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ECB's evolving communication and policy preferences since 2021 strategy review

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ECB's Evolving Communication and Policy Preferences Since 2021 Strategy Review*

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March 11, 2025

Abstract

We study the evolution of the European Central Bank's (ECB) monetary policy since July 2021, following the adoption of a new strategy and amid a period of volatile inflation. Utilizing text analysis, we assess changes in the general sentiment of the ECB's communication. Additionally, we employ topic modeling to develop an inflation focused tone index. By integrating these tone indices with real-time data from monetary policy meetings, we directly estimate the ECB's loss function. Our findings indicate a recent shift towards a more inflation-centered communication approach by the ECB. Preliminary results also suggest that the ECB's policy preferences have become more symmetric since July 2021.

Keywords: asymmetric loss function, central bank communication, textual analysis, topic model, optimal monetary policy

JEL codes: E31, E52, E58

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1 Introduction

The Governing Council of the European Central Bank (ECB) adopted a new monetary policy strategy in July 2021. The aim of the strategy review was to make the ECB's monetary policy fit to the changing economic landscape and future challenges. The strategy review covered a wide range of issues expected to impact monetary policy, from low natural interest rates to digitalization, globalization, and climate change, but the most important change was the introduction of the new definition of price stability. Another essential change was the revision of monetary policy communication strategy, which is an essential tool in monetary policy making.

The ECB has revised its definition of price stability a few times over the years. Originally, in 1998, the ECB Governing Council defined price stability as a *'year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%'*. In 2003, the Governing Council further clarified that *'in the pursuit of price stability it aims to maintain inflation rates below, but close to, 2% over the medium term'*. When the Governing Council redefined the definition in July 2021, it stated that *'price stability is best maintained by aiming for two per cent inflation over the medium term and commitment to this target is symmetric (negative and positive deviations from this target are equally undesirable)'*. The new inflation aim emphasized the importance of considering the implications of the effective lower bound (ELB). It also highlighted the need for 'forceful or persistent' monetary policy measures to prevent negative deviations from the inflation target becoming entrenched and allowed for the possibility of inflation running temporarily and moderately above the target.[1] Overall, the new strategy marked a significant departure from the previous approach, which aimed for an asymmetric 'close, but below 2%' inflation target and did not explicitly address the ELB problem.

The focus of the revised monetary policy communication strategy is on clear and effective

[1] `https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_monpol_strategy_statement.en.html`

communication to different audiences, especially to the general public. As with the old strategy, the ECB's current communication is based on press releases, press conferences after monetary policy meetings, the Economic Bulletin, and the monetary policy accounts, which are published with a delay after monetary policy meetings. Since July 2021, the ECB Governing Council has released monetary policy statements in press conferences instead of introductory statements. The new statements, which are more streamlined than the earlier ones, focus on an integrated narrative.

This paper compares the ECB's monetary policy communication and policy preferences during the old and new monetary policy strategies by investigating the introductory statements from January 1999 to June 2021 and monetary policy statements from July 2021 to July 2024. These statements are the most formal part of the ECB's qualitative communication, as they reflect the views of all members in the Governing Council at the time of monetary policy decision making. Applying the ECB-specific dictionary developed by Haavio et al. (2024), we construct the overall text tone (sentiment) index of the ECB's communication to examine how the ECB's views on the state of the economy have evolved over time. Using topic modeling, we also construct the inflation-specific text tone index to assess whether and how the recent inflation surge and subsequent inflation decrease contributed to changes in the ECB's communication. We combine the two tone indices with real-time information available at the monetary policy meetings and directly estimate the ECB's loss function during the old and new strategies.

We find that since July 2021, the ECB's communication has clearly reflected changing inflation and economic developments. New terms such as 'energy', 'food' and 'war' have appeared and are frequently used in the monetary policy statements, reflecting key drivers of inflation and the economy. The ECB's communication has become more inflation-centered and the ECB's dissatisfaction with both the state of the economy and inflation has increased to record high levels. But, most importantly, we also find suggestive evidence that the ECB's preferences for inflation have become more symmetric since July 2021, in line with the new

strategy.

The rest of the paper is organized as follows. Section 2 describes recent changes in the ECB's monetary policy communication, and Section 3 provides suggestive evidence on the impact of new strategy on the ECB's preferences. Section 4 concludes.

2 Recent changes in the ECB's monetary policy communication

In this section, we compare the ECB's monetary policy communication during the old and new monetary policy strategies.

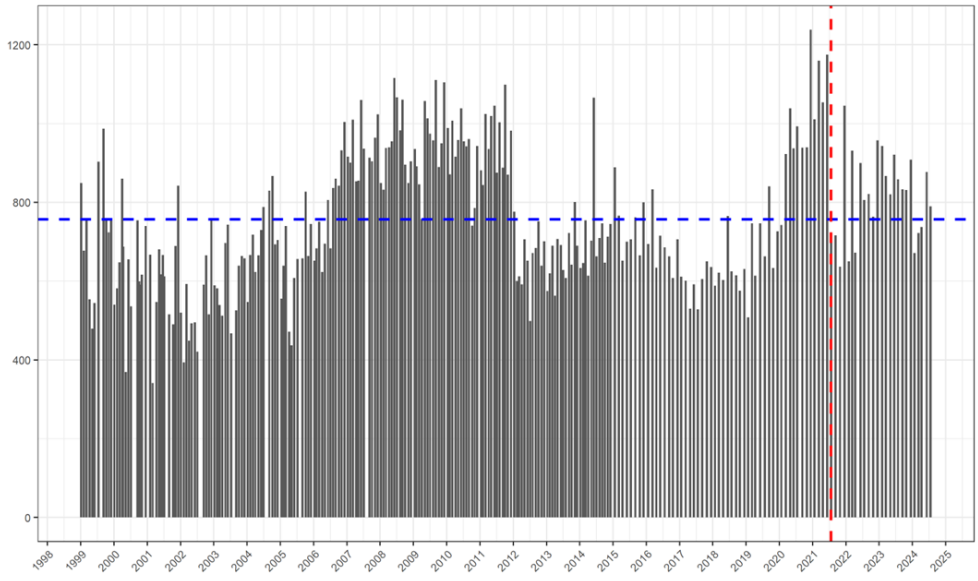

Figure 1: Number of words in each monetary policy statement, with the average word count (blue line) and the introduction of the new strategy in July 2021 (red line)

Strategy	Number of words
Whole sample	757.02
Old strategy	750.74
New strategy	815.76

Table 1: Number of words

The ECB Governing Council had a monetary policy meeting every month until December 2014, but then eight times a year, as shown in Figure 1. The number of words in these statements was relatively high during the financial crisis and in the middle of the pandemic, but shorter statements were published in 2012–2019 during the low inflation period. Table 1 indicates that the average number of words has been somewhat higher during the new strategy than during the old strategy. This is likely to reflect very volatile inflation and rapidly changing economic conditions (for example, the pandemic, the post-pandemic recovery, and the illegal war by Russia in Ukraine).

We are especially interested in the segments of the introductory statements and monetary policy statements which discuss inflation. To identify these segments, we apply topic modelling. Roughly speaking, the main idea of topic modelling is that segments of text that share the same vocabulary are likely to belong to the same topic. Specifically, we extract paragraphs from the introductory statements related to inflation using Latent Dirichlet Allocation (LDA), as introduced by Blei et al. (2003).[2] Although LDA, as a Bayesian model, requires subjective decisions when defining priors, it still reduces subjectivity compared to laborious manual classification, as it does not predefine which words describe each topic.[3]

We apply topic modelling separately to the introductory statements until June 2021 and to the monetary policy statements since July 2021. In both cases, we set the total number of topics to 8.

Figure 2 presents the topics identified by LDA and lists the 10 most common words within each topic. The probabilities indicate how likely a given word is to appear in a specific topic. We choose topics #3 and #6 as inflation texts during the old strategy. In both topics, 'inflation' is the second most common word. In addition, 'price stability' and 'medium term'

[2]LDA is a hierarchical Bayesian model for dimensionality reduction that summarizes documents as a mixture of topics and topics as a mixture of words. The basic idea of LDA is to define a probability for each word in a corpus of being generated from a specific topic and to define each document as a distribution over a collection of topics. As a result, each word w in a document d is allocated into a topic k based on the topics present in the document. The allocation is determined by how frequently the word w appears in a particular topic k. LDA model assumes exchangeability and thus is a bag-of-words method.

[3]We use Gibbs sampling method and set the hyperparameters α and β, controlling the distribution of topics per document, and the distribution of words per topic, to 0.05.

are among the most common words and expressions in topic #3, whereas 'price' and 'hicp' are among the top 10 words in topic #6.

Regarding the new strategy, we choose topics #2, #3, #4 and #6 as inflation texts. Both the increasing number of topics and the change in the top-10 words reflect changes in the ECB's communication after July 2021. Naturally, 'inflation' is still very important word in inflation-focused segments (the most common word in topics #2 and #3), but the words 'energy' and 'food' are now included in topic #2 and the words 'energy' and 'war' in topic #8. It is noteworthy that the highest probability of the word 'inflation' in topic #2 during the new strategy is 0.10, which is significantly higher than the highest probability of the word 'price' in topic #6 during the old strategy.

Overall, Figure 2 reveals that the ECB's communication has clearly reflected changing inflation and economic developments since July 2021.

Strategy	**Average share of inflation texts (%)**
Whole sample	36.77
Old strategy	34.83
New strategy	55.20

Table 2: Average share of inflation texts

Based on the above topic modelling analysis, Table 2 reports the average fractions of inflation texts (i.e., paragraphs assigned to inflation topics) in the whole period and the two sub-periods. It clearly indicates increasing inflation orientation in the ECB's communication after July 2021 compared to the earlier history. In fact, as shown in Figure 3, the fraction of inflation texts is over 50% in all monetary policy statements since 15 December 2022, and the maximum fraction, 71.6%, is measured on 4 May 2023, when the latest observed monthly HICP inflation rate was 7.0% and the ECB Governing Council continued to tighten the monetary policy by hiking the rates by another 25 basis points.

Next, based on the ECB-specific dictionary developed by Haavio et al. (2024)[4] we define

[4]To capture the style and terminology in the ECB's monetary policy communication, Haavio et al. (2024)

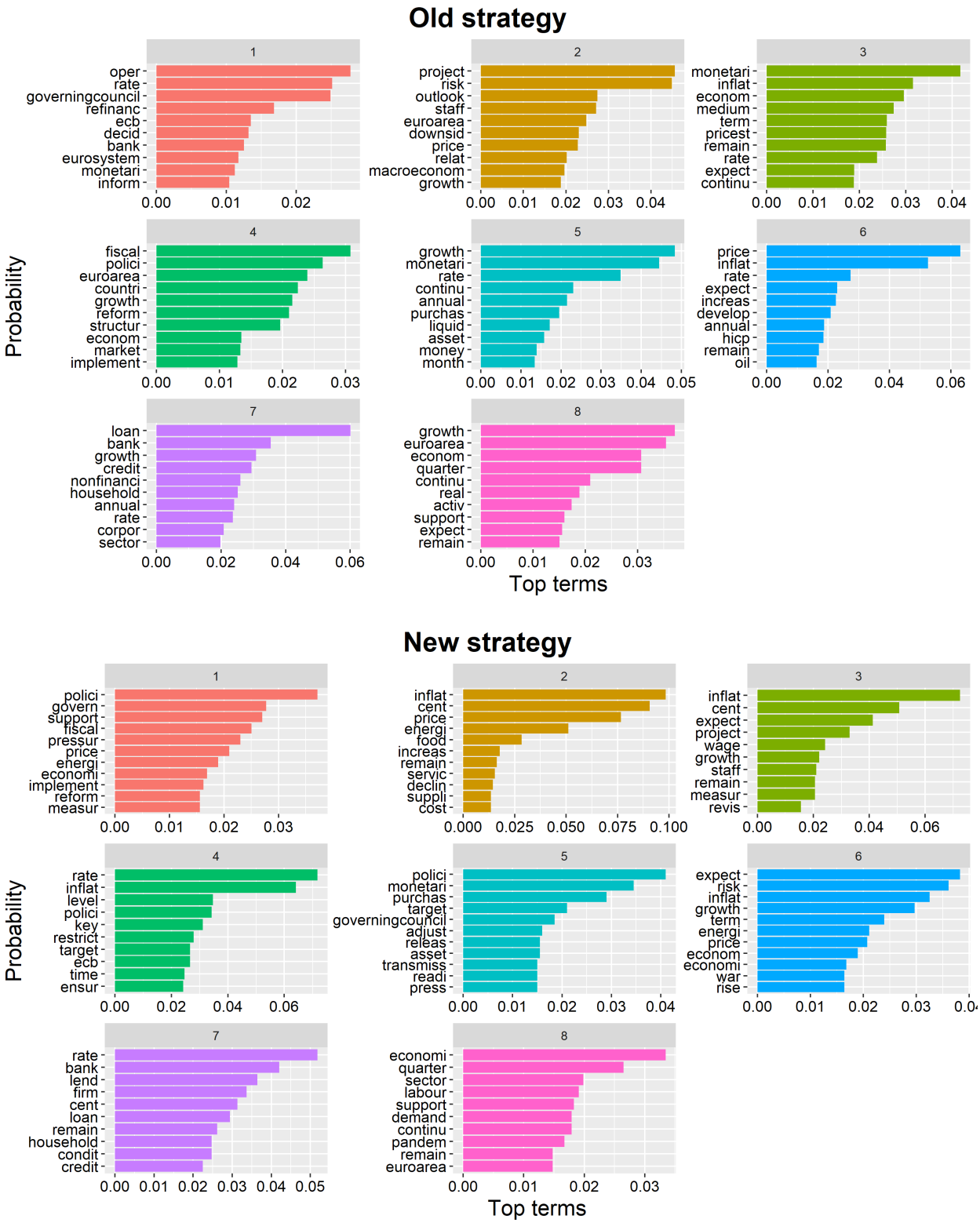

Figure 2: Topics discovered by LDA model

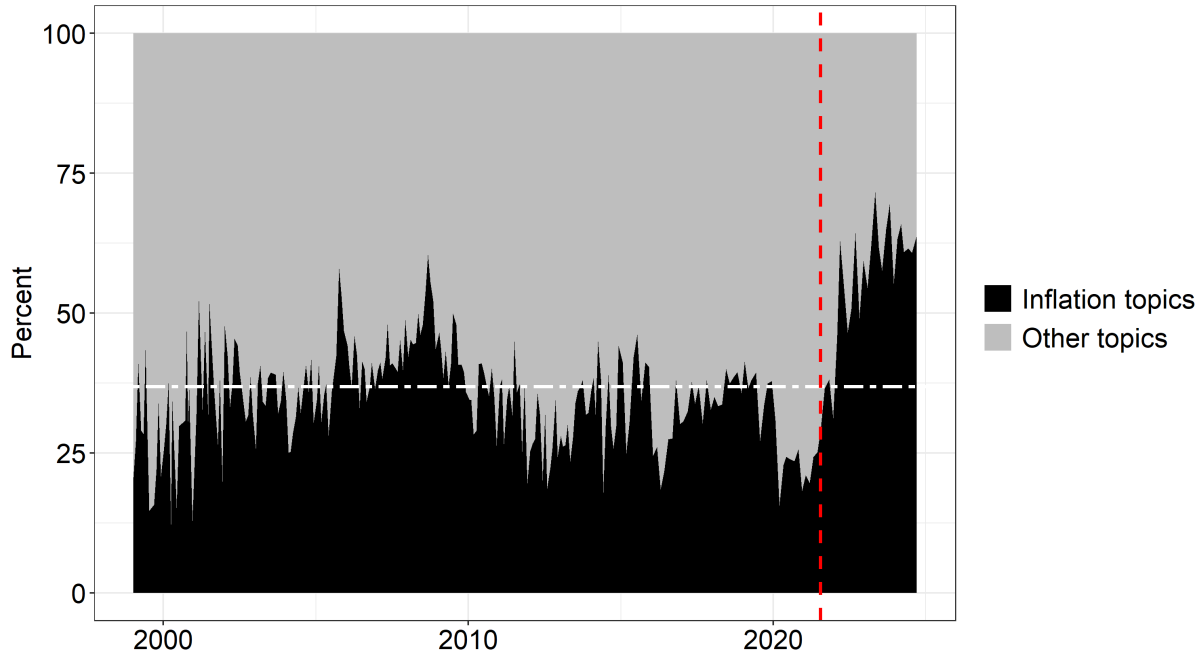

Figure 3: Fraction of inflation texts and average fraction (white). New strategy starting July 2021 (red).

the tone in the ECB's communication as the difference between the number of negative words ($\#Neg$) and positive words ($\#Pos$), normalized by the total number of words in the introductory/monetary policy statement ($\#Tot$). Hence, the tone index increases with negative sentiment, reflecting the net negative percentage of the total corpus:

$$Tone_t = \frac{\#Neg_t - \#Pos_t}{\#Tot_t}. \tag{1}$$

Similarly, we define the tone index for inflation-related texts as:

develop a new ECB-specific dictionary by tailoring the Loughran and McDonald (2011) finance-specific dictionary. Tailoring involves several modifications: updating the dictionary to include British spellings, reclassifying certain words (e.g., 'stability,' 'efficiency,' 'lag') from positive or negative to neutral based on their context in ECB texts, and including common two- and three-word phrases (bigrams and trigrams) involving sentiment words. The Loughran and McDonald (2011) dictionary has been used in a number of studies that analyse central bank communication (see e.g. Tillmann and Walter (2019), Baranowski et al. (2021), Schmeling and Wagner (2024)). In particular, Shapiro and Wilson (2022) use the dictionary in their work, where they apply text analysis to estimate the policy preferences of the Federal Reserve.

$$Tone_t^{\pi} = \frac{\#Neg_t^{\pi} - \#Pos_t^{\pi}}{\#Tot_t^{\pi}}, \tag{2}$$

where $\#Neg^{\pi}$ is the number of negative words, $\#Pos^{\pi}$ is the number of positive words, and $\#Tot^{\pi}$ is the total number of words in the inflation-focused part of the introductory/monetary policy statement.

Figure 4 shows the evolution of the two tone indices and the HICP inflation rate since January 1999. Overall, both indices indicate that during the recent inflation surge, the ECB's dissatisfaction with the state of the economy and inflation was at the same record-high level as during the Great Financial Crisis. During the old strategy, the two indices are closely related even though some differences are occasionally observed (see e.g., the year 2017). Instead, during the latter period, the correlation between the two indices is very high.[5] A large upward jump in both tone indices after July 2021 is associated with a rapid increase in inflation and Russia's attack on Ukraine in February 2022 as illustrated in Figure 4. Subsequently, as inflation eased, the tone became less pessimistic quite rapidly, albeit it has remained clearly in negative territory.

Figures A.1 to A.4 in the Appendix illustrate the top 10 most frequent sentiment words since July 2021. According to these figures, the ECB often uses positive words such as 'strength', 'robust', 'smooth', and 'confident'. Conversely, frequently used negative words include 'bottlenecks', 'weaker', 'weak', and 'tensions'. Compared to the corresponding top 10 words before July 2021, as documented in Haavio et al. (2024), many commonly used terms, such as 'unjustified', 'shortages', 'conflict', and 'crisis', reflect exceptional economic and geopolitical conditions.

[5]The correlation between the whole text tone and the inflation text tone is 0.77 (0.66) during the latter (former) period.

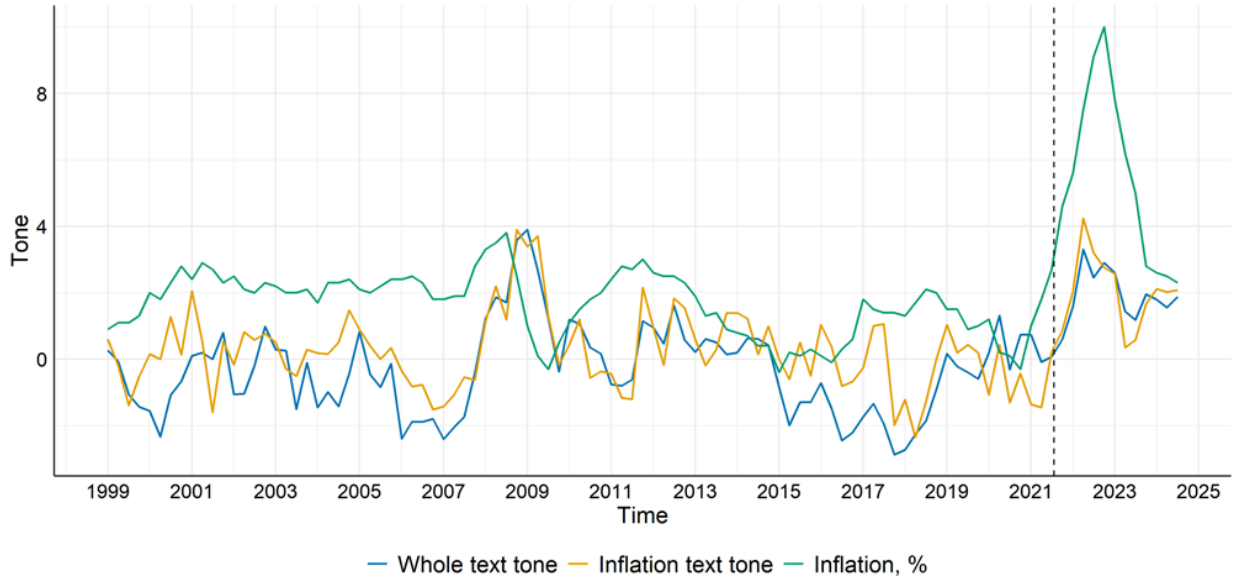

Figure 4: Lexicon-based whole text tone and inflation text tone indices, with HICP inflation. The new strategy is represented by a dashed vertical line. Note: The tone measures the net negativity of the ECB's communication. Hence, positive (negative) values of the tone indices indicate that the ECB is dissatisfied (satisfied) with the state of the economy or inflation. Note: For clarity the tones are aggregated to quarterly levels.

3 Suggestive evidence on the impact of the new strategy on the ECB's preferences

The ECB's Governing Council's new monetary policy strategy marked a significant change from the previous strategy, which aimed for an asymmetric "close, but below 2%" inflation target and did not explicitly address the ELB problem. Our results from Haavio et al. (2024)[6] suggest that during the period 1999–2021, i.e., prior to the new strategy, the departure of the

[6]Haavio et al. (2024) directly estimate the ECB's loss function and they find that asymmetric preferences are robust across various specifications, including different sets of control variables and alternative measures of inflation (e.g., the latest inflation observation, the average of the two latest observations, or the average of current inflation and the one-quarter-ahead forecast). It also holds under different text selections (whole introductory statements vs. inflation-focused segments) and alternative tone measures (based on e.g., ECB-specific dictionary, FinBERT language model of Araci (2019), or Central Bank RoBERTa language model of Pfeifer and Marohl (2023), as well as the Economic Outlook Index of Picault and Renault (2017)). Furthermore, our findings are consistent across various loss functions (piecewise linear, i.e., V-shaped, or linear-exponential, i.e., U-shaped), data frequencies (meeting-based or quarterly), and sample periods (full sample; excluding the effective lower bound (ELB) period; excluding the Financial Crisis and the Great Recession; or starting from May 2003). Asymmetric results is also true for forward-looking and backward-looking statements.

ECB's preferences from symmetry was significant: the slope of the (V-shaped) loss function was at least three times steeper when inflation was above the target than when it was below the target.

An obvious question is whether the new monetary policy strategy changed the ECB's preferences. The answer to this question at this stage can be only tentative since the inflation environment changed abruptly, monetary policy faced difficult trade-offs and uncertainties, and the number of data points to compare the old and new strategies is very limited. Nevertheless, we make a first attempt to shed light on the issue by using Haavio et al.'s (2024) approach and evaluating the ECB's loss function during the period July 2021 – September 2024.

During the new strategy inflation values are predominantly above 2%. Therefore, our comparison is based on Equation (3), which includes several dummy variables. In the estimation, we use both the whole text and inflation text tones as the dependent variable:

$$\begin{aligned} Tone_t = \alpha &+ \delta_{A,New} \times D_{New,t} \times D_{High,t} \times Inflation_t \\ &+ \delta_{A,Old} \times (1 - D_{New,t}) \times D_{High,t} \times Inflation_t \\ &+ \delta_{B,Old} \times (1 - D_{New,t}) \times (1 - D_{High,t}) \times Inflation_t \\ &+ \beta' \mathbf{z}_t + \varepsilon_t \end{aligned} \tag{3}$$

In this equation, $D_{New,t}$ is a dummy variable that equals 1 if the observation is from the period after the new strategy was implemented, and 0 otherwise. Similarly, $D_{High,t}$ is a dummy variable that equals 1 if inflation is above the 2% target, and 0 otherwise. The coefficients $\delta_{A,New}$, $\delta_{A,Old}$ capture the loss function's right side of the slope during the new and old strategies, respectively, while $\delta_{B,Old}$ captures the left-side slope. The vector $\mathbf{z}_t$ represents control variables.

We employ an F-test to assess whether the coefficients for inflation above the target are equal under the old and new strategies (i.e. we test if $\delta_{A,New} = \delta_{A,Old}$). Furthermore, we use another F-test to determine whether the absolute value of the slope of the loss function

above the inflation target during the new strategy differs from the absolute value of the slope below the target under the old strategy (i.e. we test whether $\delta_{A,New} + \delta_{B,Old} = 0$).

Before going to the detailed estimation results (reported in Tables 3 and 4 below), we first illustrate some of our findings in Figure 5 (which corresponds to results reported in column (1) of Table 3). The figure conveys two main pieces of evidence. First, the observations (inflation-sentiment pairs) corresponding to the new strategy lie predominantly below the right arm of the loss function estimated under the old strategy. Second, in the proximate right arm of the loss function under the new strategy the slope is less steep and in fact not much steeper than the left arm of the loss function under the old strategy. This suggests at least tentatively more symmetric policy preferences after July 2021, in accordance with the ECB's new strategy.

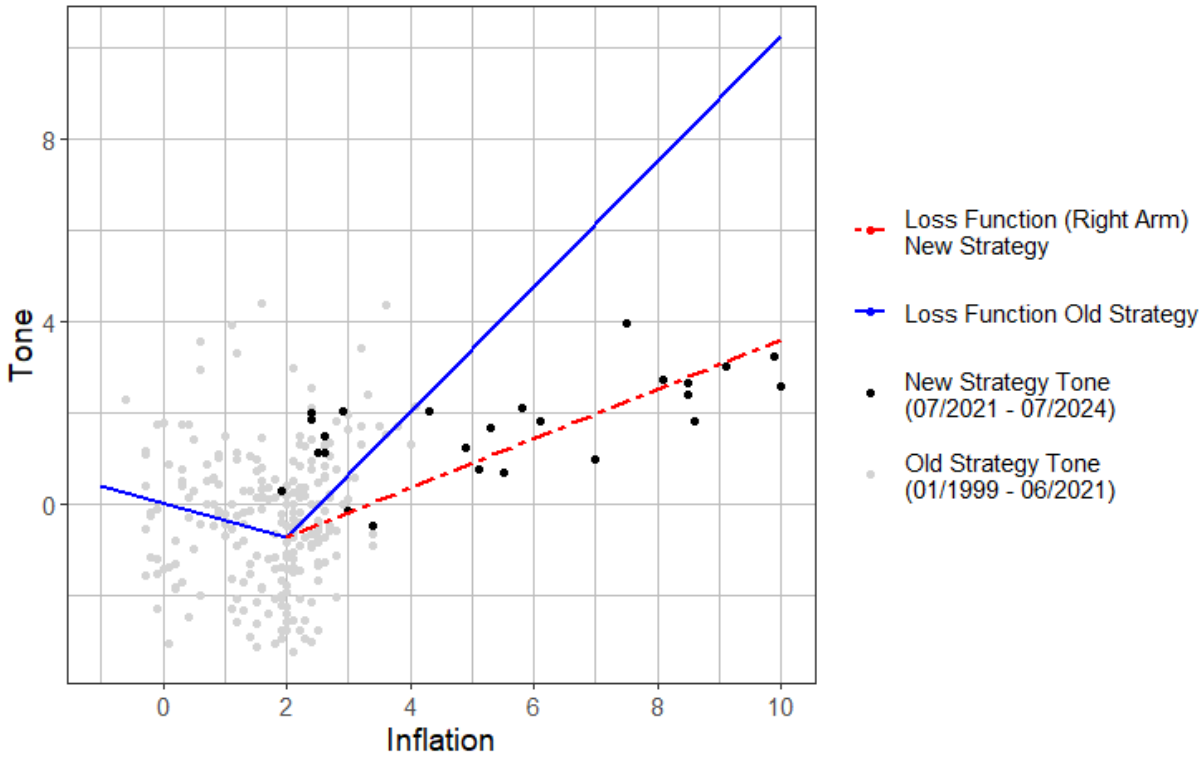

Figure 5: *Comparing the relationship between the tone and inflation under the ECB's old and new strategy. Notes: The tone is computed with the lexicon-based method, applied to whole introductory statement texts. The tone measures the net negativity of the ECB's communication. Hence positive (negative) values of the tone indicate that the ECB is dissatisfied (satisfied) with the state of the economy.*

Evidently, the tone of the ECB's communication under the new strategy has been influenced by the changing environment, such as the COVID-19 pandemic and the Russian invasion of Ukraine. These confounding factors complicate the comparison of the loss function under the old and new strategies. To address these issues, the set of control variables is augmented by indicators relevant to interpreting and understanding recent developments. These indicators include the Geopolitical Risk Index by Caldara and Iacoviello (2022), the Economic Policy Risk Index by Baker et al. (2016), computed for the four largest euro-area member countries, and the Global Supply Chain Pressure Index published by the Federal Reserve Bank of New York. We also include more standard real-time economic indicators (euro area industrial production and unemployment rate) and financial market variables (spreads of 6-month Euribor swaps and euro area corporate bond yields over euro area government bond yields, or 'swapspread' and 'corpspread', respectively) as control variables.

Tables 3 and 4 present the estimation results. Each specification employs a linear ordinary least squares (OLS) regression model, with the tone measure as the dependent variable. In Table 3, column (1) shows that during the new strategy, the inflation coefficient above the target (0.540) has been significantly lower compared to the old strategy (1.333), confirming the finding of Figure 5. This finding remains valid when control variables are added in columns (2) and (3). The F-test p-values further confirm these findings, reinforcing the statistical significance of the difference.

Table 4 reports similar results for the inflation text tone. Column (1) shows that the coefficient for above-target inflation remains lower under the new strategy (0.426) compared to the old strategy (0.920). This result holds when control variables are included and is supported by the F-test, with one exception (in column (3)).

Overall, these results indicate that the loss function has become less asymmetric, in the sense that the right arm (above the inflation target) seems to be less steep under the new strategy than under the old strategy. The initial evidence illustrated in Figure 5 also suggests that the right arm of the loss function under the new strategy is perhaps not much

Table 3: V-shaped loss function, lexicon based whole text tone

	Tone		
	(1)	(2)	(3)
Inflation below target (old strategy)	−0.362***	−0.208*	0.065
Inflation above target (old strategy)	1.333***	1.191***	0.779***
Inflation above target (new strategy)	0.540***	0.617***	0.382***
Industrial production (log-diff)		−9.942*	−1.454
Unemployment (diff)		8.959***	4.805***
Swapspread			−0.256
Corpspread			0.541***
Economic policy uncertainty (EPU)			0.537***
Geopolitical risks			0.108
Supply chain disruptions			0.026
Constant	−0.695***	−0.576***	−2.191***
Observations	264	264	240
R^2	0.229	0.381	0.535
Adjusted R^2	0.220	0.369	0.515
F-test p-value, Inf. above new str. = Inf. above old str.	0.001***	0.009***	0.065*
F-test p-value, Inf. above new str. = - Inf. below old str.	0.193	0.001***	0.000***
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 4: V-shaped loss function, lexicon based inflation text tone

	Tone		
	(1)	(2)	(3)
Inflation below target (old strategy)	−0.169	−0.077	0.071
Inflation above target (old strategy)	0.920***	0.839***	0.486**
Inflation above target (new strategy)	0.426***	0.477***	0.369***
Industrial production (log-diff)		−13.393***	−7.791
Unemployment (diff)		5.244***	2.221
Swapspread			−0.091
Corpspread			0.441***
Economic policy uncertainty (EPU)			0.359**
Geopolitical risks			−0.016
Supply chain disruptions			−0.151*
Constant	0.014	0.084	−1.062***
Observations	264	264	240
R^2	0.172	0.256	0.385
Adjusted R^2	0.162	0.242	0.358
F-test p-value, Inf. above new str. = Inf. above old str.	0.027**	0.091*	0.600
F-test p-value, Inf. above new str. = - Inf. below old str.	0.045**	0.001***	0.001***
Note:			*p<0.1; **p<0.05; ***p<0.01

steeper than the left arm of the loss function under the old strategy. However, there is less support for this 'perfect symmetry' from a more comprehensive analysis which includes the control variables: the null hypothesis that $\delta_{A,New} + \delta_{B,Old} = 0$ is rejected by the F-test in all specifications, apart from one (the exception is column (1) in Table 3, corresponding to Figure 5). But obviously new data with inflation below 2% would be needed to estimate the left arm under the current strategy and to infer whether or not the loss function is symmetric.

4 Conclusions

We find that the ECB's communication has become clearly more inflation-centered and negative since July 2021, following the adoption of the new monetary policy strategy and during the rapid rise and fall in inflation. We have also shed some light on the question of whether the ECB's preferences have become more symmetric since July 2021, after the adoption of the new strategy. The answers to the latter question are tentative at this stage, since the economic environment changed and difficult policy trade-offs emerged almost immediately after the summer of 2021.

The ECB is currently assessing its monetary policy strategy, focusing, inter alia, on the implications of the changed inflation and economic environment for the monetary policy strategy. While the starting point of the strategy review is that there is no need to make changes to the symmetric, medium-term oriented 2% inflation target, there will be a review of the lessons learned from the low and high inflation periods. This includes the operationalization of the medium-term orientation of the monetary policy, and an analysis of the ECB's reaction function to both upside and downside inflation threats.[7] The 2025 strategy review will also assess the ECB communication.

[7] See Lane's speech on 16 September 2024: `https://www.ecb.europa.eu/press/key/date/2024/html/ecb.sp240916~c0eff5db57.en.html`

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Appendix

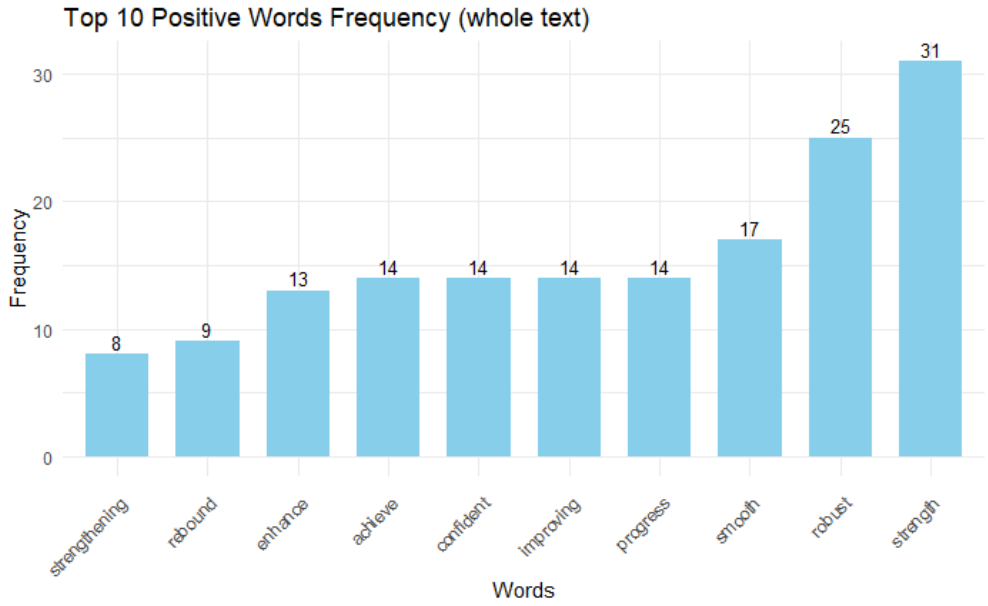

Figure A.1: Top 10 positive sentiment words in whole monetary policy texts

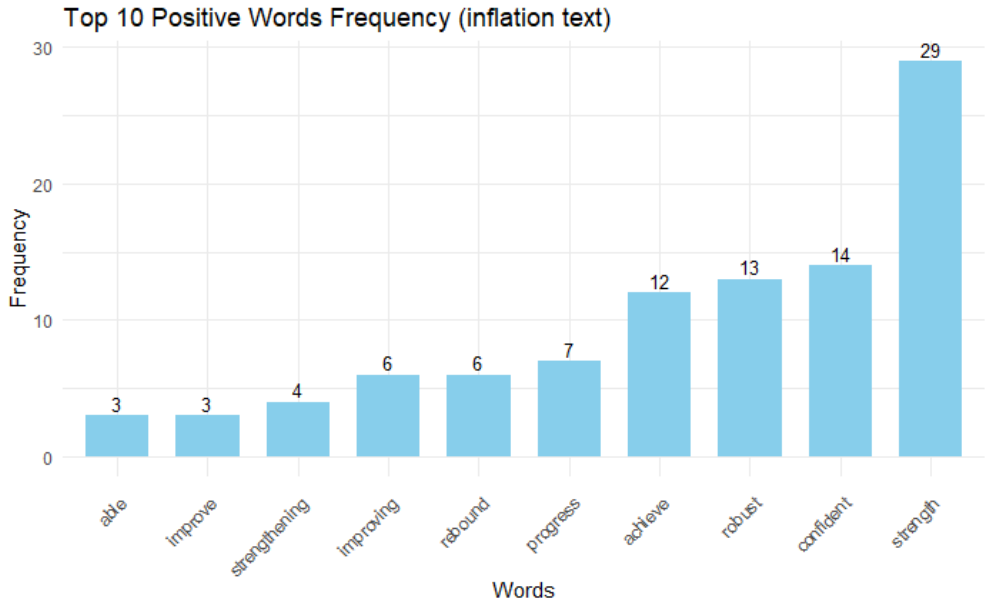

Figure A.2: Top 10 positive sentiment words in inflation monetary policy texts

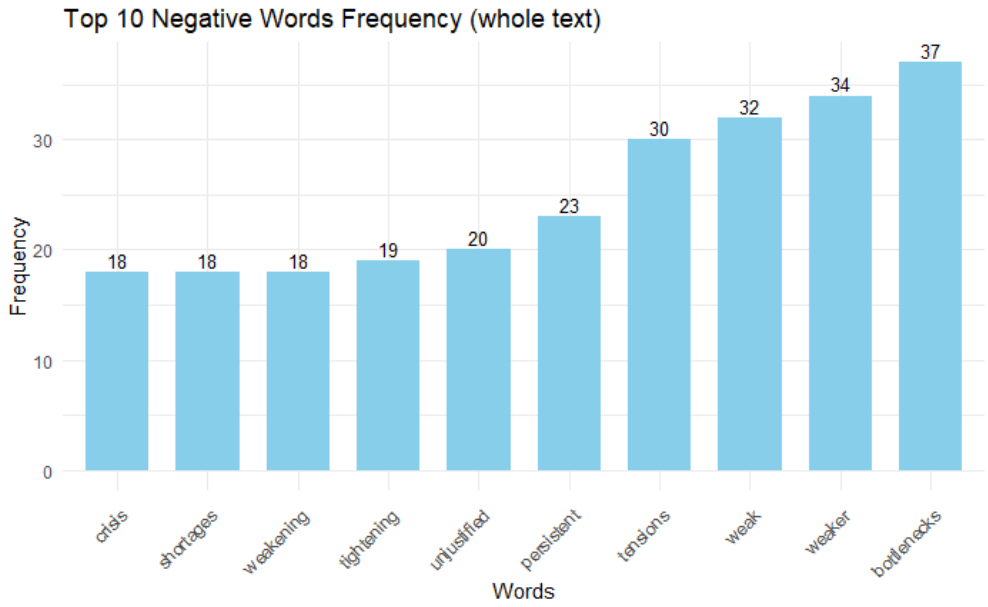

Figure A.3: Top 10 negative sentiment words in whole monetary policy texts

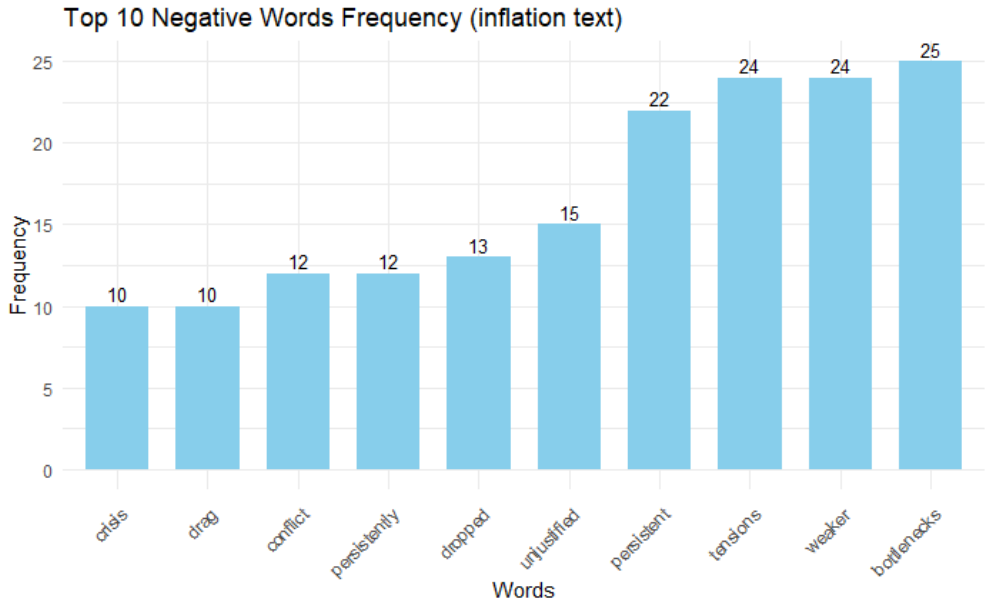

Figure A.4: Top 10 negative sentiment words in inflation monetary policy texts

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