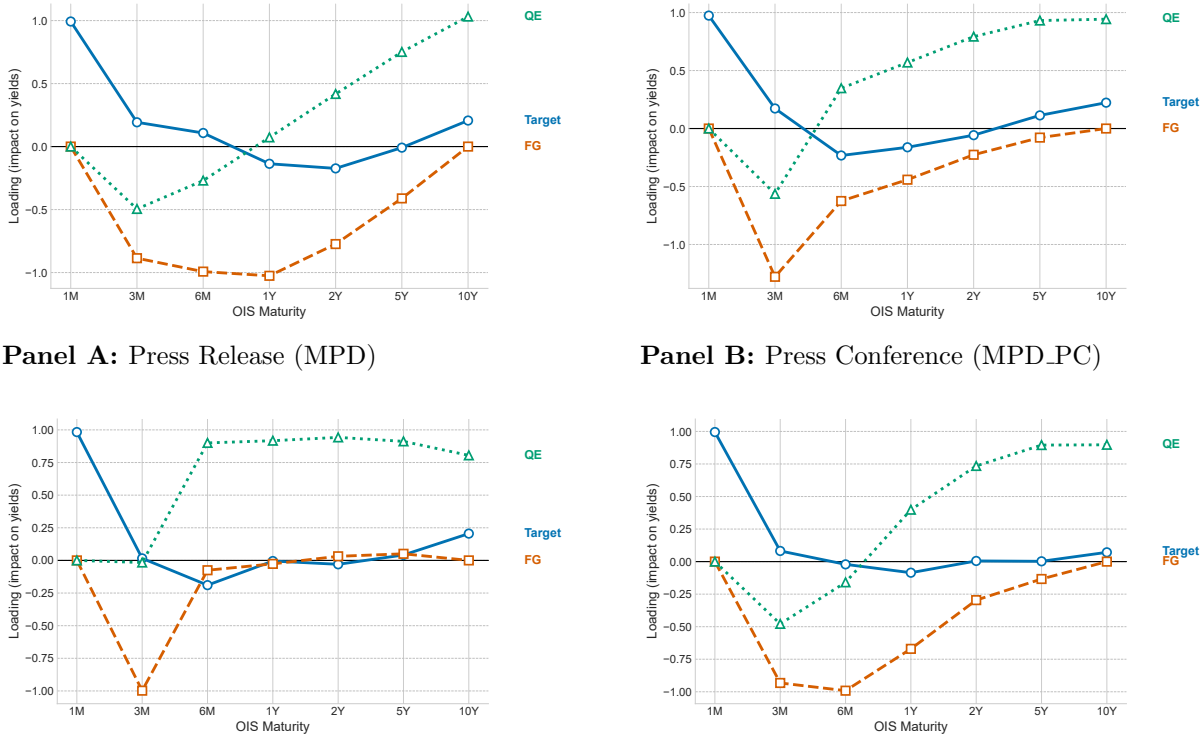
where $F^{(j)} \in \mathbb{R}^{T_j \times 3}$ contains the first three component scores (one row per event), $\Lambda^{(j)} \in \mathbb{R}^{3 \times 7}$ are the loadings, and $e^{(j)}$ are residuals. Because raw PCs have no direct economic interpretation, I apply an orthogonal rotation,

$$F_*^{(j)} = F^{(j)} H^*, \qquad \Lambda_*^{(j)} = (H^*)^\top \Lambda^{(j)}, \tag{4}$$

with H^* chosen so that: (i) the first column loads most on the short end (policy target), (ii) the second concentrates on the 3M-2Y belly (forward guidance), and (iii) the third

[11] Swanson (2021) separately identifies surprise changes in the federal funds rate, forward guidance, and large-scale asset purchases (LSAPs) for each FOMC announcement from July 1991 to June 2019; Swanson and Jayawickrema (2024) extend the approach to Fed Chair speeches.

Figure 3: Rotated policy-factor loadings across the OIS curve by communication channel.



Panel A: Press Release (MPD)

Panel B: Press Conference (MPD_PC)

Panel C: Monetary Policy Accounts (ACC)

Panel D: Speeches

Notes: Each panel plots the loadings of the three rotated intraday policy factors across OIS maturities (1M–10Y): *Target* (solid, circles), *Forward Guidance* (dashed, squares), and *QE* (dotted, triangles). Loadings are unitless and indicate which maturities move most for a unit shock to each factor. It is constructed as per the methodology provided by Swanson (2021) for Federal Reserve Communications.

loads on the long end (QE). Signs are set for interpretability (positive at 1M for the target factor and positive at 10Y for the QE factor). The resulting unit-variance series are denoted $F_{\text{target}}, F_{\text{fg}}, F_{\text{qe}}$.

The orthogonal rotation ensures that the three principal components map cleanly onto economically interpretable dimensions of policy news. Figure 3 illustrates this structure by plotting the rotated loadings across OIS maturities for each communication channel. The loadings confirm the intended interpretation:

- **Target factor** (F_{target}): news about the current policy-rate stance; strongest effects at the very short end.
- **Forward-guidance factor** (F_{fg}): news about the expected path of policy rates; loads heavily on the intermediate maturities (3M–2Y).
- **QE (term-premium) factor** (F_{qe}): loads at the long end of the curve, reflecting information about balance-sheet policy and duration risk.

4.4 Econometric specifications

To test the dissertation's hypotheses, I employ a two-model empirical strategy. The first is a high-frequency, *intraday event-study model* designed to identify the immediate causal impact of communication tone. This provides the cleanest measure of the immediate reaction while controlling for policy-news shocks extracted from OIS surprises. Second, a *daily panel* that tests whether tone effects persist at the day horizon and whether they are stronger in periods of financial stress.

4.4.1 Intraday model

Two complementary intraday specifications were used because they answer different parts of the central question. The pooled panel asks, within each channel, does tone contain information beyond policy-news shocks and risk controls? The asset-specific regressions then ask which markets move and by how much, delivering economically interpretable slopes in native units. Both specifications use the EA–MPD/EA–CED windows, the same controls (policy factors and the 60-minute pre-event ΔVSTOXX), and differ only in how the tone slope is parameterized and how the standard errors were clustered (two-way by event day × asset in the pooled panel; day-clustered in single-asset fits).

Pooled stacked panel

$$\underbrace{\Delta y_{a,e}^{(k)}}_{\text{event-window change}} = \alpha_a + \beta^{(k)}\,\text{tone}_e^{(k)} + \Theta' F_e^{(k)} + \phi\,\Delta\text{VSTOXX}_e^{\text{pre}} + \gamma'\text{DoW}_e + \chi\,\mathbf{1}\{\text{Pres}\}_e + \varepsilon_{a,e}. \tag{a}$$

Where:

- $\Delta y_{a,e}^{(k)}$ is the event-window change for asset a on event e (bps for rates/spread; % for equity/FX).
- $\text{tone}_e^{(k)}$ is the within-channel standardized hawk–dove tone.
- $F_e^{(k)} = (F_{\text{target}}, F_{\text{fg}}, F_{\text{qe}})'$ are the standardized PCA policy-news factors.
- $\Delta\text{VSTOXX}_e^{\text{pre}}$ is the 60-minute pre-event change immediately preceding the event start, absorbing contemporaneous shifts in risk appetite.
- DoW_e is the vector of day-of-week dummies for the event date.
- $\mathbf{1}\{\text{Pres}\}_e$ flags President-delivered speeches (and EP hearings) within the SPEECH channel[12]
- α_a are asset fixed effects.

[12] This indicator is only defined for SPEECH events and is excluded from PR/PC/ACC specifications. It is constructed from EA–CED speaker flags in Istrefi et al. (2024) by setting it to 1 if either $s_{\text{president}} = 1$ or $s_{\text{ECBpreshearing}} = 1$ for the event, and to 0 otherwise.

Asset-specific intraday regressions

$$\underbrace{\Delta y_{a,e}^{(k)}}_{\text{event-window change}} = \beta_{0,a} + \beta_a^{(k)} \,\text{tone}_e^{(k)} + \Theta' F_e^{(k)} + \phi\, \Delta\text{VSTOXX}_e^{\text{pre}} + \gamma' \text{DoW}_e + \chi\, \mathbf{1}\{\text{Pres}\}_e + \varepsilon_{a,e}. \tag{b}$$

Where:

- $\beta_{0,a}$ is the asset-specific intercept; $\beta_a^{(k)}$ is the by-asset tone slope (bps or % per 1-SD tone shock) for channel k.
- All other variables are as in (a); tone and factors are standardized within channel.

4.4.2 Daily panel and state contingency

$$\Delta y_{a,t}^{(k)} = \alpha_a + \beta^{(k)} \,\text{tone}_t^{(k)} + \Theta' F_t^{(k)} + \gamma' \text{DoW}_t + \mu_{\text{month}(t)} + \theta\, \Delta\text{VSTOXX}_t + \psi\, D_t^{\text{FOMC}} + \phi' M_t + \varepsilon_{a,t}. \tag{5}$$

Where:

- $\Delta y_{a,t}^{(k)}$ is the close-to-close change of asset a on date t.
- $\text{tone}_t^{(k)}$ is the standardized channel-k tone index (z-score), aggregated across all documents released on date t.
- $F_t^{(k)} = \{F_{\text{Target}}, F_{\text{FG}}, F_{\text{QE}}\}$ are the daily PCA factors extracted from high-frequency surprises, rotated into Target, Forward Guidance, and QE components for each channel k.
- α_a are asset fixed effects, absorbing all time-invariant heterogeneity between assets.
- DoW_t are day-of-week dummies; $\mu_{\text{month}(t)}$ are month fixed effects for calendar seasonality.
- ΔVSTOXX_t is the daily change in the VSTOXX volatility index, capturing risk environment shifts.
- D_t^{FOMC} flags U.S. FOMC policy announcement days.
- $M_t = \{\text{EA CPI flash}, \text{EA PMI flash}, \text{EA GDP}, \text{US CPI}, \text{US NFP}, \text{US Core PCE}\}$ are Euro Area and U.S. macro-release dummies to control for overlap with major announcements.

State-contingent extension

To study state dependence, I interact tone with systemic stress while holding policy factors and macro overlaps constant:

$$\begin{aligned}\Delta y_{a,t}^{(k)} = \alpha_a + \beta_0^{(k)}\,\widetilde{\text{tone}}_t^{(k)} + \beta_1^{(k)}\,\text{CISS}_t^z + \lambda^{(k)}\Big(\widetilde{\text{tone}}_t^{(k)} \times \text{CISS}_t^z\Big) + \Theta' F_t^{(k)} \\ + \gamma'\text{DoW}_t + \mu_{\text{month}(t)} + \theta\,\Delta\text{VSTOXX}_t + \psi\,D_t^{\text{FOMC}} + \phi' M_t + \varepsilon_{a,t}.\end{aligned} \tag{6}$$

Where:

- $\widetilde{\text{tone}}_t^{(k)} \equiv \text{tone}_t^{(k)} - \overline{\text{tone}}^{(k)}$ mean-centres tone within channel k, so $\beta_0^{(k)}$ is the tone effect at *average* stress (and holding other controls fixed).
- CISS_t^z is the standardized Composite Indicator of Systemic Stress (z-score); the interaction coefficient $\lambda^{(k)}$ captures how the marginal tone effect varies with stress: $\partial \Delta y_{a,t}^{(k)} / \partial \text{tone}_t^{(k)} = \beta_0^{(k)} + \lambda^{(k)} \text{CISS}_t^z$.

5 Empirical Results

5.1 Descriptive Statistics

The table 2 reports descriptive statistics for the channel-specific tone index and announcement window returns. Within each channel, the tone series is correctly centered and scaled: means are near zero and standard deviations about one, implying no mechanical hawkish" or dovish" tilt. Event-window returns have near-zero means but occasional large moves. Dispersion is greatest at short maturities (1M–3M OIS) and declines toward the long end (10Y), while equity and FX are less volatile. This is exactly what I would expect if communication primarily shifts near-term policy-rate expectations with only partial transmission to long rates and risk assets. Overall, Table 2 confirms that the variables are well-behaved for my design (standardized tones; symmetric windows) and suggests economically meaningful cross-channel and cross-asset heterogeneity to be tested in the main results.

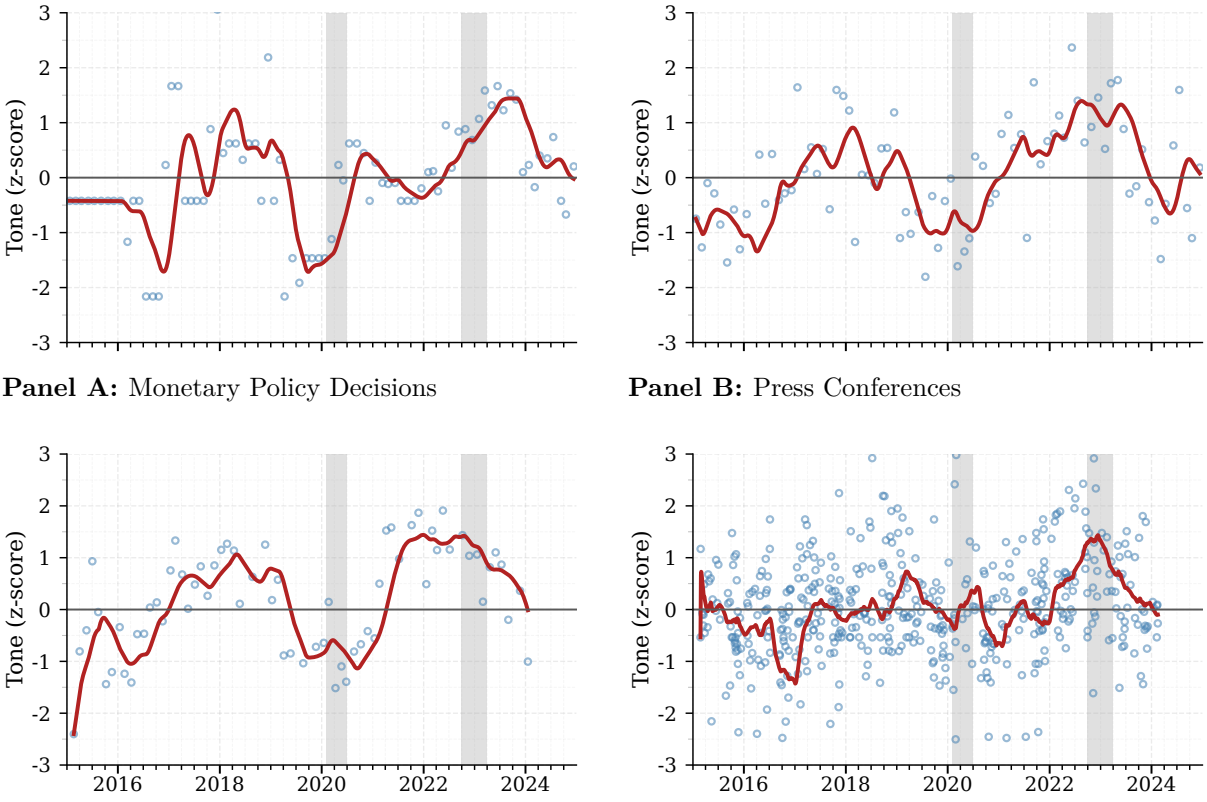
Table 2: Descriptive Statistics: ECB Tone and Event-Window Returns

	N	Mean	SD	Min	Max
Panel A: Tone by communication channel (event-level)					
ACC	65	0.179	0.999	−2.403	1.910
PC	80	0.026	1.019	−3.090	2.367
PR	80	0.000	1.017	−2.162	3.058
SPEECH	613	0.003	1.012	−4.792	3.363
Panel B: Event-window returns by asset (pooled across channels)					
EUROSTOXX	644	0.013	0.414	−2.432	2.260
EURUSD	840	−0.014	0.257	−1.330	1.684
OIS_1M	691	0.107	1.124	−4.750	21.500
OIS_3M	752	0.128	1.145	−5.375	15.980
OIS_2Y	830	0.008	1.699	−16.800	13.300
OIS_10Y	830	−0.010	1.805	−9.500	8.750
IT–DE_10Y_SPREAD	783	−0.064	2.698	−18.950	34.050

Notes: Panel A reports standardized document tone (z-score within channel); one observation per event × channel. Panel B reports intraday event-window returns pooled across channels for the EUROSTOXX index and EURUSD (percent), and changes in OIS rates at 1M/3M/2Y/10Y maturities and the Italy-Germany 10Y sovereign yield spread (basis points). Units follow EA-MPD/EA-CED conventions. Sample: 2015-2024.

Furthermore, Figure 4 provides a visual representation of the narrative tone for each communication channel over the sample period. The plots reveal several key stylized facts. First, speeches (Panel D) are by far the most frequent communication tool, while the tone of both speeches and press conferences (Panel B) exhibits greater volatility than the more formally scripted monetary policy decisions (Panel A). Second, the six-month smoother traces a clear regime shift: a prolonged accommodative/neutral phase through the pandemic gives way to a pronounced, sustained hawkish turn from late-2021 as inflation pressures build. The co-movement of this pivot across channels suggests that the tone indices capture a common policy narrative rather than channel-specific noise. This delivers strong face validity for the empirical analysis that follows, where I test how markets price these channel-specific signals.

Figure 4: ECB Narrative Tone by Communication Channel



Panel A: Monetary Policy Decisions

Panel B: Press Conferences

Panel C: Monetary Policy Accounts

Panel D: Executive Board Speeches

Notes. This chart presents event-level hawk–dove tone for each ECB communication channel (blue markers), together with a 6-month (180-day) moving average computed on a daily grid (red line). Shaded regions indicate euro-area recessions (CEPR dating when available). The y-axis is standardized within channel (z-scores), and all panels share identical scales to aid comparability.
Source: ECB and author's calculations.

5.2 Intraday Analysis

Table 3 and Table 10 in Appendix present the core results from the pooled intraday regressions. A consistent pattern emerges across all four communication channels: high-frequency market reactions are overwhelmingly driven by substantive monetary policy news rather than narrative tone. The inclusion of PCA factors markedly improves explanatory power, with adjusted R-squared values rising sharply. These coefficients display theoretically consistent signs - QE surprises load positively across all channels, Forward Guidance is negative and significant in MPD, PC, and SPEECH, and Target surprises exert particularly strong influence in MPD. By contrast, tone coefficients are small and insignificant, suggesting that on average, narrative tone does not systematically shift returns once policy content is controlled for.

While the pooled regressions established that policy-surprise variables dominate nar-

Table 3: Intraday Pooled Regressions for Scheduled Policy Announcements (MPD & PC)

	MPD			PC		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.087	0.116	0.181	0.140	0.144	0.042
	(0.117)	(0.104)	(0.596)	(0.108)	(0.102)	(0.584)
Tone (z)	−0.032	0.030	0.039	−0.144	−0.118	−0.112
	(0.116)	(0.101)	(0.102)	(0.107)	(0.102)	(0.102)
Target factor		**0.745*****	**0.750*****		0.103	0.101
		(0.188)	(0.186)		(0.103)	(0.103)
FG factor		**−0.638****	**−0.631****		**−0.289***	**−0.293***
		(0.192)	(0.190)		(0.146)	(0.147)
QE factor		**0.702*****	**0.702*****		**0.694*****	**0.690*****
		(0.172)	(0.170)		(0.147)	(0.148)
Controls	No	Yes	Yes	No	Yes	Yes
Asset FE	No	No	Yes	No	No	Yes
DoW FE	No	No	Yes	No	No	Yes
R-squared	0.000	0.256	0.285	0.003	0.131	0.144
Adj. R-squared	0.001	0.249	0.270	0.001	0.123	0.125
N	560	560	560	560	560	560

Notes: This table presents pooled regression results for the intraday impact of ECB communication tone during scheduled policy announcements. The dependent variable is the high-frequency return for the seven core assets, pooled across assets. The main independent variable is the standardized tone (z-score). Coefficients are shown with two-way clustered standard errors (event date × asset) in parentheses. Columns (2)–(3) and (5)–(6) include monetary policy surprise factors (Target, Forward Guidance, QE) constructed via PCA; factors are built from the high-frequency dataset of Altavilla et al. (2019) following the factor methodology in Swanson (2021). The specification estimated separately by channel $k \in \{\text{MPD}, \text{PC}\}$ is:

$$\begin{aligned}\Delta y_{a,e}^{(k)} = \alpha_a \;+\; \beta^{(k)}\,\text{tone}_e^{(k)} \;+\; \Theta' F_e^{(k)} \;+\; \phi\,\Delta\text{VSTOXX}_e^{\text{pre}} \\ +\; \gamma'\text{DoW}_e \;+\; \chi\,\mathbf{1}\{\text{Pres}\}_e \;+\; \varepsilon_{a,e},\end{aligned} \tag{a}$$

*******, ******, and ***** denote significance at the 1%, 5%, and 10% levels, respectively.

rative tone on average, the by-asset estimates in Table 4 reveal where this dominance is most pronounced. The effects of policy factors align cleanly with the term structure of interest Interest rate responses align neatly with the term structure: Target shocks drive the short end (OIS-1M), Forward Guidance shapes the intermediate maturities, and QE dominates the long end (10Y). These regressions achieve very high explanatory power, with R-squared values frequently above 0.95, underscoring that the PCA-based policy decomposition effectively isolates the monetary policy signal. By contrast, equity and FX markets show weaker and more heterogeneous responses, consistent with these markets incorporating broader drivers such as growth expectations and global risk sentiment.

Table 4: By-asset intraday coefficients by channel

	EUROSTOXX	EURUSD	OIS 1M	OIS 3M	OIS 2Y	OIS 10Y	IT–DE 10Y spread
Panel A: Press Release (PR)							
Tone (z)	+0.004	+0.010	-0.013	-0.052	-0.068	+0.058	+0.266
	(0.046)	(0.031)	(0.044)	(0.067)	(0.069)	(0.062)	(0.404)
F_{target}	**-0.313*****	+0.038	**+3.076*****	**+0.603*****	**-0.597*****	**+0.461*****	**+2.030*****
	(0.080)	(0.057)	(0.080)	(0.122)	(0.126)	(0.115)	(0.720)
F_{fg}	**-0.180****	-0.042	+0.002	**-2.704*****	**-2.684*****	-0.044	**+1.330***
	(0.082)	(0.059)	(0.082)	(0.124)	(0.129)	(0.118)	(0.741)
F_{qe}	**-0.390*****	**+0.136****	+0.009	**-1.514*****	**+1.451*****	**+2.458*****	**+2.859*****
	(0.073)	(0.053)	(0.074)	(0.111)	(0.115)	(0.104)	(0.667)
Obs.	80	80	80	80	80	80	80
R^2	0.357	0.260	0.986	0.967	0.972	0.954	0.260
Panel B: Press Conference (PC)							
Tone (z)	**+0.172****	-0.049	-0.005	+0.001	+0.027	+0.042	-0.684
	(0.074)	(0.046)	(0.010)	(0.020)	(0.077)	(0.128)	(0.648)
F_{target}	-0.078	**+0.124*****	**+0.376*****	**+0.146*****	**-0.169***	**+0.712*****	-0.522
	(0.070)	(0.045)	(0.010)	(0.020)	(0.076)	(0.130)	(0.596)
F_{fg}	+0.079	-0.073	-0.002	**-1.063*****	**-0.640*****	-0.009	-0.290
	(0.098)	(0.063)	(0.015)	(0.028)	(0.108)	(0.183)	(0.820)
F_{qe}	**-0.186***	**+0.251*****	-0.002	**-0.461*****	**+2.381*****	**+3.027*****	-0.213
	(0.097)	(0.064)	(0.015)	(0.028)	(0.108)	(0.184)	(0.827)
Obs.	80	80	80	80	80	80	80
R^2	0.209	0.445	0.949	0.960	0.955	0.887	0.045
Panel C: Monetary Policy Accounts (ACC)							
Tone (z)	-0.013	+0.038	+0.004	-0.002	+0.016	-0.028	+0.167
	(0.023)	(0.023)	(0.004)	(0.004)	(0.049)	(0.073)	(0.198)
F_{target}	+0.032	+0.022	**+0.155*****	+0.006	-0.023	**+0.213*****	-0.084
	(0.024)	(0.023)	(0.004)	(0.004)	(0.051)	(0.074)	(0.204)
F_{fg}	+0.020	-0.011	-0.001	**-0.408*****	+0.026	+0.005	+0.014
	(0.023)	(0.022)	(0.004)	(0.004)	(0.049)	(0.071)	(0.195)
F_{qe}	**-0.040***	**+0.067*****	-0.000	**-0.006***	**+0.846*****	**+0.861*****	+0.184
	(0.023)	(0.023)	(0.004)	(0.004)	(0.050)	(0.073)	(0.199)
Obs.	57	57	57	57	57	57	57
R^2	0.285	0.231	0.967	0.996	0.863	0.790	0.045
Panel D: Speeches (SPEECH)							
Tone (z)	+0.027	-0.002	-0.002	+0.018	-0.010	+0.017	-0.135
	(0.022)	(0.011)	(0.002)	(0.012)	(0.027)	(0.036)	(0.119)
F_{target}	**+0.047***	-0.016	**+0.308*****	**+0.023***	+0.018	**+0.086****	-0.055
	(0.024)	(0.011)	(0.002)	(0.012)	(0.027)	(0.037)	(0.123)
F_{fg}	-0.002	**-0.042*****	+0.001	**-0.431*****	**-0.313*****	-0.034	**-0.265***
	(0.028)	(0.012)	(0.002)	(0.013)	(0.030)	(0.040)	(0.141)
F_{qe}	-0.017	+0.007	-0.000	**-0.217*****	**+0.836*****	**+1.413*****	-0.157
	(0.024)	(0.011)	(0.002)	(0.012)	(0.027)	(0.036)	(0.124)
Obs.	335	436	436	436	436	436	413
R^2	0.023	0.045	0.990	0.758	0.784	0.809	0.024

Notes: This table reports by-asset intraday regressions for all channels in four panels. The dependent variable is the event-window change in each asset (% for equity/FX; bps for rates/spread). The key regressor is the channel-standardized tone; all specifications include the three PCA policy-news factors. Coefficients are shown with clustered standard errors in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels.

The one notable deviation arises during the press conference, where equities exhibit a modest but statistically significant positive response to narrative tone. This likely reflects the live Q&A dynamic, where journalists can probe for clarification and market participants may interpret verbal cues as additional information. Importantly, the same tone signal does not generate measurable effects in rates, suggesting that markets distinguish between rhetorical signals and substantive policy shifts. Overall, the intraday evidence underscores that policy surprises anchor market pricing across assets, while tone effects remain secondary, localized, and economically modest, with visibility concentrated in equities during real-time verbal exchanges.

This pattern provides the foundation for the subsequent discussion in Section 7 of why tone may matter selectively, and how its influence compares with prior findings in the literature.

5.3 Daily Regression Analysis

The pooled daily regressions reported in Tables 5 and 11 show that at the daily horizon, the information surviving from ECB communications is limited. Across press releases and press conferences, standardized tone is small and statistically indistinguishable from zero, and the policy-news factors no longer exert systematic effects at the panel level. By contrast, speeches retain economically and statistically meaningful coefficients on the policy factors, and in all channels the change in implied equity volatility (ΔVSTOXX) emerges as a large and precisely estimated driver of daily variation. These pooled results suggest that day-to-day pricing is dominated by common risk conditions, with speeches standing out as the only setting where structured policy content consistently carries through to market close.

Table 12 shows that channel-specific tone effects only become visible once assets are disaggregated. Rates display the expected maturity profile: short-term yields respond most strongly to Target surprises, while intermediate and long maturities load on Forward Guidance and QE. In press conferences, tone does not significantly affect equities or EURUSD, with only a marginal effect at the two-year yield. By contrast, in speeches equities exhibit a small negative response to hawkish tone at the 10% level, though the effect is economically minor. This contrasts with the intraday evidence, where equities reacted modestly and positively to tone during live Q&A. It also suggests that any initial tone-driven equity response fades or even reverses by the daily close. Across all channels, credit and sovereign spreads prove especially informative, but their variation is explained by QE and Forward Guidance surprises together with ΔVSTOXX, rather than by tone itself. These results indicate that daily risk premia are the locus where structured policy signals and market sentiment intersect, while rhetorical tone leaves only weak and short-lived effects.

Table 5: Daily pooled regressions by channel: baseline vs. Tone × CISS

	ACC		**SPEECH**	
	(1) Baseline	(2) + CISS & int.	(3) Baseline	(4) + CISS & int.
Intercept	+0.583	−1.489	−0.401	**−1.995****
	(0.894)	(2.514)	(0.323)	(0.703)
Tone (z)	+0.339	**+2.084****	**+0.130***	−0.038
	(0.262)	(0.772)	(0.069)	(0.132)
CISS (z)	—	**+1.448****	—	−0.154
		(0.593)		(0.128)
Tone × CISS (z)	—	**−1.861****	—	−0.211
		(0.565)		(0.142)
Target factor	−0.256	−1.783	**+0.114***	−0.024
	(0.280)	(1.143)	(0.059)	(0.137)
FG factor	−0.122	**−1.066***	**+0.165****	+0.109
	(0.248)	(0.514)	(0.062)	(0.199)
QE factor	−0.210	+0.805	**+0.180****	−0.118
	(0.264)	(0.644)	(0.061)	(0.143)
ΔVSTOXX	**+1.282*****	+1.091	**+0.684*****	**+0.548*****
	(0.282)	(0.887)	(0.039)	(0.083)
DoW FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Asset FE	Yes	Yes	Yes	Yes
R^2	0.090	0.183	0.117	0.124
Adj. R^2	0.044	0.072	0.109	0.093
N	456	160	3005	864

Notes: Pooled daily panel by channel with two specifications per channel. Columns (1) and (3) are the **baseline** with standardized tone (z), the three daily PCA policy–news factors (Target, Forward Guidance, QE), and ΔVSTOXX; columns (2) and (4) add standardized **CISS** and the **Tone×CISS** interaction. Day-of-week, month, and asset fixed effects are included. Standard errors are two-way clustered by *date* and *asset*; SEs are shown in parentheses under coefficients. **Bold** coefficients are statistically significant; *, **, *** denote significance at the 10%, 5%, and 1% levels.

In the full specification with stress interactions (columns (2) and (4) of Tables 5 and 11, evidence of state dependence emerges most clearly in the *Monetary Policy Accounts*. When systemic stress is at average levels ($\text{CISS}^z = 0$), tone in Accounts is associated with

a significant positive return impact. However, the interaction between tone and CISS is negative and statistically significant, indicating that as stress increases, the effect of tone weakens and may even reverse.[13] The CISS coefficient itself is positive and significant in this channel, indicating that markets pay closer attention to Accounts under heightened stress. No such amplification emerges for other channels.

Overall, the daily analysis confirms that structured policy signals remain the primary drivers of asset prices, with their influence persisting through to the market close, while tone effects appear only selectively and under specific conditions. These findings underscore that the informational content of ECB communication is highly conditional and it varies by channel, asset, and state of the market.

5.4 Discussion and Policy Implications

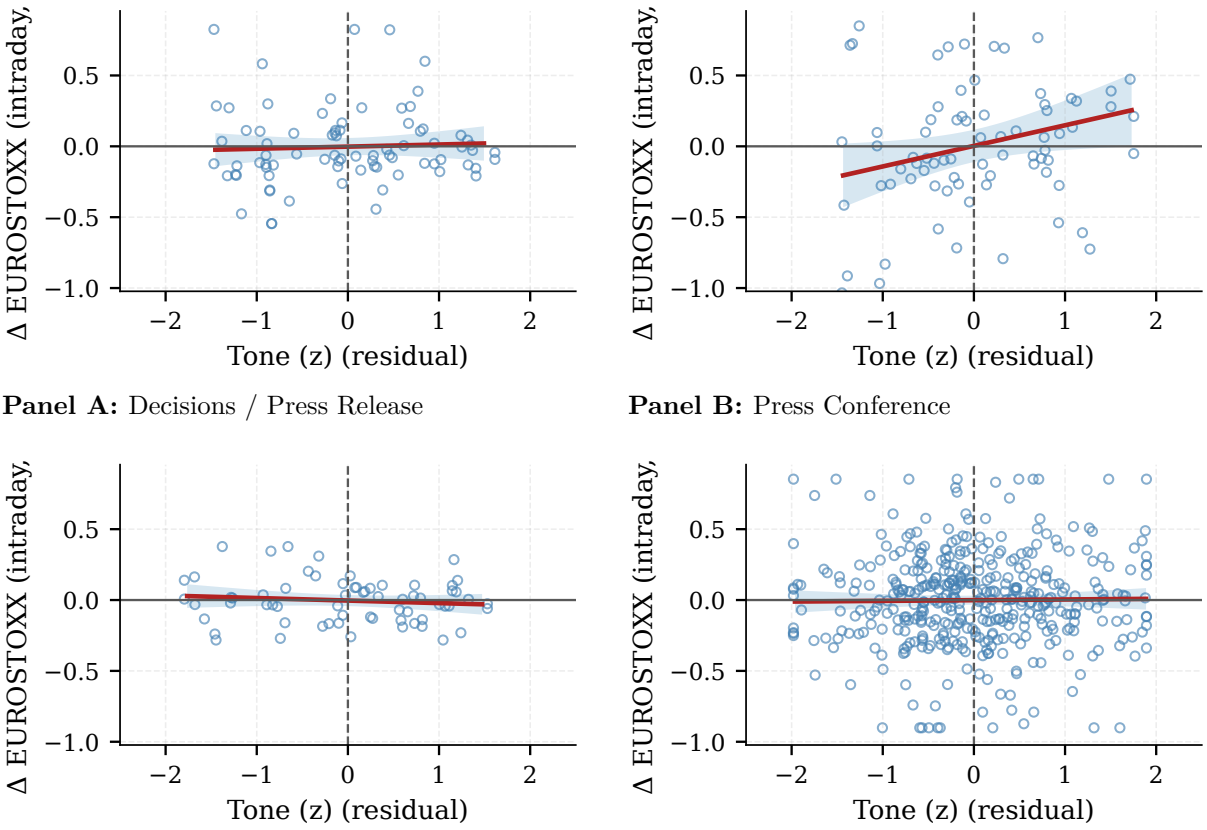
The results connect closely with the existing literature and help to clarify some apparent disagreements. Altavilla et al. (2019) demonstrate that the ECB's two-tier communication generates distinct shocks, with Target effects concentrated in press releases and Forward Guidance (FG) and QE shaping conference-window yields. I find the same pattern: Target dominates the short end, while FG and QE load more heavily on the belly and the long end. Andrade and Ferroni (2021) show that Odyssean FG[14] pushes up medium-to-long yields and depresses equities, and my intraday estimates in Table 4 deliver this configuration across multiple channels. I find that only equities display a significant sensitivity to tone across channels, even after controlling for policy shocks. This is consistent with the evidence in Parle (2022) and Kaminskas and Jurkšas (2024), who also identify equity effects from press-conference and speech tone. Both studies attribute this to the operation of an *information channel*, whereby communication conveys central bank's private assessments about growth and inflation that investors interpret as favourable news rather than a simple re-pricing of the policy path. However, my results differ sharply from Istrefi et al. (2024), who document that inter-meeting communication events are associated with significant market movements comparable to, or larger than, those following policy announcements, particularly at longer maturities. My estimates suggest instead that tone has limited traction in rates and spreads and is concentrated in equity responses.

My results show that tone can act as a complementary tool alongside hard policy stances, but it cannot shape expectations on its own. Central banks should therefore anchor communication in clear signals about the policy path and balance-sheet stance, using tone selectively to reinforce credibility and nuance. These lessons are particularly

[13] The marginal effect of tone is given by $\partial \Delta y / \partial \text{tone} = \beta_0^{(ACC)} + \lambda^{(ACC)} \cdot \text{CISS}^z$, implying that the tone effect becomes zero at approximately one standard deviation of CISS.

[14] "Odyssean" FG denotes a binding commitment about the future policy path, distinct from "Delphic" guidance that primarily conveys information about the outlook. See Andrade and Ferroni (2021).

Figure 5: EUROSTOXX vs Tone (Intraday, by Communication Channel)



Panel A: Decisions / Press Release

Panel B: Press Conference

Panel C: Accounts (Minutes)

Panel D: Speeches

Notes. Scatter plots show intraday EUROSTOXX changes against narrative tone for four ECB communication channels. Red line indicates OLS fit with 95% confidence band; variables are residualized on policy factors (F_{target}, F_{FG}, F_{QE}) and $\Delta\text{VSTOXX}_{\text{PRE}}$. Data winsorized at the 2nd–98th percentiles to mitigate outlier influence.
Source: Author's calculations based on ECB and Bloomberg data.

relevant in the post-2022 environment, when the ECB raised rates at an unprecedented pace while shrinking its balance sheet. In such high-stress environments, markets paid less attention to rhetoric and more to concrete guidance on terminal rates, policy persistence, and the pace of quantitative tightening. At the same time, effective transmission to the real economy makes clear communication essential. It is policy surprises related to QE and forward guidance, rather than tone, that drive long-term yields and affect sovereign and credit spreads. These spreads further influence corporate borrowing costs, sovereign refinancing, and investment patterns. Consistent and well-timed communication reduces uncertainty and supports transmission, while poorly calibrated rhetoric can raise term premia and widen credit spreads, especially for the periphery and high-yield issuers.

6 Robustness Checks

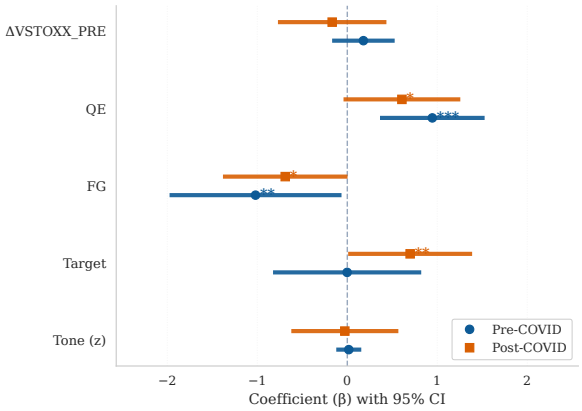
As a robustness check, I re-estimated the baseline intraday specification separately for the pre- and post-COVID periods while keeping the econometric design unchanged. This split-sample test examines whether the tone impact is regime-dependent or stable across very different policy and market environments. It tackles two practical concerns: (i) pandemic-era interventions and temporary market frictions could mechanically amplify or dampen high-frequency responses; and (ii) the post-COVID information set (e.g., inflation and policy-rate uncertainty) may alter how investors translate ECB communication into prices. The accompanying figure 6 reports the pre- and post-COVID coefficients (with 95% CIs) for each communication channel. Overall, in both regimes, the patterns mirror the main analysis: Policy factor loadings retain their expected signs and relative magnitudes across regimes, and the incremental role of tone remains limited once policy factors are controlled for.

As a second check, I performed intraday regressions using an alternative tone dictionary based on the lexicons of Tadle (2022) for Federal Reserve Communication. The results in Tables 13 and 14 indicate that they are closely aligned with the baseline. Across channels, the three policy factors keep their expected signs and relative magnitudes. The tone coefficient continues to be small and imprecise in most specifications, suggesting that my conclusions are not driven by any single sentiment measure. The one notable result that holds across dictionaries is a positive and statistically significant equity response during press conferences, reflecting that the unscripted Q&A provides incremental, forward-looking information for risk appetite beyond the measured policy surprises. Overall, the size of the tone effect is smaller than the impact of the policy factors and the cross-asset response pattern remains unchanged. These consistencies indicate that the findings capture genuine relationships rather than artifacts of a particular dictionary.

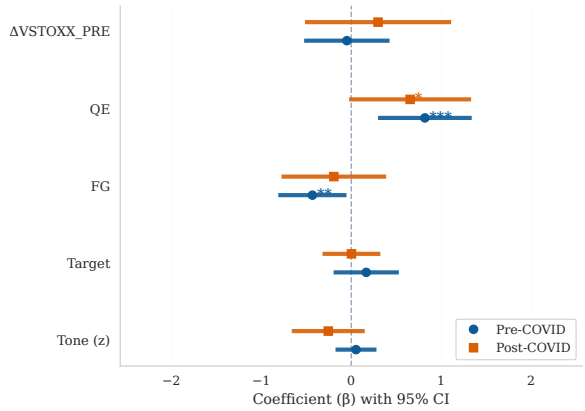
In the final robustness check, I re-evaluate the intraday specifications after purging the tone measure of policy content. Within each channel, I project the baseline tone on the three PCA policy factors (Target, FG, QE) and use the standardised residual - an *orthogonalised tone* as the regressor, keeping the econometric design otherwise identical to the baseline. This is inspired from Kaminskas and Jurkšas (2024)'s residual-based approach to isolating the "surprise" in communication,[15] but aligns the purge with the policy-news dimensions that actually price in my sample. The results reported in Tables 6 and 15 reflect their similarities with the baseline result: factor loadings keep their expected signs and magnitudes across channels, while the residual (policy-free) tone plays

[15] Kaminskas and Jurkšas (2024) first remove predictable components from a sentiment index by estimating $\text{MP\_Sentiment}_t = \beta_0 + \beta_1 \,\text{Sentiment\_Trend}_t + \beta_2 \,\text{Inflation}_{2y2y,t} + \beta_3 \,\text{Financial\_volatility}_t + \beta_4 \,\text{Economic\_uncertainty}_t + \varepsilon_t$, and use the residual as a cyclical ("surprise") sentiment component. They then regress asset returns on this residual: $R_t = \beta_0 + \beta_1 \,\text{Sentiment\_Cyclical}_t + \beta_2 \, R_t^{\text{control}} + \varepsilon_t$.

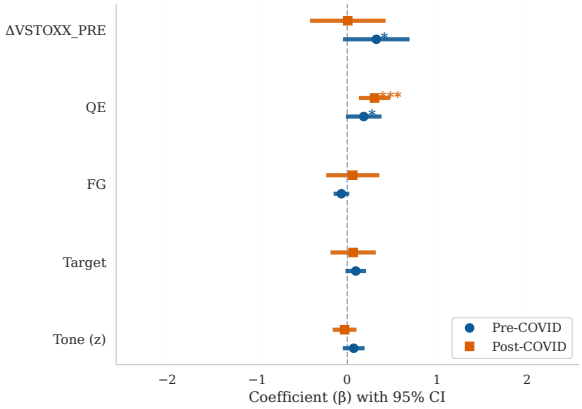
Figure 6: Subsample Analysis: Intraday Impact of Tone and Policy Factors



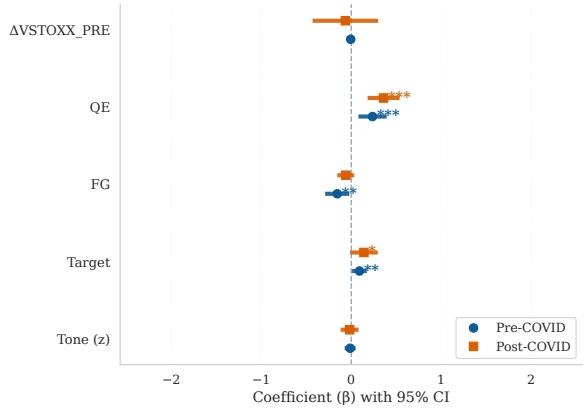
Panel A: MPD - Press Release



Panel B: MPD - Press Conference



Panel C: Monetary Policy Accounts



Panel D: Speeches

Note. This figure plots the coefficients and 95% confidence intervals from pooled intraday regressions, estimated separately for the Pre–COVID ♦ and Post–COVID ■ periods. The dependent variable is the pooled intraday return across the seven core assets. The specification includes asset and day-of-week fixed effects, and controls for the Target, FG, and QE factors. Stars denote conventional significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

at most a minor role. This strengthens the main interpretation that markets primarily absorb ECB communication through policy content and that any ”pure” tone once stripped of policy news adds little explanatory power beyond those factors.

Table 6: Intraday Pooled Regressions with Orthogonalised Tone by Channel

	MPD	**PC**	**ACC**	**SPEECH**
Panel A: Regression coefficients				
Intercept	+0.142	+0.036	−0.001	+0.012
	[0.581]	[0.584]	[0.094]	[0.065]
Orthog. tone (z)	+0.040	−0.111	+0.025	−0.009
	[0.102]	[0.102]	[0.036]	[0.020]
Target factor	**+0.757*****	+0.115	+0.040	**+0.085*****
	[0.185]	[0.103]	[0.038]	[0.023]
FG factor	**−0.622****	**−0.297***	−0.047	**−0.104*****
	[0.189]	[0.146]	[0.037]	[0.025]
QE factor	**+0.702*****	**+0.690*****	**+0.275*****	**+0.289*****
	[0.170]	[0.147]	[0.038]	[0.023]
Asset FE / DoW FE	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes
R^2 / Adj. R^2	0.285 / 0.271	0.144 / 0.126	0.168 / 0.145	0.090 / 0.086
N	560	560	399	3223
Panel B: First–stage diagnostics for orthogonalised tone				
Events (tone construction)	80	80	57	363
First–stage R^2	0.016	0.016	0.077	0.013
corr(tone, tone$_\perp$)	0.992	0.992	0.961	0.994
corr(tone$_\perp$, F_{target})	0.000	0.000	0.000	0.000
corr(tone$_\perp$, F_{fg})	0.000	0.000	0.000	0.000
corr(tone$_\perp$, F_{qe})	0.000	0.000	0.000	0.000

Notes: "Orthog. tone" is constructed within each channel $k \in \{\text{MPD, PC, ACC, SPEECH}\}$ by projecting the event–level standardized tone on that channel's PCA policy factors and taking the residual, which is then re-standardized to unit variance:

$$z_t^{(k)} = \alpha^{(k)} + \Theta^{(k)\prime} F_t^{(k)} + \varepsilon_t^{(k)}, \qquad \text{tone}_{\perp,t}^{(k)} = \frac{\varepsilon_t^{(k)}}{\text{sd}(\varepsilon_t^{(k)})}.$$

Here t indexes event days, $z_t^{(k)}$ is the baseline tone (z-score), and $F_t^{(k)} = (F_{\text{Target}}, F_{\text{FG}}, F_{\text{QE}})'$ are the daily PCA policy factors computed for channel k. The first-stage R^2 reports the share of tone variance explained by these factors in the projection above (smaller values indicate little linear policy content in tone). Correlations in Panel B are computed across event days used to build $z_t^{(k)}$. Panel A regressions are estimated on intraday data with asset and day-of-week fixed effects and two-way clustered standard errors (event date × asset). By construction, $\text{corr}(\text{tone}_{\perp,t}^{(k)}, F_{t,j}^{(k)}) \approx 0$ for each factor j, and $\text{corr}(z_t^{(k)}, \text{tone}_{\perp,t}^{(k)}) \approx \sqrt{1 - R^2}$ when an intercept is included. Bold coefficients denote significance at the 10% (*), 5% (**), and 1% (***) levels.

7 Limitations and Extensions

A key limitation of my design is that the dictionary-based tone measures, even when carefully curated and checked against an alternative lexicon, remain coarse proxies for what market participants actually extract from ECB texts. Dictionaries are context-

insensitive: they struggle with negation ("not improving"), scope ("risks to growth"), modality and hedging ("could", "likely"), and domain-specific meanings ("tightening cycle" vs "tight conditions"). Recent work also argues that simple counts miss affective nuance and rhetorical signals in central-bank language. These properties introduce classical measurement error that likely attenuates estimated tone effects and can blur tone with policy content. My factor-decomposition controls (Target, FG, QE) help mitigate that blur, but they have their own drawback. Because they are extracted from asset-price moves around announcements, they can absorb not only policy information (which I then attribute to the Target/FG/QE policy factors) but also time-varying risk premia and liquidity conditions, so the factors are not a "pure" measure of what was communicated. This underscores how hard it is to cleanly separate communicative tone from the channels through which markets price policy news.

To move past these limits, recent NLP advances offer practical upgrades directly relevant to my setting. Gambacorta et al. (2024) develop central-bank-adapted transformer models that handle negation, hedging, and idiomatic usage better than dictionaries and improve performance on policy-text tasks. Deng et al. (2024) read press conferences at the sentence level and fuse textual stance with vocal affect in a fine-grained, multi-modal framework, yielding stronger links to high-frequency market moves than coarse document scores. These advances align with my objectives and suggest that an ECB-specific, fine-tuned model would produce more faithful and stable tone measures. Therefore, an extension of my study would be to train an ECB-tuned classifier that jointly predicts tone and policy content, uses retrieval to anchor outputs in prior ECB communications, and imposes an explicit orthogonality penalty so the learned tone is separated from the Target, FG, and QE factor dimensions. I would validate pre- and post-COVID for stability checks, then re-estimate the intraday specifications to assess incremental explanatory power.

8 Conclusion

This dissertation shows that ECB communication is priced by markets primarily through structured policy surprises, with narrative tone playing a secondary and conditional role. Intraday reactions confirm that Target, Forward Guidance, and QE factors anchor the term structure and spreads, while tone briefly lifts equities during press-conference Q&A before fading. At the daily horizon, tone effects are limited to speeches and the Monetary Policy Accounts, with the latter showing state dependence: tone matters under average stress but loses traction in turbulent regimes. These results highlight that tone can complement, but not substitute for, hard policy signals. Therefore, central banks should prioritise clear guidance on policy rates and balance-sheet strategy, while using tone to reinforce credibility and nuance. This is especially important in the current environment

of heightened macroeconomic uncertainty and shifting global trade dynamics. Future research could build on this analysis by using richer text-mining methods, incorporating multimodal communication, and examining how tone interacts with expectations around key turning points in monetary policy.

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A Appendix

A.1 Pre-processing Steps

This appendix documents the text pre-processing pipeline used before applying the dictionary-based scoring. The workflow mirrors the widely used `quanteda` pipeline in Benoit et al. (2018), and is implemented in Python to match the replication codebase.

1. Each document (press conference transcript, monetary policy account, or speech) is segmented into paragraphs and then into sentences.
2. A standard list of stopwords is removed to eliminate very common tokens that carry negligible information (for example "the", "and", "or").
3. A short list of ECB-specific boilerplate terms with low informational value is removed. These are selected after inspecting the most frequent tokens that remain after stopword removal, to reduce ambiguity driven by non-informative phrases.
4. All numeric characters and punctuation are stripped.
5. All tokens are lowercased to ensure results are invariant to capitalization.
6. Sentence boundaries are validated to ensure that monetary-policy sentences are not split improperly. Only sentences that contain at least one economic term from the ECB-adapted dictionaries proceed to scoring.

A.2 ECB-adapted Dictionaries: Neutral & Pessimistic Terms

Table 7: ECB-specific lexicons used in the study (Neutral and Pessimistic)

Panel A: Neutral economic terms

activity	financing_conditions	loans
annual_growth	firms	macroeconomic_projections
business	gdp	markets
confidence	growth	outlook
credit	headline_inflation	output
demand	hicp	price
economy	income	prices
economic_growth	inflation	private_sector
economies	inflation_expectations	projection
employment	inflation_rates	projections
expansion	interest_rate	rate
expectations	interest_rates	rates
financial_conditions	investment	real_economy
financial_market	job_creation	recovery
financial_markets	labour	situation
financial_system	labour_market	stability
financial_stability	liquidity	wage

Panel B: Pessimistic economic terms

app	fragmentation	risk
asset_purchases	issue	risks
balance_sheet	issues	stress
balance_sheets	loss	tensions
challenge	losses	turbulence
challenges	problem	turmoil
concern	problems	uncertainty
concerns	programme	uncertainties
crises	purchase	unemployment
crisis	recession	volatility

Notes: The neutral vs. pessimistic economic lists provide the economic "base" classification used in the sentence-level scoring rules. The positive vs. negative lists provide the polarity classification. The combined rules follow Parle (2022) with lexicons adapted from Kaminskas and Jurkšas (2024).

A.3 ECB-adapted Dictionaries: Positive & Negative Terms

Table 8: ECB-specific lexicons used in the study (Positive and Negative)

Panel C: Positive tone words

better	improving	strengthen
favourable	increase	strengthening
favourably	increased	strengthens
good	increases	strong
grew	increasing	stronger
grow	increasingly	strongly
growing	large	successful
grows	larger	supporting
high	positive	sustainable
higher	rise	up
improve	rises	upside
improved	rising	upswing
improvement	rose	uptick
improves	stable	upward

Panel D: Negative tone words

adverse	fell	reduces
decline	lack	reducing
declined	limited	reduction
declining	little	slide
decrease	low	small
difficult	lower	smaller
downward	negative	subdued
end	reduce	vulnerable
fall	reduced	weak
falling		

Notes: The neutral vs. pessimistic economic lists provide the economic "base" classification used in the sentence-level scoring rules. The positive vs. negative lists provide the polarity classification. The combined rules follow Parle (2022) with lexicons adapted from Kaminskas and Jurkšas (2024).

A.4 BIS vs. ECB Speech Tone

Table 9: BIS vs. ECB Speech Tone: Coverage, Top Speakers, and Cross-Source Overlap

Panel A: Coverage and distribution of daily tone indices

Source	Days with tone	Mean	Std	Min	Max	Positive %	Negative %
BIS speeches	673	5.43	9.36	-47.47	41.67	71.3	22.7
ECB official speeches	789	5.33	9.51	-41.58	55.17	71.4	22.2

Panel B: Top speakers by count

Rank	BIS speeches		ECB official speeches	
	Name	Count	Name	Count
1	Christine Lagarde	104	Christine Lagarde	133
2	Mario Draghi	89	Yves Mersch	111
3	Yves Mersch	87	Mario Draghi	105
4	Benoït Cœuré	85	Benoït Cœuré	100
5	Fabio Panetta	85	Luis de Guindos	95

Panel C: Cross-source overlap

Days with both datasets	611
Correlation of daily tone indices	0.954

Notes: Tone is the dictionary-based hawk–dove index described in the text. "Positive%" ("Negative%") is the share of days with tone > 0 (< 0); the residual share is near-zero/neutral. BIS speeches were retrieved via the `gingado` Python library from the Bank for International Settlements repository (https://bis-med-it.github.io/gingado/datasets.html#load_cb_speeches). ECB official speeches were scraped from the ECB website (https://www.ecb.europa.eu/press/key/html/downloads.en.html). Date coverage: BIS 2015-01-25 to 2025-06-19; ECB official 2015-01-25 to 2025-07-14. Dates are inclusive.

A.5 Intraday Pooled Regressions for Inter-Meeting Communications (ACC & SPEECH

Table 10: Intraday Pooled Regressions for Inter-Meeting Communications (ACC & SPEECH)

	ACC			SPEECH		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.045	0.039	−0.005	−0.008	−0.001	0.019
	(0.036)	(0.036)	(0.094)	(0.018)	(0.020)	(0.068)
Tone (z)	−0.009	0.019	0.026	0.004	−0.013	−0.015
	(0.036)	(0.037)	(0.038)	(0.018)	(0.022)	(0.022)
Target factor		0.043	0.046		**0.061****	**0.061****
		(0.039)	(0.039)		(0.022)	(0.022)
FG factor		−0.048	−0.051		**−0.152*****	**−0.151*****
		(0.037)	(0.037)		(0.025)	(0.025)
QE factor		**0.273*****	**0.273*****		**0.279*****	**0.280*****
		(0.038)	(0.038)		(0.022)	(0.022)
Controls	No	Yes	Yes	No	Yes	Yes
Asset FE	No	No	Yes	No	No	Yes
DoW FE	No	No	Yes	No	No	Yes
R-squared	0.000	0.155	0.168	0.000	0.104	0.107
Adj. R-squared	−0.002	0.146	0.145	−0.000	0.102	0.102
N	443	399	399	3,807	2,928	2,928

Notes: This table presents pooled regression results for the intraday impact of ECB communication tone. The dependent variable is the high-frequency return for the seven core assets, pooled across assets. The main independent variable is the standardized tone (z-score). Coefficients are shown with two-way clustered standard errors (event date × asset) in parentheses. Columns (2)–(3) and (5)–(6) include monetary policy surprise factors (Target, Forward Guidance, QE) constructed via PCA; factors are built from the high frequency dataset provided by Istrefi et al. (2024) following the methodology for factor construction by Swanson (2021). The specification estimated separately by channel $k \in \{\text{ACC}, \text{SPEECH}\}$ is:

$$\begin{aligned}\Delta y_{a,e}^{(k)} = \alpha_a \;+\; \beta^{(k)}\,\text{tone}_e^{(k)} \;+\; \Theta' F_e^{(k)} \;+\; \phi\,\Delta\text{VSTOXX}_e^{\text{pre}} \\ +\; \gamma'\text{DoW}_e \;+\; \chi\,\mathbf{1}\{\text{Pres}\}_e \;+\; \varepsilon_{a,e},\end{aligned} \tag{a}$$

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

A.6 Daily Regression Results: MPD and PC

Table 11: Daily pooled regressions by channel: baseline vs. Tone × CISS

	MPD		**PC**	
	(1) Baseline	(2) + CISS & int.	(3) Baseline	(4) + CISS & int.
Intercept	+0.079	−0.220	+0.325	−1.264
	(1.556)	(2.338)	(1.558)	(2.223)
Tone (z)	+0.092	+0.105	+0.230	+0.201
	(0.232)	(0.748)	(0.234)	(0.575)
CISS (z)	—	−0.341	—	+0.098
		(0.476)		(0.385)
Tone × CISS (z)	—	−0.271	—	+0.382
		(0.740)		(0.400)
Target factor	+0.059	+1.037	+0.167	+0.102
	(0.437)	(1.946)	(0.244)	(0.654)
FG factor	+0.507	+1.521	−0.119	+0.117
	(0.444)	(1.674)	(0.335)	(1.009)
QE factor	+0.739	+2.166	+0.391	+0.668
	(0.424)	(1.285)	(0.336)	(1.028)
ΔVSTOXX	**+1.140*****	**+1.106*****	**+1.164*****	**+1.080*****
	(0.100)	(0.266)	(0.095)	(0.166)
DoW FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Asset FE	Yes	Yes	Yes	Yes
R^2	0.226	0.264	0.223	0.253
Adj. R^2	0.199	0.193	0.196	0.181
N	640	240	640	240

Notes: Pooled daily panel by channel with two specifications per channel. Columns (1) and (3) are the **baseline** with standardized tone (z), the three daily PCA policy–news factors (Target, Forward Guidance, QE), and ΔVSTOXX; columns (2) and (4) add standardized **CISS** and the **Tone×CISS** interaction. Day-of-week, month, and asset fixed effects are included. Standard errors two-way clustered by date and asset; SEs shown in parentheses under coefficients. **Bold** coefficients are statistically significant; *, **, *** denote significance at the 10%, 5%, and 1% levels.

A.7 By Asset Regression Results - Daily Frequency

Table 12: Daily by–asset regressions with PCA factors by channel

	EUROSTOXX	EURUSD	GOVY_2Y	GOVY_10Y	IT_DE_FUT_SPREAD	HY_IG_SPREAD
Panel A: Press Release (MPD)						
Intercept	+0.003 (0.006)	+0.002 (0.006)	-0.018 (0.032)	+0.010 (0.039)	+0.457 (0.657)	-0.801 (3.979)
Tone (z)	+0.001 (0.001)	-0.001 (0.001)	-0.001 (0.005)	-0.002 (0.006)	-0.079 (0.105)	+0.265 (0.639)
Target factor	-0.002 (0.002)	-0.000 (0.002)	+0.002 (0.010)	+0.016 (0.012)	-0.169 (0.199)	-0.105 (1.203)
FG factor	+0.001 (0.002)	-0.002 (0.002)	-0.014 (0.010)	+0.006 (0.012)	+0.207 (0.202)	+1.271 (1.221)
QE factor	-0.001 (0.002)	-0.000 (0.002)	**+0.028***** (0.009)	**+0.028**** (0.011)	-0.310 (0.193)	**+2.162*** (1.166)
ΔVSTOXX	**-0.007***** (0.000)	-0.000 (0.000)	+0.001 (0.002)	+0.000 (0.003)	**-0.258***** (0.046)	**+3.717***** (0.276)
R^2	0.863	0.175	0.527	0.284	0.566	0.793
N	80	80	80	80	80	80
Panel B: Press Conference (PC)						
Intercept	-0.000 (0.006)	+0.003 (0.006)	+0.001 (0.035)	+0.022 (0.032)	+0.498 (0.710)	-0.101 (4.090)
Tone (z)	-0.001 (0.001)	-0.000 (0.001)	**+0.012**** (0.006)	**+0.009*** (0.005)	-0.096 (0.115)	+0.614 (0.662)
Target factor	+0.001 (0.001)	**+0.002**** (0.001)	+0.002 (0.006)	**+0.010*** (0.005)	+0.143 (0.120)	+0.505 (0.689)
FG factor	+0.001 (0.001)	-0.001 (0.001)	-0.007 (0.008)	+0.004 (0.007)	-0.119 (0.164)	-0.317 (0.947)
QE factor	-0.002 (0.001)	+0.002 (0.001)	**+0.021**** (0.008)	**+0.038***** (0.007)	+0.065 (0.165)	+1.249 (0.949)
ΔVSTOXX	**-0.007***** (0.000)	+0.000 (0.000)	**+0.005**** (0.002)	**+0.004**** (0.002)	**-0.316***** (0.047)	**+3.797***** (0.269)
R^2	0.862	0.294	0.438	0.526	0.491	0.780
N	80	80	80	80	80	80
Panel C: Monetary Policy Accounts (ACC)						
Intercept	-0.002 (0.002)	+0.001 (0.002)	+0.016 (0.013)	+0.023 (0.014)	-0.036 (0.169)	+2.328 (3.152)
Tone (z)	-0.000 (0.001)	+0.001 (0.001)	**+0.011**** (0.005)	+0.007 (0.006)	**+0.161**** (0.069)	+1.082 (1.285)
Target factor	+0.001 (0.001)	+0.000 (0.001)	**+0.014**** (0.006)	**+0.017***** (0.006)	**+0.204***** (0.074)	-0.901 (1.375)
FG factor	+0.000 (0.001)	**-0.001**** (0.001)	-0.001 (0.005)	-0.001 (0.005)	+0.031 (0.065)	-0.362 (1.218)
QE factor	+0.000 (0.001)	-0.000 (0.001)	-0.007 (0.005)	-0.005 (0.006)	+0.078 (0.070)	-0.606 (1.296)
ΔVSTOXX	**-0.007***** (0.001)	-0.001 (0.001)	-0.001 (0.006)	-0.004 (0.006)	-0.092 (0.074)	**+3.963***** (1.385)
R^2	0.797	0.356	0.322	0.330	0.323	0.287
N	57	57	57	57	57	57
Panel D: Speeches (SPEECH)						
Intercept	-0.001 (0.001)	-0.000 (0.001)	+0.008 (0.008)	+0.013 (0.009)	+0.040 (0.156)	-0.996 (1.180)
Tone (z)	**-0.001**** (0.000)	+0.000 (0.000)	-0.001 (0.002)	-0.001 (0.002)	+0.007 (0.038)	+0.363 (0.290)
Target factor	-0.000 (0.000)	+0.000 (0.000)	+0.002 (0.002)	**+0.005**** (0.002)	-0.007 (0.033)	**+0.356*** (0.250)
FG factor	+0.000 (0.000)	**-0.001**** (0.000)	**-0.003*** (0.002)	**+0.004**** (0.002)	+0.031 (0.035)	**+0.483*** (0.263)
QE factor	**-0.001*** (0.000)	+0.000 (0.000)	**+0.006***** (0.002)	**+0.010***** (0.002)	+0.016 (0.034)	**+0.541**** (0.258)
ΔVSTOXX	**-0.005***** (0.000)	-0.000 (0.000)	-0.001 (0.001)	**-0.003**** (0.001)	**-0.078***** (0.022)	**+2.162***** (0.165)
R^2	0.629	0.079	0.117	0.115	0.049	0.380
N	376	376	376	376	376	375

Notes: This table reports the results of asset–by–asset daily regressions for each channel using the estimated coefficients with one–way clustering by date. Regressors include standardized tone (z), PCA policy–news factors (Target, Forward Guidance, QE), and ΔVSTOXX. Standard errors are shown in parentheses. Stars denote p–values from the clustered SEs: *** 1%, ** 5%, * 10%.

A.8 Intraday Pooled Regressions (Alternative Dictionary)

Table 13: Intraday Pooled Regressions (Alt. Dictionary)

	MPD	**PC**	**ACC**	**SPEECH**
Intercept	+0.419	+0.039	+0.016	−0.002
	[1.023]	[0.584]	[0.095]	[0.084]
Alt tone (z)	+0.051	−0.123	+0.031	−0.031
	[0.118]	[0.104]	[0.039]	[0.026]
Target factor	**+0.753*****	+0.095	+0.043	**+0.117*****
	[0.201]	[0.104]	[0.039]	[0.029]
FG factor	**−0.627****	**−0.296***	−0.051	**−0.130*****
	[0.203]	[0.146]	[0.037]	[0.029]
QE factor	**+0.703*****	**+0.691*****	**+0.273*****	**+0.285*****
	[0.183]	[0.148]	[0.038]	[0.027]
ΔVSTOXX	+0.086	+0.040	−0.184	+0.007
	[0.194]	[0.217]	[0.116]	[0.008]
Asset FE	Yes	Yes	Yes	Yes
DoW FE	Yes	Yes	Yes	Yes
R-squared	0.278	0.144	0.174	0.112
Adj. R-squared	0.260	0.125	0.148	0.106
N	490	560	399	2053

Notes: This table reports intraday regressions based on the alternative dictionary tone lexicons developed by Tadle (2022) for Federal Reserve communications. The dependent variable is the asset return around the policy communication event. All specifications include asset and day-of-week fixed effects, and use two-way clustered standard errors (by date and asset). Bold coefficients are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

A.9 By–Asset Intraday Regressions (Alternative Dictionary)

Table 14: Intraday by–asset regressions (Alt. dictionary) by channel

	EUROSTOXX	EURUSD	OIS_1M	OIS_3M	OIS_2Y	OIS_10Y	IT_DE_10Y_SPREAD
Panel A: Press Release (MPD)							
Alt tone (z)	−0.007 (0.053)	+0.021 (0.032)	−0.015 (0.051)	−0.043 (0.077)	−0.082 (0.080)	+0.065 (0.072)	+0.334 (0.475)
Target Factor	−0.294*** (0.085)	+0.006 (0.054)	**+3.082***** (0.087)	**+0.593***** (0.130)	−0.599*** (0.136)	**+0.452***** (0.123)	**+2.062**** (0.783)
FG Factor	−0.180** (0.086)	−0.042 (0.055)	+0.003 (0.087)	−2.707*** (0.131)	−2.682*** (0.137)	−0.053 (0.126)	**+1.372*** (0.797)
QE Factor	−0.373*** (0.078)	**+0.108**** (0.049)	+0.013 (0.079)	−1.526*** (0.119)	**+1.457***** (0.124)	**+2.444***** (0.111)	**+2.883***** (0.722)
ΔVSTOXX	+0.033 (0.090)	+0.105 (0.161)	+0.140 (0.230)	−0.040 (0.077)	−0.099 (0.117)	+0.116 (0.094)	+1.427 (1.833)
R^2	0.332	0.244	0.986	0.967	0.972	0.954	0.258
N	70	70	70	70	70	70	70
Panel B: Press Conference (PC)							
Alt tone (z)	**+0.142*** (0.075)	−0.024 (0.047)	−0.003 (0.011)	−0.003 (0.020)	+0.028 (0.078)	+0.017 (0.130)	−0.736 (0.655)
Target Factor	−0.071 (0.071)	**+0.126***** (0.045)	**+0.376***** (0.010)	**+0.146***** (0.020)	−0.168** (0.076)	**+0.710***** (0.131)	−0.556 (0.596)
FG Factor	+0.081 (0.099)	−0.075 (0.064)	−0.002 (0.015)	−1.063*** (0.028)	−0.639*** (0.108)	−0.007 (0.183)	−0.312 (0.819)
QE Factor	−0.188* (0.099)	**+0.251***** (0.064)	−0.002 (0.015)	−0.460*** (0.028)	**+2.381***** (0.108)	**+3.028***** (0.184)	−0.210 (0.826)
ΔVSTOXX	−0.175 (0.177)	−0.006 (0.269)	−0.031 (0.032)	**+0.083***** (0.025)	−0.363* (0.188)	+0.093 (0.203)	−2.174 (3.577)
R^2	0.190	0.438	0.949	0.960	0.955	0.887	0.047
N	80	80	80	80	80	80	80
Panel C: Monetary Policy Accounts (ACC)							
Alt tone (z)	−0.023 (0.024)	+0.032 (0.023)	+0.002 (0.004)	−0.001 (0.004)	+0.029 (0.050)	−0.022 (0.077)	+0.186 (0.202)
Target Factor	+0.030 (0.024)	+0.020 (0.023)	**+0.155***** (0.004)	+0.006 (0.004)	−0.012 (0.051)	**+0.219***** (0.082)	−0.002 (0.213)
FG Factor	+0.022 (0.023)	−0.006 (0.022)	−0.001 (0.004)	−0.408*** (0.004)	+0.015 (0.049)	+0.005 (0.073)	+0.067 (0.198)
QE Factor	−0.040* (0.024)	**+0.068***** (0.022)	−0.001 (0.004)	−0.006 (0.004)	**+0.840***** (0.049)	**+0.859***** (0.073)	+0.193 (0.198)
ΔVSTOXX	−0.035 (0.097)	−0.227** (0.099)	+0.015 (0.016)	+0.020 (0.028)	−0.175 (0.122)	+0.023 (0.152)	−1.908 (1.536)
R^2	0.295	0.303	0.968	0.996	0.868	0.790	0.074
N	57	57	57	57	57	57	57
Panel D: Speeches (SPEECH)							
Alt tone (z)	**+0.046*** (0.025)	−0.003 (0.012)	−0.003 (0.010)	**+0.034*** (0.020)	−0.031 (0.043)	+0.003 (0.062)	−0.220 (0.144)
Target Factor	**+0.101***** (0.035)	−0.021 (0.013)	**+0.289***** (0.009)	−0.025 (0.022)	**+0.109**** (0.047)	**+0.116*** (0.063)	−0.023 (0.199)
FG Factor	−0.001 (0.034)	−0.040*** (0.013)	−0.006 (0.008)	−0.503*** (0.024)	−0.269*** (0.051)	+0.046 (0.064)	−0.257 (0.171)
QE Factor	−0.054* (0.028)	−0.009 (0.012)	+0.007 (0.009)	−0.258*** (0.022)	**+0.811***** (0.049)	**+1.374***** (0.066)	+0.009 (0.149)
ΔVSTOXX	**+0.007**** (0.003)	−0.054 (0.048)	−0.087** (0.042)	−0.040 (0.088)	−0.044 (0.103)	+0.065 (0.135)	−0.520 (0.507)
R^2	0.087	0.048	0.815	0.679	0.655	0.612	0.025
N	221	354	282	287	315	323	271

Notes: This table reports the by-asset regression results based on the alternative dictionary lexicons developed by Tadle (2022) for Federal Reserve Communications. All specifications include asset fixed effects and day-of-week fixed effects. **Bold** coefficients are statistically significant at the 10% (*), 5% (**), and 1% (***) levels.

A.10 Intraday by–asset regressions with orthogonalised tone

Table 15: Intraday by–asset regressions with orthogonalised tone by channel

	EUROSTOXX	EURUSD	OIS_1M	OIS_3M	OIS_2Y	OIS_10Y	IT_DE_10Y_SPREAD
Panel A: Press Release (MPD)							
Orthog. tone (z)	+0.005 [0.044]	+0.010 [0.031]	−0.009 [0.044]	−0.049 [0.066]	−0.070 [0.069]	+0.046 [0.062]	+0.345 [0.393]
Target factor	**−0.313***** [0.080]	+0.039 [0.057]	**+3.073***** [0.080]	**+0.594***** [0.121]	**−0.606***** [0.125]	**+0.497***** [0.112]	**+2.015***** [0.713]
FG factor	**−0.179**** [0.081]	−0.041 [0.058]	−0.002 [0.081]	**−2.713***** [0.123]	**−2.697***** [0.128]	+0.001 [0.115]	**+1.274*** [0.728]
QE factor	**−0.390***** [0.073]	**+0.135**** [0.052]	−0.002 [0.073]	**−1.515***** [0.111]	**+1.450***** [0.115]	**+2.477***** [0.103]	**+2.757***** [0.655]
N	80	80	80	80	80	80	80
R^2	0.357	0.255	0.986	0.967	0.972	0.953	0.254
Panel B: Press Conference (PC)							
Orthog. tone (z)	**+0.135**** [0.068]	−0.047 [0.044]	−0.003 [0.010]	+0.007 [0.021]	−0.010 [0.076]	+0.035 [0.127]	−0.893 [0.568]
Target factor	−0.077 [0.068]	**+0.130***** [0.044]	**+0.376***** [0.010]	**+0.144***** [0.021]	**−0.168**** [0.076]	**+0.715***** [0.127]	−0.314 [0.572]
FG factor	+0.068 [0.097]	−0.075 [0.063]	+0.000 [0.015]	**−1.064***** [0.030]	**−0.668***** [0.109]	−0.010 [0.183]	−0.327 [0.816]
QE factor	**−0.192*** [0.098]	**+0.251***** [0.063]	+0.000 [0.015]	**−0.469***** [0.030]	**+2.379***** [0.110]	**+3.030***** [0.183]	−0.172 [0.822]
N	80	80	80	80	80	80	80
R^2	0.193	0.444	0.948	0.954	0.953	0.887	0.039
Panel C: Monetary Policy Accounts (ACC)							
Orthog. tone (z)	−0.013 [0.022]	+0.036 [0.022]	+0.003 [0.004]	−0.002 [0.004]	+0.016 [0.047]	−0.027 [0.070]	+0.160 [0.190]
Target factor	+0.034 [0.023]	+0.014 [0.023]	**+0.154***** [0.004]	**+0.006*** [0.004]	−0.027 [0.049]	**+0.219***** [0.073]	−0.121 [0.199]
FG factor	+0.018 [0.023]	−0.005 [0.022]	+0.000 [0.004]	**−0.409***** [0.004]	+0.028 [0.048]	+0.000 [0.070]	+0.040 [0.193]
QE factor	**−0.041*** [0.023]	**+0.070***** [0.023]	−0.000 [0.004]	**−0.007*** [0.004]	**+0.848***** [0.049]	**+0.858***** [0.072]	+0.198 [0.198]
N	57	57	57	57	57	57	57
R^2	0.285	0.231	0.967	0.996	0.863	0.790	0.045
Panel D: Speeches (SPEECH)							
Orthog. tone (z)	**+0.035*** [0.021]	−0.010 [0.010]	−0.001 [0.008]	+0.025 [0.016]	−0.010 [0.036]	+0.010 [0.046]	−0.108 [0.106]
Target factor	+0.037 [0.025]	−0.013 [0.011]	**+0.306***** [0.008]	**+0.049***** [0.017]	**+0.088**** [0.040]	**+0.127**** [0.051]	−0.021 [0.119]
FG factor	−0.018 [0.029]	**−0.043***** [0.012]	−0.005 [0.009]	**−0.359***** [0.019]	**−0.202***** [0.044]	+0.065 [0.056]	−0.211 [0.138]
QE factor	−0.035 [0.025]	+0.004 [0.011]	+0.000 [0.008]	**−0.200***** [0.018]	**+0.813***** [0.041]	**+1.367***** [0.052]	−0.038 [0.124]
N	361	488	472	473	486	486	457
R^2	0.024	0.046	0.769	0.518	0.557	0.631	0.023

Notes: "Orthog. tone" is constructed within each channel $k \in \{\text{MPD, PC, ACC, SPEECH}\}$ by projecting the event–level standardized tone on that channel's PCA policy factors and taking the residual, which is then re-standardized to unit variance:

$$z_t^{(k)} \;=\; \alpha^{(k)} + \Theta^{(k)\prime} F_t^{(k)} + \varepsilon_t^{(k)}, \qquad \text{tone}_{\perp,t}^{(k)} \;=\; \frac{\varepsilon_t^{(k)}}{\text{sd}(\varepsilon_t^{(k)})}.$$

Here t indexes event days, $z_t^{(k)}$ is the baseline tone (z-score), and $F_t^{(k)} = (F_{\text{Target}}, F_{\text{FG}}, F_{\text{QE}})'$ are the daily PCA policy factors computed for channel k. The first-stage R^2 reports the share of tone variance explained by these factors in the projection above (smaller values indicate little linear policy content in tone). Correlations in Panel B are computed across event days used to build $z_t^{(k)}$. Panel A regressions are estimated on intraday data with asset and day-of-week fixed effects and two-way clustered standard errors (event date × asset). By construction, $\text{corr}(\text{tone}_{\perp,t}^{(k)}, F_{t,j}^{(k)}) \approx 0$ for each factor j, and $\text{corr}(z_t^{(k)}, \text{tone}_{\perp,t}^{(k)}) \approx \sqrt{1 - R^2}$ when an intercept is included. Bold coefficients denote significance at the 10% (*), 5% (**), and 1% (***) levels.

Response Summary:

Supervisor Approval

The responses provided by the student are contained within this online form.

You will be asked to provide one of the following outcomes.

For forms identified as eligible for a Research Ethics Form waiver (i.e. student not collecting any primary data):

1. Research Ethics Form waiver approved - ethical approval not required

2. Research Ethics Form waiver not approved - the research is not eligible for a REF waiver due to the answers provided, and the student must re-submit a new REF

For all other forms (i.e. the student is collecting primary data):

3. Research Ethics approval granted - the project is low risk and the appropriate measures have been considered, you are happy to approve

4. Research Ethics approval granted with conditions - the project is low risk, however, there are minor revisions or additional considerations needed. Ethical approval is granted on the condition that the considerations or revisions are carried out and implemented by the student.

5. Rejected - major revisions needed in order to approve, so the student should discuss with their supervisor and re-submit.

6. Rejected - full HSSREC review and approval required, as the project is not suitable for low-risk review.

You must now scroll down and click through the online form and provide your response at the end. Please do not make any changes to the student's answers. You will be able to provide feedback to the student at the end if you are rejecting the form.

Student Application for Research Ethics Approval.

This form is applicable to all types of student dissertation or research project. You should consult with your supervisor before completing this form.

Ethical Approval is delegated to the students' supervisor and can only be given for **low risk research projects.**

This form should take you around 30 minutes to complete, depending on the type of research you are planning.

You will be guided through the form and asked to confirm a number of statements to ensure that your research is eligible for review as low-risk. We hope that this form helps you think about the ethical dimensions of your research.

You will be notified of the outcome via email when your Research Ethics Form has been reviewed by your supervisor.

You must not start any data collection before Ethical Approval has been granted. Please note: submission of this form does not mean that the research has been granted ethical approval. Your supervisor will review and approve this form.

Once approved, you must upload confirmation of your Ethics Approval to my.wbs. You must also include a copy of your Research Ethics Approval as part of your final submission.

Q42.

Research Ethics Online Training Certificate

In order to prepare you for your Research Ethics application, you must have completed your Research Ethics Training moodle before you submit this form. This is a University requirement, and all staff and students delivering research are required to complete the concise version of the Epigeum Training Programme as a minimum. There will be elements of this training which you will find helpful to support you with your research, as well as elements aimed at full-time researchers.

You will find the Epigeum online training moodle here: https://warwick.ac.uk/services/ris/research-integrity/training/online-training/

Please upload your certificate of completion here before continuing.

[Click here]

Q77. Which type of programme are you enrolled on at WBS?

- Full-time Masters (MSc)

Q7. Which course are you enrolled on at WBS?

- MSc Finance (MSF)

Q8. Please select your Programme Team email address below
Please check that this is correct, based on your course selection. We will use this to notify your Programme Team of your Research Ethics submission and outcome.

- FinancePG@wbs.ac.uk

Q96.

Student details

Please enter your details below very carefully, as we will use this information to notify you of your Research Ethics Form outcome. Please make sure you only use your Warwick student email address e.g. firstname.surname@warwick.ac.uk

Student 1 Full name	Shreyas Urgunde
Student 1 Email address (@warwick.ac.uk)	shreyas.urgunde@warwick.ac.uk
Student 1 ID Number (without "u")	5582804
Student 2 Full name	N/A
Student 2 Email address (@warwick.ac.uk)	N/A
Student 2 ID Number (without "u")	N/A
Student 3 Full name	N/A
Student 3 Email address (@warwick.ac.uk)	N/A
Student 3 ID Number (without "u")	N/A

Q10.

Supervisor details

You will find this information on the supervisor allocation email from your Programme Team.
Please make sure that you enter this correctly, as we will use this to request your Research Ethics Approval.
Please do not submit this form if you have not been allocated a supervisor yet.

What is the name of your allocated supervisor?
Philippe Mueller

Q11. Please enter your supervisor's email address.

You will find this information on the supervisor allocation email from your Programme Team. Please make sure that you double-check and enter this correctly, as we will use this to request your Research Ethics Approval.

Philippe.Mueller@wbs.ac.uk

Your Research

You will be guided through the next set of questions about your planned research to determine whether your research is eligible for low-risk review, or even REF waiver.

Completing this form should be a useful exercise to support you in planning your research, by prompting you to think carefully about aspects of your research methodology.

Some of the questions presented to you will be determined by your answers to previous questions so please make sure that you check all your answers as you go.

Please provide as much information about your research as possible. There is additional guidance for completing this form available in your Student Handbook.

Q12. What is the current title for your research?

How does the European Central Bank's (ECB) narrative tone (hawkish/dovish) influence the volatility of corporate bond spreads in the Eurozone, and evaluating this relationship across different parameters

Q13. What are your research aims?

My primary objectives are to:
- Quantify the impact of ECB narrative tone (hawkish/dovish) on corporate bond spread volatility.
- Evaluate asymmetries in this relationship during crisis versus non-crisis periods.

Q90. Please tick all of the research methods below that you plan to utilise:

- Secondary data analysis (previously existing datasets)
- Literature-based research or documentary analysis

Q91. Which type of secondary data will you be using in your research? Please tick all options which are relevant:

- Previously existing datasets where individual-level information is not provided
- Previously existing datasets where individual level data is provided but individuals cannot be identified

Q17. Your research may be eligible for a REF waiver.

Please tick to confirm that your research will <u>not</u> include any of the following:

- Questionnaires or surveys
- Interviews or oral histories
- Laboratory or field experiments
- Analysis or use of any kind of social media
- Ethnography or observation
- Collection of individual-level information relating to human subjects (including, in some circumstances, deceased human subjects)
- Any other methodology that involves live human participants or their data

Q39.

Data Analysis

Please specify the data analysis method(s) for your research design.

Please explain:

- **Which analysis methods you will use for your research? E.g. content analysis, framework analysis, interpretative phenomenological analysis etc. and any statistical analyses.**
- **Will you be using any software for the analysis, and how will it be used?**

My data analysis will primarily involve various panel data techniques, complemented by textual analysis of European Central Bank speeches to capture underlying sentiments.
While I expect to mainly use Python, I may also use STATA or R for conducting regression analyses if necessary.

Q40.

Student declaration for Ethical Approval.

In order to ensure that you have accessed the relevant information and guidance on research integrity, and that the information you have provided is accurate, please tick to confirm that you agree with the statements below:

- The information in this form together with any accompanying information is complete and correct to the best of my knowledge and belief, and I take full responsibility for it.
- I have accessed the necessary training about research ethics and have consulted my supervisor to confirm that the data sources I intend to access are acceptable.
- I undertake to abide by the University of Warwick's Research Code of Practice and other relevant professional and University policies, regulations, procedures and guidelines in undertaking this research.
- I confirm I am familiar with and will conduct my research in line with the University's Data Protection Policy including General Data Protection Regulation (GDPR) and Data Protection Act 2018 (DPA 2018). I will report any data breaches to the University's Information and Data Director: dpo@warwick.ac.uk
- I understand that I must not begin any research until I have received ethical approval from the supervisor to proceed.
- I understand that any changes that I would like to make to this study after receiving approval from WBS, require further review. As such they must be submitted via a new Research Ethics Form before such changes are implemented.

Click Next to submit your Research Ethics Form. You will not be able to return and edit your responses once you submit.

Your responses will be automatically sent to your supervisor for review.

Supervisor outcome

Q41.

Please select which outcome you are providing for this Research Ethics Approval form.

All supervisors must grant or waive ethical approval for their student's research project BEFORE the student carries out data collection.

- Research Ethics Form waiver approved - ethical approval not required

Q52. Please confirm that you have seen and checked that the following documents have been submitted. You can view these from the response summary included in the email sent requesting your review.

Research Integrity Epigeum Training Certificate (all students)	Checked

Q88. Please sign to confirm that you believe that the student (or SCP group) has fully considered the ethical dimensions of their proposed research, and that the project is eligible for a Research Ethics Form Waiver, which you are granting. This means that research ethics approval is not required and you are happy for the student to continue with the research.

Embedded Data:

Q_URL	https://wbs.qualtrics.com/jfe/form/SV_1Rjpdf1wRHmhthI?Q_R=R_2eP1cHYytpSb788