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What analysts hear and why it matters for monetary policy

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Abstract

We introduce a novel measure of how European Central Bank (ECB) monetary policy is interpreted by analysts at major investment banks. We construct a "policy interpretation shock" based on the language used in analysts' reports covering monetary policy decisions by the ECB's Governing Council (GovC). The main identifying assumption is that changes in the way analysts report on policy communication by the GovC—that is, the change in the policy tone from the preview *report to the* recap *report—reflect unexpected information revealed by the policy event. Using GPT-based sentiment extraction, we show that the tone in these reports closely tracks that of the GovC, often even anticipating shifts in tone. Changes in the policy tone before and after meetings capture how market intermediaries interpret and adjust their assessment of policy decisions. These interpretation shocks are followed by contractionary macroeconomic responses and systematic movements in financial-market prices. These findings underscore the important role of communication in shaping expectations and influencing economic outcomes.*

JEL codes: E52, E58, E44

Keywords: Monetary policy communication, large language models, analyst reports

Non-technical summary

Monetary policy decisions influence the economy not only through changes in interest rates, but also through communication. How financial markets interpret central bank communication can shape expectations about the future path of monetary policy. This paper asks how policy communication is interpreted by market intermediaries, and why this matters, assessing reports written by analysts at major investment banks following monetary policy decisions by the European Central Bank's (ECB) Governing Council (GovC).

Most banks publish "preview" reports before ECB Governing Council meetings and "recap" reports shortly afterwards. Preview reports describe analysts' expectations for the upcoming monetary policy decision, while recap reports assess the decision and update their outlook for monetary policy. Crucially, these reports set out analysts' expectations about the interest-rate decision itself, but also the rationale offered by the GovC and the likely tone of communication, as well as how the decision leads them to revise their outlook for future policy decisions. By comparing the language used in these reports before and after each decision, we construct a measure of how analysts interpret ECB monetary policy decisions.

Using a large language model, we evaluate whether analysts interpret the monetary policy stance as more "hawkish" or more "dovish" than expected. We define policy interpretation shocks as unexpected changes in analysts' assessment of the ECB's monetary policy stance between preview and recap reports, after removing the component associated with revisions in their views of inflation and economic activity.

Hawkish interpretation shocks lead to a decline in economic activity, prices and employment in the euro area over the following years. The size and direction of these effects are broadly similar to those generated by standard interest rate shocks. Financial markets appear to play a key role in transmitting these effects: hawkish interpretation shocks are followed by increases in short-term interest rates and a delayed appreciation of the euro.

These interpretation shocks capture an additional dimension of monetary policy news. We find that interpretation shocks are only weakly to moderately correlated with standard measures of monetary policy surprises derived from financial market data. Rather than simply reflecting market pricing, analysts interpret and contextualise policy decisions for investors.

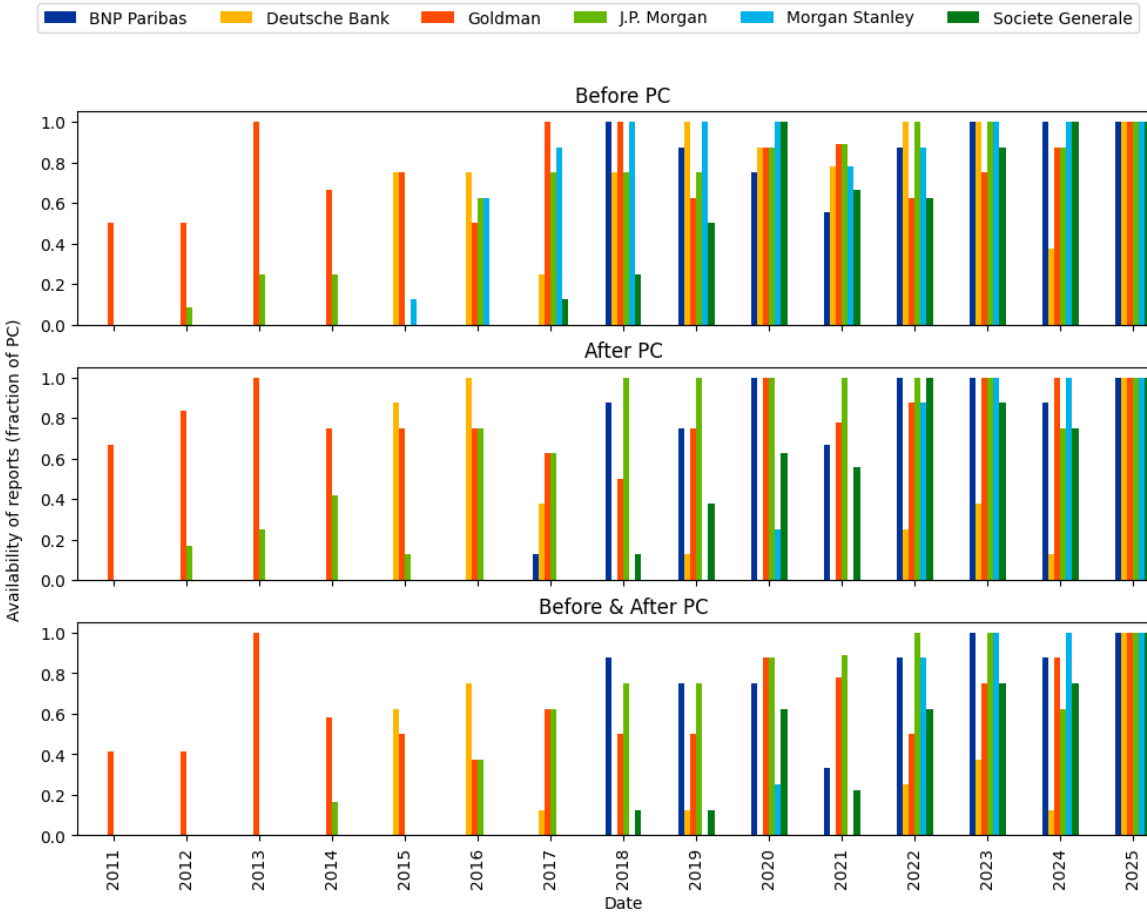
The results highlight the importance of communication in the transmission of monetary policy. The way policy decisions are interpreted by analysts contains information that is relevant for subsequent financial market pricing and macroeconomic outcomes. This underscores the importance for central banks of communicating policy decisions clearly and consistently.

What analysts hear and why it matters for monetary policy

Reports by analysts at major investment banks give a unique insight into how monetary policy decisions are interpreted by market intermediaries. Most major investment banks on the sell-side have a team of analysts covering ECB monetary policy decisions. Their job is to come up with a "view" on how the ECB is likely to set monetary policy going forward and to assess the policy decisions as they happen. Since the global financial crisis, most major banks have published "preview" and "recap" reports around ECB rate decisions. The "preview" reports are released in the days leading up to rate decisions and often give an assessment of the policy decisions that analysts expect the Governing Council to take, including on specific tools like the setting of interest rates, the calibration of asset purchases and communication. Following the decisions, the "recap" reports then comment on the policy decisions that were taken and provide an assessment of how this changes their policy view. These reports are produced for, and widely disseminated to, investors and are also read by policymakers. We therefore view analysts as influential interpreters of monetary policy: they translate the policy event into an assessment of the policy stance, its rationale and the likely future policy path, and disseminate that assessment to market participants.

Analyst reports capture how monetary policy news is processed, interpreted and contextualised by informed market participants and thereby offer a unique opportunity to measure how monetary policy decisions are perceived by markets, which ultimately matters for the transmission of policy. Existing measures of monetary policy communication typically observe one of two ends of the communication process. Sender-based measures, constructed from central bank statements and press conferences, capture the content and tone of the message released by the policymaker, but not how that message is understood by its audience. Market-based measures, constructed from high-frequency asset-price movements, capture the immediate repricing triggered by the policy event, but do not reveal the narrative or interpretation underlying that repricing. Analyst reports complement these measures by providing a textual record of how the message that policymakers send is interpreted for market participants. They show how influential market intermediaries translate the full policy event—including the decision, its rationale, and its implications for the reaction function and future policy path—into an updated policy view. Comparing previews and recaps therefore fills an important gap in the existing literature. It yields a measure of interpretation rather than of the sender's message or the immediate asset-price response.

Chart 1: Analysts' reports covering ECB monetary policy decisions *(share of Governing Council monetary policy meetings)*



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
Notes: The bars represent the share of ECB Governing Council monetary policy meetings for which there is a preview report for the different banks of the sample in the first row, a recap of the decision in the second row and both a preview and a recap in the third row. Previews and recaps are identified as reports dated within seven calendar days before or after the press conference and discuss the ECB policy decision.
Latest observation: 6 March 2025.

The coverage of these ECB "preview" and "recap" reports has grown and is almost complete for a set of major banks starting in 2018. We construct a library of analysts' reports that focus on ECB policy decisions covering six investment banks (Deutsche Bank, Goldman Sachs, J.P. Morgan, Morgan Stanley, Société Générale, BNP Paribas). We build the dataset by searching, filtering and downloading reports directly from the research portals of these institutions. First, we search for reports titled "ECB Preview", "ECB Commentary" or "ECB Recap" or search manually for relevant reports containing "ECB" within seven calendar days before or after each Governing Council decision, corresponding to a two-week window centred on the event. Within each bank and Governing Council meeting, the preview score is the average of all scored reports dated between one and seven calendar days before the press conference, while the

recap score is the average of all reports dated on the press-conference day or within the following seven days. If a bank publishes more than one report within either window, the individual reports receive equal weight. We also manually verify that the reports contain discussion of ECB policy decisions. We then run a GPT Large Language Model (LLM)[1] to extract the relevant text from the reports, which are in PDF format, excluding headers, footers, disclosures, analysts' contact details, and other irrelevant commentary. The coverage of reports starts in 2010 for Goldman Sachs and 2012 for J.P. Morgan but is spotty for the other banks at the beginning of the period. Most banks have good coverage, offering both before and after decision reports starting in 2018 (Chart 1). The final shock-construction sample contains 265 complete bank–meeting preview–recap observations across 105 Governing Council event months between July 2011 and March 2025. The number of banks contributing to an event ranges from one to six and averages 2.52. Annex Table C.2 reports bank-level coverage of the matched preview–recap sample.

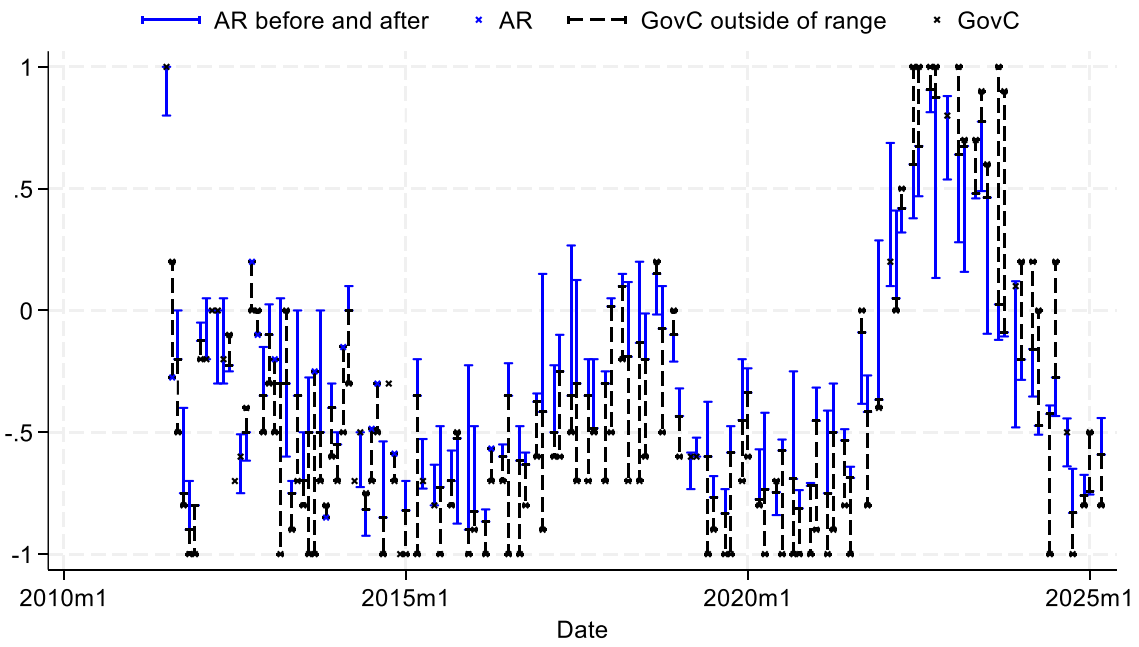
Using GPT-4.1, we extract sentiment scores from analysts' reports, and show that the policy tone of analysts' reports closely tracks the tone of the Governing Council's official communication. The prompt engineering process involves defining: (i) the persona of a central banker performing the evaluation, (ii) the topic to be scored, and (iii) the required output format. The final measure of sentiment or tone varies between -1 (very dovish) and +1 (very hawkish).[2] Overall, the policy tone from the analysts' reports tracks the GovC policy tone (from the Monetary Policy Statement (MPS) and Press Conference Q&A) very well in terms of levels and direction since 2011 (Chart 2). Analyst reports tend to move into more hawkish or dovish territory before the GovC policy tone. Furthermore, the rise of hawkish analyst and GovC sentiment coincides with the start of the hiking cycle in 2022 and the move to more dovish sentiment precedes the start of rate cuts. We also score the analyst tone regarding the outlook for inflation and the state of the economy.[3]

The policy tone from analysts' reports also shows similar dynamics to those obtained from a simple dictionary-based topic-tone model (Chart 3). The topic-tone model provides a useful benchmarking exercise for the GPT sentiment scores.[4] The two approaches–GPT-4.1 and the topic-tone algorithm–are run on the analysts' reports (both preview and recap) and the average

[1] We use GPT-4.1 to extract and score texts. We access the model via the ECB's LLM safe environment and run the code in Azure ML.
[2] See Annex D for a description of the prompt and an example of how analyst reports are read and scored.
[3] A hawkish inflation tone is defined as language that indicates expectations of high inflation, while a hawkish economic tone is defined as language that indicates high or strengthening levels of economic activity or growth. A dovish inflation tone indicates expectations of low inflation and a dovish economic tone low or weakening levels of economic activity.
[4] See the following blog posts for a description of the dictionary-based topic-tone model: "How words guide markets: measuring monetary policy communication", "How central bank communication affects the economy".

policy tone is extracted. The two approaches yield policy tone scores with similar overall dynamics. However, the GPT tends to be less volatile, especially throughout the effective lower bound period.

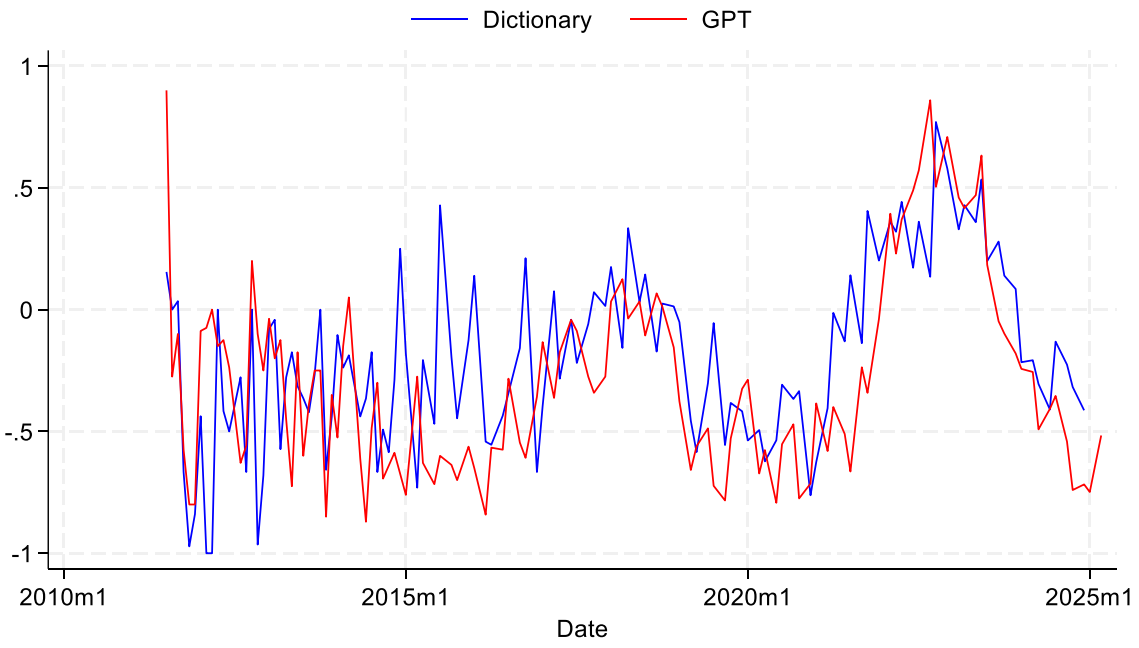
Chart 2: Policy tone from analysts' reports compared to the ECB's Governing Council *(index)*



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
Notes: The chart shows the policy tone from the GPT-4.1 model. Blue vertical lines connect the cross-bank average preview and recap policy-tone scores at each Governing Council meeting. Blue crosses show the available analyst average when only a preview or a recap is observed. Black crosses show the official ECB press conference policy-tone score. Dashed black lines connect the official score to the analyst preview–recap range when it lies outside that range. Latest observation: 6 March 2025.

Most analyses of communication tone have used natural language processing algorithms based on word-counting or predefined dictionaries. These approaches work well when the language used in the texts is well structured, employs consistent terminology and remains relatively stable over time. These conditions are less likely to hold for analysts' reports, whose language may differ across institutions and evolve over time. The topic-tone model partly addresses this by looking for combinations of topic, directional and strength-related words within short text windows. However, it can still miss relevant expressions that are not included in its dictionaries or misclassify more complex sentences when the relevant words fall outside the rolling search window. The LLM can read longer passages in context and better distinguish between the Governing Council's decision, analysts' prior expectations, their updated assessment and conditional statements about future policy.

Chart 3: Policy tone from analysts' reports scored by the GPT compared to the topic-tone model *(index)*



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
Notes: At each Governing Council monetary policy meeting, the blue and red lines show the mean of the cross-bank average preview and recap policy-tone scores generated by the topic-tone model and GPT-4.1, respectively.
Latest observation: 6 March 2025.

To assess sensitivity to prompt design, we rescore the same reports using an expanded prompt that preserves the persona, topic separation, scoring scale and output format of the baseline exercise but provides more detailed contextual guidance on the three topics (monetary policy, inflation and the economy) and provides examples. The GPT scores from the baseline and alternative prompts are highly correlated. The raw report-level monetary-policy scores have a Pearson correlation of 0.909 across 1,515 matched reports. We then reconstruct the policy interpretation shock using the complete set of alternative policy, inflation and economy scores and re-estimate the local projections. The resulting impulse responses using these alternative tone shocks are broadly similar across the macroeconomic variables and the overnight index swap (OIS) curve. Annex D reports both prompt specifications, the report-level score comparison and a direct overlay of the baseline and alternative-prompt impulse responses.[5]

We construct a new measure of "policy interpretation shocks" based on the change in policy tone between preview and recap reports around monetary policy decisions. The key intuition is

[5] To show that the results are not driven by neutral classifications, we also reconstruct the shock after excluding bank–meeting observations for which both the preview and recap monetary-policy scores are neutral. This removes 2 of 265 complete bank–meeting pairs (0.8%), located in two event months. The resulting event shock has a correlation of 0.988 with the baseline and a mean absolute difference of 0.0067.

that the combination of the "preview" and "recap" reports provides a direct measure of how analysts update their assessment of the policy stance following the policy event. If the policy event were fully anticipated and no other relevant information arrived during the report window, the change in the policy tone should be zero. A change in the measured communication tone in analysts' reports should then reflect new information about the policy decision, including how it is communicated by the GovC.

Our interpretation shock measures the change in policy tone reported by bank analysts that is not systematically associated with changes in their inflation or economic tone. We start by measuring the bank-level change in the policy tone, inflation tone and economy tone embedded in these reports. We regress the bank-level change in the policy tone on the bank-level change in the inflation tone and economy tone as follows:

$$\Delta \boldsymbol{PolicyTone}_{i,t} = \boldsymbol{\beta}_{1,i}\Delta \boldsymbol{InflationTone}_{i,t} + \boldsymbol{\beta}_{2,i}\Delta \boldsymbol{EconomyTone}_{i,t} + \boldsymbol{v}_{i,t}$$

where $\boldsymbol{i}$ indexes banks and $\boldsymbol{t}$ Governing Council events. Because the regressions are estimated separately for each bank, the coefficients are allowed to differ across institutions. The residual $\boldsymbol{v}_{i,t}$ measures the part of bank $\boldsymbol{i}$'s policy-tone revision that is not explained by its corresponding inflation- and economy-tone revisions. The residualisation removes the fitted linear component associated with these two revisions.[6] At each event, the policy interpretation shock is the equal-weighted average of the available bank-level residuals, $\boldsymbol{s}_t = \frac{1}{\boldsymbol{B}_t}\sum_{i\in \boldsymbol{I}_t} \boldsymbol{v}_{i,t}$, where $\boldsymbol{I}_t$ is the set of banks with an available residual at event $\boldsymbol{t}$, and $\boldsymbol{B}_t$ is the number of such banks.[7]

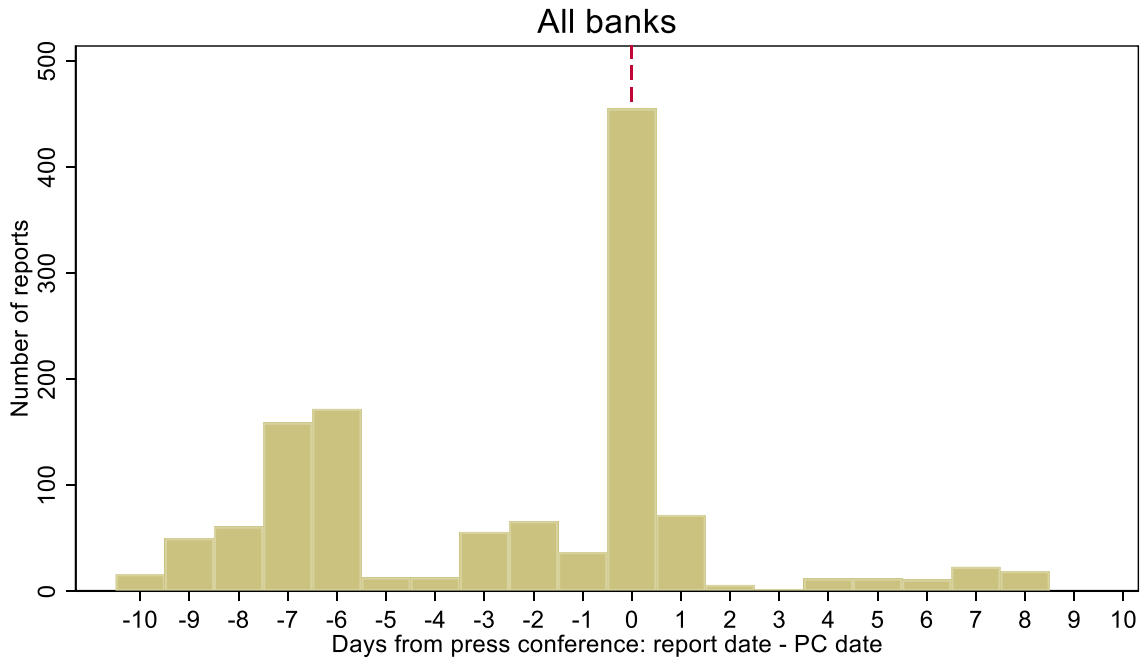
Annex Table B.1 reports coefficient estimates and diagnostics for the bank-level residualisation regressions. At least one of the economy- or inflation-tone coefficients is statistically significant for five of the six banks, while the uncentred $\boldsymbol{R}^2$ values range from 0.05 to 0.45, indicating heterogeneous but non-negligible explanatory power. Leave-one-bank-out versions of the aggregate shock have correlations with the baseline between 0.93 and 0.99. Alternative aggregations based on within-bank-standardised residuals and the median bank residual have

[6] As a robustness check we also apply the poor man's sign restrictions of Jarociński and Karadi (2020) to these cleaned communication surprises. This essentially involves setting to zero any policy interpretation shock that accompanies a co-movement of the 3-month OIS rate and equity prices during the press conference window. The results are unchanged, suggesting that the baseline findings are not driven by this class of central-bank information effects.

[7] We estimate these regressions separately for each bank in event time, treating successive usable Governing Council meetings as consecutive observations. The regressions are estimated without a constant, and inference uses Newey–West standard errors with a bandwidth of three event observations. Our policy interpretation shock is the equal-weighted mean of all available bank-level residuals at each Governing Council event. The resulting event shock is assigned to the calendar month of the meeting and set to zero in non-meeting months between the first and last usable event.

correlations with the baseline of 0.989 and 0.993, respectively. These results indicate that the shock is robust to bank composition, differences in residual scale and the choice between mean and median aggregation.

Chart 4: Timing of analyst reports around ECB press conferences



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
Notes: The chart shows the number of analyst reports by signed distance from the ECB press conference date. Negative values denote reports published before the press conference; zero and positive values denote reports published on or after the press conference date. Reports published on the day of the press conference are treated as recap reports. Reports dated from seven days before through seven days after the press conference, inclusive, enter the baseline sample. The wider ±10-day range is shown to illustrate that relatively few reports fall outside this window.
Latest observation: 6 March 2025.

Our key identifying assumption is that, after removing the fitted linear component associated with revisions in inflation and economy tone, the remaining preview-to-recap change in the policy tone reflects unexpected information revealed by the policy event itself. Chart 4 shows that many preview reports are published one week before the press conference, while recap reports are concentrated on the day of the press conference or shortly afterwards. This publication pattern motivates our use of a two-week window around policy events: a narrower window would exclude many genuine previews that are systematically released one week ahead of the meeting. At the same time, the bunching of recaps around the press-conference day limits the scope for unrelated news after the policy event to influence the measured change in tone. Nevertheless, other information may arrive between the preview and the policy decision, or between the policy decision and the recap, including macroeconomic data

releases, market developments, or other news. Our bank-level purging step mitigates this concern by filtering changes in perceived policy stance that systematically coincide with revisions in analysts' assessments of inflation and economic activity out of the shock measure. The narrow timing of the reports and averaging of residual changes across banks reduce the influence of unrelated news and bank-specific interpretation and measurement noise on our policy interpretation shock. In estimating the effects of these shocks, we additionally condition on a broad set of macroeconomic and financial variables and on standard high-frequency rate surprises.

We then estimate a monthly local projections model to measure the response of macroeconomic and financial variables to policy interpretation shocks. The horizon used is 36 months. The outcome vector $\boldsymbol{y_{t+h}}$ comprises real GDP, the GDP deflator, total employment, the 1-month, 3-month and 2-year overnight-index-swap rates, the US-dollar-per-euro exchange rate and the 10-year euro-area sovereign benchmark yield. Quarterly observations for real GDP, the GDP deflator and total employment are converted to monthly frequency using linear interpolation in levels. The resulting monthly series are subsequently transformed into natural logarithms. The specification is as follows:

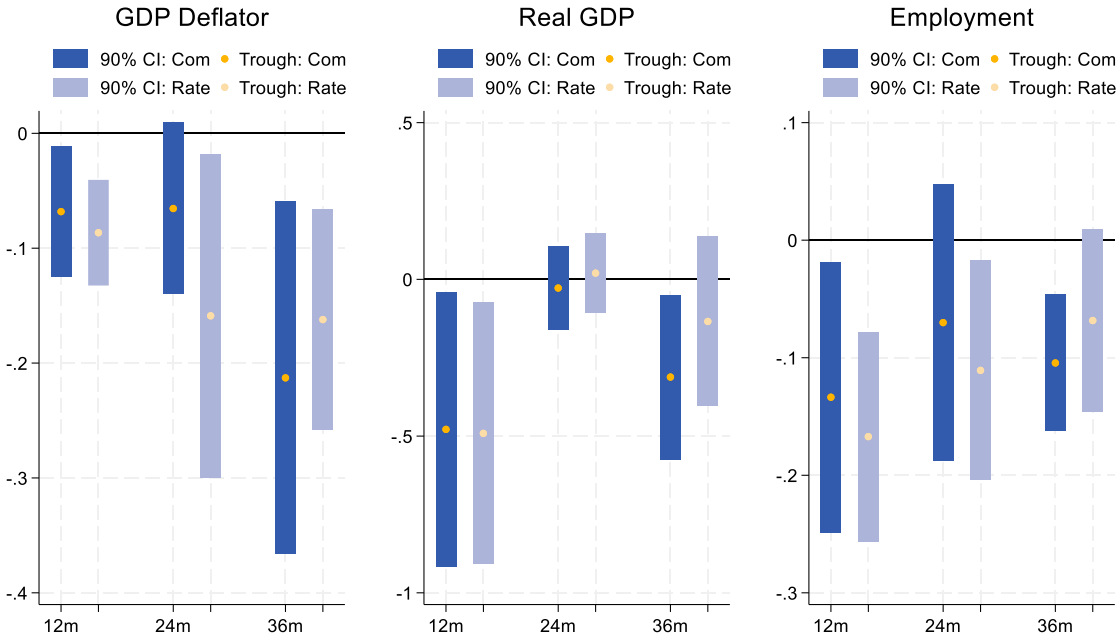
$$\boldsymbol{y_{t+h}} = \boldsymbol{\alpha_h} + \boldsymbol{\beta_h s_t} + \boldsymbol{\theta_h r_t} + \boldsymbol{\Gamma'_h X_t} + \boldsymbol{\Pi'_h D_t} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{p}} \boldsymbol{\Delta'_{h,j} \omega_{t-j}} + \boldsymbol{\varepsilon_{t+h}}$$

Here, $\boldsymbol{s_t}$ denotes the policy interpretation shock, while $\boldsymbol{r_t}$ is the 3-month OIS high-frequency rate surprise from Altavilla et al. (2019). Accordingly, $\boldsymbol{\beta_h}$ measures the response of the outcome at horizon $\boldsymbol{h}$ to the interpretation-shock conditional on conventional interest-rate news, while $\boldsymbol{\theta_h}$ captures the corresponding response to the rate surprise. The vector $\boldsymbol{X_t}$ contains the contemporaneous values of the other variables in the outcome vector, together with the logarithm of an all-commodity price index and the logarithm of the ECB Composite Indicator of Systemic Stress. The vector $\boldsymbol{D_t}$ contains the pandemic and Ukraine-war indicators which enter contemporaneously only. The lag vector $\boldsymbol{\omega_{t-j}} = (\boldsymbol{s_{t-j}}, \boldsymbol{r_{t-j}}, \boldsymbol{X'_{t-j}}, \boldsymbol{y_{t-j}})'$ collects lagged values of the policy interpretation shock, the rate surprise, the macroeconomic and financial controls, and the dependent variable, with the associated coefficients contained in $\boldsymbol{\Delta_{h,j}}$.

The baseline specification includes two monthly lags. Annex Chart A.1 overlays estimates from otherwise identical specifications containing one, two, three and four monthly lags. Responses are estimated using Newey–West standard errors and are presented with 68% and 90% confidence bands. The reported impulse responses are rescaled to represent a one-standard-deviation policy interpretation shock. We define the potential shock-date sample as June 2011

to March 2025; the effective sample in each horizon-specific regression is determined by the lag requirements and data availability. Detailed definitions, transformations, sources, identifiers and variable-specific coverage are reported in Annex Table C.1.

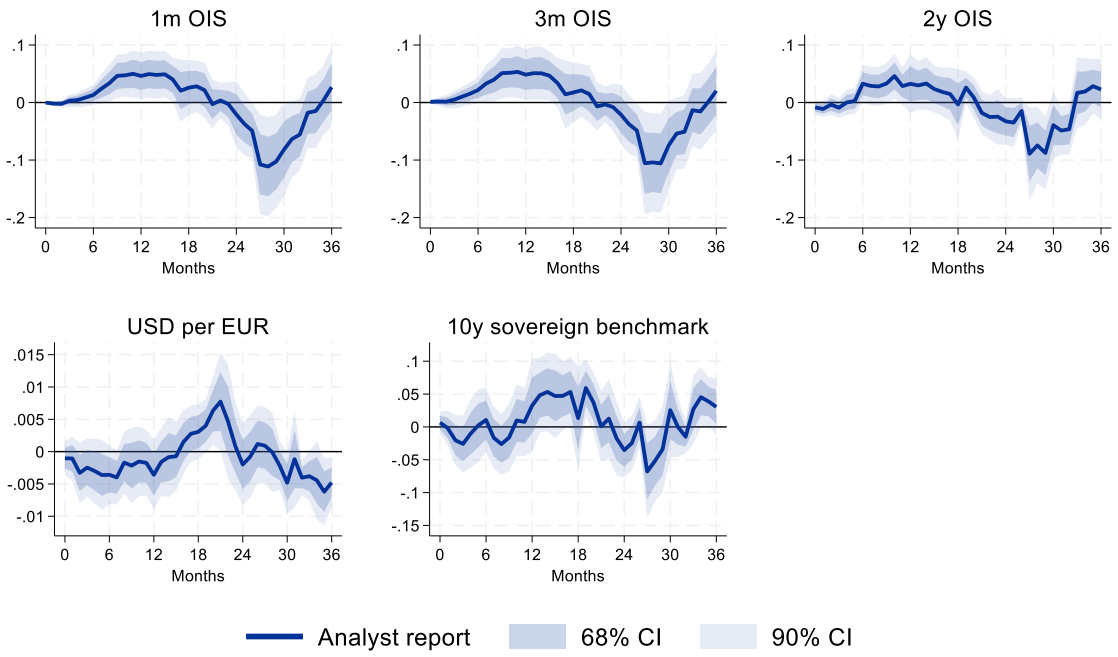
Chart 5: Trough responses of key macroeconomic variables to policy interpretation and rate shocks *(percentage change)*



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Eurostat; ECB; Bloomberg Finance L.P.; IMF; Altavilla et al. (2019) and staff calculations.
Notes: The chart reports the trough responses of real GDP, the GDP deflator and employment within months 0–12, 13–24 and 25–36 following a (i) one-standard-deviation tightening policy interpretation shock ("Com") and (ii) a one-standard-deviation Altavilla et al. (2019) rate shock ("Rate"). Shaded bars report pointwise 90% confidence intervals at the horizon at which each trough occurs. The baseline specification contains two monthly lags. Responses are expressed in percentage terms.
Regression sample: June 2011–March 2025.
Latest observations used in t+h responses: May 2025.

A hawkish policy interpretation shock is followed by declines in the GDP deflator, real GDP and employment. The trough responses of all three variables are negative and statistically significant at the 10% level within the first year. The second-year troughs are not significantly different from zero. In the third-year window, the trough responses of all three variables are again significantly negative. The responses generally have the same sign and are of a comparable order of magnitude to those generated by the Altavilla et al. (2019) rate shock, although the relative magnitudes vary across outcomes and horizons (Chart 5).

Chart 6: Responses of financial market variables to policy interpretation shocks *(percentage-point and exchange rate level changes)*



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Eurostat; ECB; Bloomberg Finance L.P.; IMF; Altavilla et al. (2019) and staff calculations.
Notes: The charts show the responses of the 1-month, 3-month and 2-year OIS rates, the US-dollar-per-euro exchange rate and the 10-year euro-area sovereign benchmark yield to a one-standard-deviation tightening policy interpretation shock. The baseline specification contains two monthly lags. Response variables are expressed in their original units (percentage points for interest rates and yields, US dollars per euro for the exchange rate). Shaded areas report 68% and 90% confidence intervals.
Regression sample: June 2011–March 2025.
Latest observations used in t+h responses: May 2025.

The financial-market responses suggest that financial-market pricing may provide a link between policy interpretation shocks and the broader macroeconomic effects. Policy communication may affect the real economy through several channels. It can, for example, signal the future stance of monetary policy, explain the policymaker's reaction function, or reveal information about inflation and the economy, which may affect expectations for both current and future policy. While we remain agnostic as to which specific channel underpins our empirical results, we investigate financial-market pricing as one possible transmission mechanism. To assess this channel, we use the same local-projection specification with the 1-month, 3-month and 2-year OIS rates, the US-dollar-per-euro exchange rate and the 10-year euro-area sovereign benchmark yield as dependent variables. A hawkish policy interpretation shock is followed by statistically significant increases in OIS rates across short and medium maturities. The exchange rate initially falls before rising at horizons of roughly 16 to 23 months; it then reverses again at longer horizons. The 10-year sovereign benchmark yield rises at some intermediate horizons but is more variable and less persistent than the OIS responses (Chart

6). At longer horizons, the initial OIS responses reverse, with rates declining after around two years, indicating that the effect on financial-market pricing is not permanent. Taken together, these responses are consistent with financial-market repricing forming part of the transmission of policy interpretation shocks to the real economy.

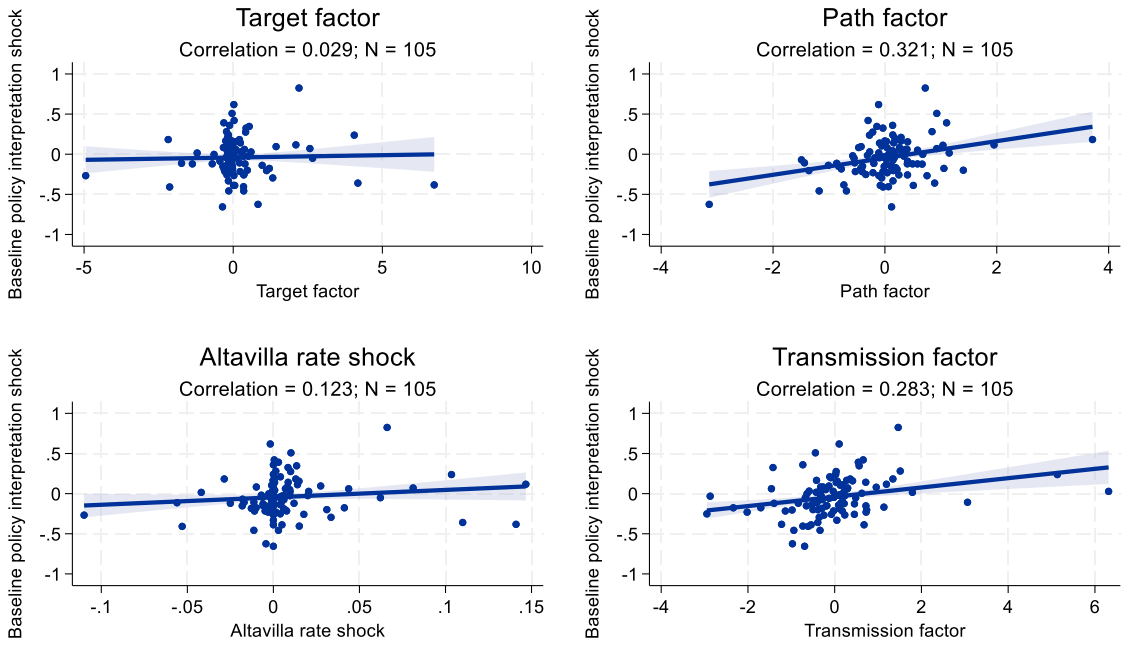
The baseline results are robust to alternative lag lengths and to the inclusion of additional monetary-policy communication and rate shock controls, pointing to policy interpretation shocks as a distinct component of monetary policy. Chart A.1 shows the responses of macroeconomic and financial variables under otherwise identical specifications using one to four monthly lags. The contractionary macroeconomic responses and the rise and subsequent reversal in OIS rates are visible across the lag choices, although the exchange-rate, sovereign-yield and some longer-horizon responses vary more. Chart A.2 adds three alternative monetary policy shocks to the baseline control set, which already includes the Altavilla et al. (2019) 3-month OIS rate surprise. The first is the change in the policy tone from the official ECB GovC communication of policy decisions, retrieved from the MPS and Q&A transcript, and orthogonalised against the changes in the inflation and economy tones as before.[8] The second is the "path" shock and the third the "target" rate shock taken from a factor-based decomposition of high-frequency identification shocks in Akkaya et al. (2024). The broad macroeconomic and OIS response patterns remain similar, while some longer-horizon financial responses are less stable. These exercises indicate that the principal results are not driven by a particular lag choice or by the omission of these alternative monetary-policy shock measures.

Analysts' reports capture a dimension of monetary policy news that is distinct from both official Governing Council communication and the immediate response of asset prices. We conceptualise analysts as influential interpreters of policy news rather than passive aggregators of dispersed information. Their role is to translate the policy event into a view on the policy stance, its rationale and likely future path of policy and to disseminate that interpretation to investors. To assess whether our measure merely repackages the immediate market response, we examine its contemporaneous correlation with the standard 3-month OIS high-frequency rate shock of Altavilla et al. (2019) and the target, path and transmission shocks of Akkaya et al. (2024). The correlations are positive but weak to moderate (Chart 7), indicating that the policy interpretation shocks contain an interpretive signal that is not fully captured by the immediate repricing of financial assets. Policy interpretation shocks therefore capture a dimension of monetary policy news that goes beyond standard market-based surprises. Our

[8] The construction of ECB communication shocks follows the methodology laid out in the following blog post: "How central bank communication affects the economy". We regress the difference between policy scores of consecutive ECB monetary policy press conferences on the change in economic and inflation scores, and use the residuals as the ECB communication shock.

approach does not, however, identify the causal effect of publishing an analyst report on financial prices. Rather, we interpret the results as showing that the policy interpretations reflected in analysts' reports contain economically relevant information and are followed by subsequent changes in financial conditions and macroeconomic outcomes.

Chart 7: Correlations between financial market-based policy shocks and policy interpretation shocks



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Akkaya et al. (2024); Altavilla et al. (2019); and staff calculations.
Notes: The panels plot the policy interpretation shock against the target, path and transmission factors of Akkaya et al. (2024) and the 3-month OIS high-frequency rate shock of Altavilla et al. (2019). Each observation represents a matched analyst-report and high-frequency policy-event month. Solid lines show linear fitted relationships and shaded areas report 90% confidence intervals. Panel subtitles report Pearson correlations. The sample contains 105 policy-event months.
Sample: July 2011–March 2025.

The results show that how analysts interpret policy decisions matters for macroeconomic outcomes and suggest that effective communication depends not only on what policymakers say, but also on how the message is understood by market participants. While careful communication can help clarify policy decisions, unexpected changes in communication also have macroeconomic effects. The sizeable and significant responses of output, prices and employment highlight the importance of communication as a transmission channel of monetary policy. These effects are consistent with several, potentially complementary mechanisms. First, communication may signal the future policy path shaping expectations about the likely direction and persistence of future rate decisions, including how the Governing Council's reaction function maps economic developments into policy actions. Second, even though we filter out explicit changes in analysts' assessments of inflation and economic conditions, communication

may still convey latent information about the central bank's assessment of the economic outlook through the interpretation of policy tone, thereby affecting expectations indirectly. Third, the short-term reaction of prices, output and employment to policy interpretation shocks potentially highlights the important role of communication in shaping inflation and broader macroeconomic expectations. Together, these findings highlight the importance of clear communication. The results are consistent with policy communication being transmitted through the interpretations reflected in analysts' reports, potentially via financial market pricing, to real economic outcomes.

The nature and importance of policy interpretation shocks are likely to depend on the monetary policy environment. Policy interpretation shocks should not necessarily be viewed as communication noise or evidence of a communication failure. They may reflect unexpected signals about the future policy path, revisions to the perceived reaction function, or changes in how analysts understand the Governing Council's assessment of risks and contingencies. Some variation in interpretation is therefore likely to be intrinsic to forward-looking, state-contingent monetary policy, although ambiguity or inconsistency in communication may also create avoidable noise; our empirical approach does not distinguish between these components. At the effective lower bound, communication about the future policy path and unconventional instruments may carry a larger share of the policy signal, while during rapid hiking or easing cycles analysts must assess the likely pace, persistence and endpoint of adjustment. By contrast, when policy is predictable and communication largely confirms expectations, interpretation shocks may be smaller. Our sample spans these different regimes, but the limited number of policy events prevents a precise assessment of such state dependence.

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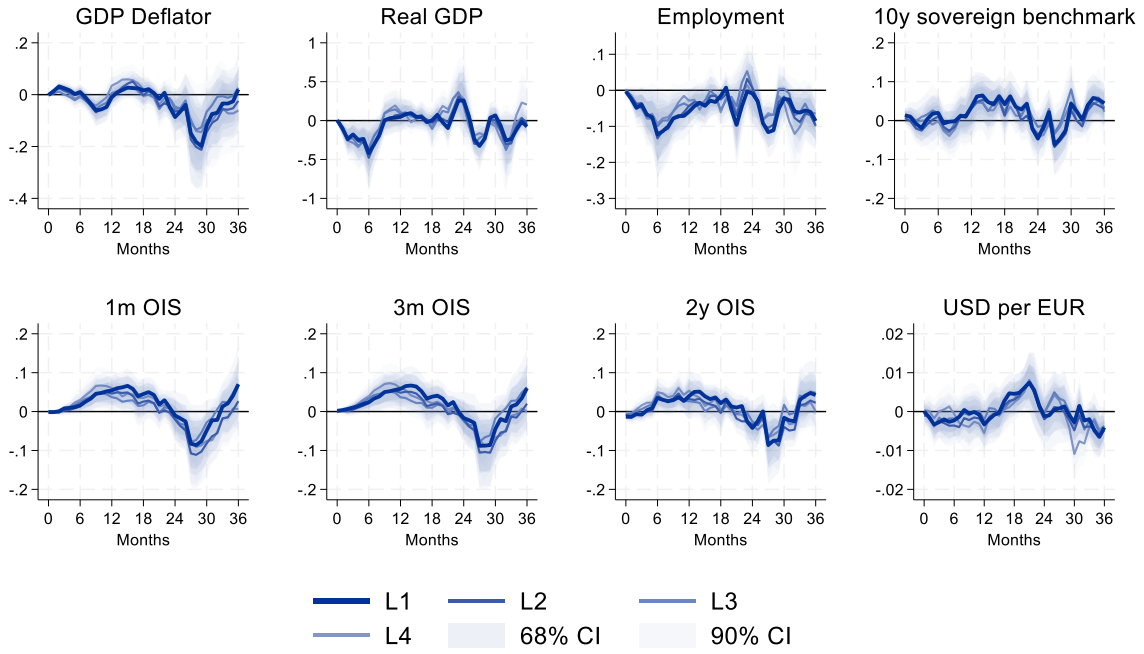
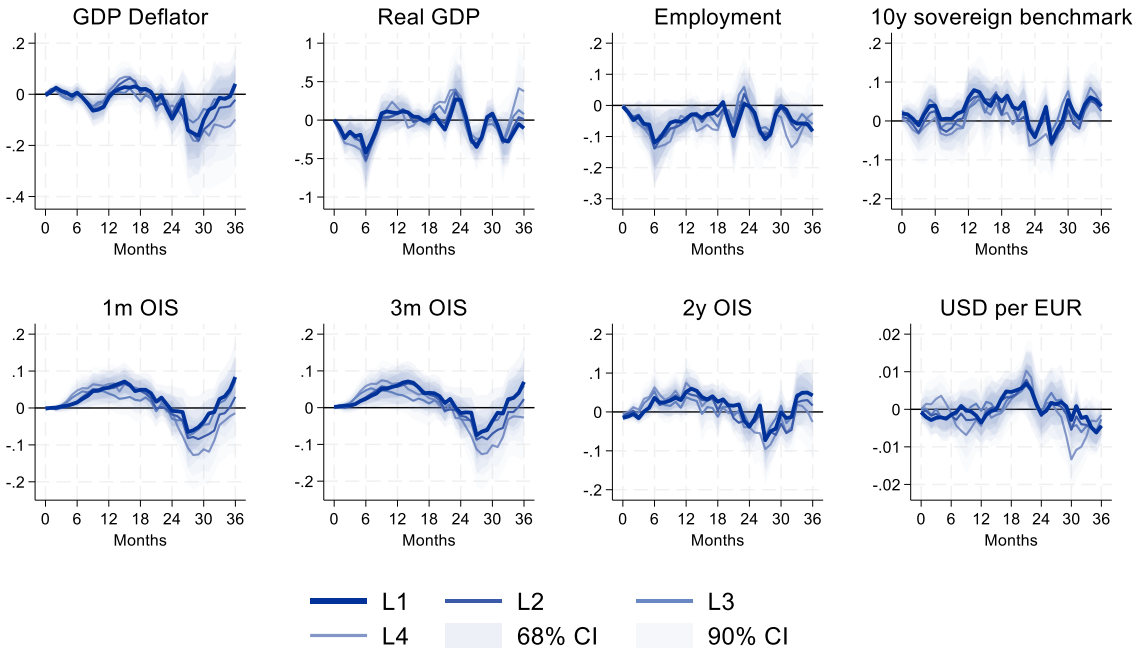
Annex A

Chart A.1: Response of key macroeconomic and financial variables to policy interpretation shocks under alternative lag specifications



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Eurostat; ECB; Bloomberg Finance L.P.; IMF; Altavilla et al. (2019) and staff calculations.
Notes: Charts show the response of real GDP, the GDP deflator, employment, 1-month, 3-month and 2-year OIS rates, EUR/USD exchange rate, and 10-year sovereign bond yield benchmark to a tightening analyst report policy interpretation shock from otherwise identical specifications containing one, two, three and four monthly lags. Corresponding shaded areas report pointwise 68% and 90% confidence intervals. The two-lag specification is the baseline. The shock is standardised to one standard deviation of the shock distribution. The units of the macroeconomic response variables are percentage changes, financial variables are expressed in their original units (percentage points for interest rates and yields, levels for the exchange rate).
Regression sample: June 2011–March 2025.
Latest observations used in t+h responses: May 2025.

Chart A.2: Response of macroeconomic and financial market variables to policy interpretation shocks with additional monetary-policy shock controls



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Eurostat; ECB; Bloomberg Finance L.P.; IMF; Akkaya et al. (2024); Altavilla et al. (2019) and staff calculations.
Notes: Charts show the response of real GDP, the GDP deflator, employment, 1-month, 3-month and 2-year OIS rates, EUR/USD exchange rate, and 10-year sovereign bond yield benchmark to a tightening analyst report policy interpretation shock from specifications containing one, two, three and four monthly lags that add the official ECB communication shock and the Target and Path factors to the baseline control set. Corresponding shaded areas report pointwise 68% and 90% confidence intervals. The shock is standardised to one standard deviation of the shock distribution. The units of the macroeconomic response variables are percentage changes, financial variables are expressed in their original units (percentage points for interest rates and yields, levels for the exchange rate).
Regression sample: June 2011–March 2025.
Latest observations used in t+h responses: May 2025.

Annex B

Table B.1: Diagnostics for bank-level residualisation regressions *(Dependent variable: preview-to-recap change in policy tone)*

Bank	Δ Economy tone	Δ Inflation tone	$R^2_{unc.}$	N	Residual s.d.	LOO corr.
BNP Paribas	0.32*	0.77***	0.45	44	0.31	0.96
	(0.17)	(0.25)				
Deutsche Bank	-0.23**	0.39**	0.27	25	0.29	0.98
	(0.11)	(0.19)				
Goldman Sachs	0.29*	0.26**	0.20	67	0.26	0.95
	(0.15)	(0.11)				
J.P. Morgan	0.28***	0.38***	0.35	71	0.27	0.93
	(0.10)	(0.06)				
Morgan Stanley	0.02	0.21*	0.05	26	0.37	0.99
	(0.23)	(0.11)				
Société Générale	0.29	0.23	0.08	32	0.33	0.98
	(0.28)	(0.18)				

Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
*Notes: The table reports diagnostics from the bank-level regressions used to construct the policy interpretation shock. The dependent variable is the preview-to-recap change in policy tone for each bank. Economy tone and inflation tone are the corresponding preview-to-recap changes in analysts' assessments of economic activity and inflation. Standard errors are reported in parentheses. Regressions are estimated without a constant, matching the construction of the baseline shock. Standard errors are Newey-West with a bandwidth of three event observations. LOO corr. denotes the correlation between the baseline aggregate shock and a leave-one-bank-out alternative excluding the respective bank. Correlations between the baseline shock and alternative aggregations based on within-bank-standardised residuals and the median bank residual are 0.989 and 0.993, respectively. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels.*
Latest observation: 6 March 2025.

Table B.1 reports diagnostics for the bank-level residualisation regressions used to construct the policy interpretation shock. Revisions in analysts' assessments of inflation and economic activity are systematically related to policy-tone revisions for several institutions: at least one of the two coefficients is statistically significant for five of the six banks. The uncentred R^2 values range from 0.05 to 0.45, indicating that the explanatory importance of the controls is heterogeneous but non-negligible for a number of banks. Residual standard deviations range from 0.26 to 0.37. The aggregate is not driven by any individual institution: leave-one-bank-out shocks have correlations with the baseline between 0.93 and 0.99. Alternative aggregations based on within-bank-standardised residuals and the median bank residual have correlations of 0.989 and 0.993, respectively. These results support using the equal-weighted average of the bank-level residuals while showing that the shock is robust to bank composition, differences in residual scale and the choice between mean and median aggregation.

Annex C

This annex documents the macroeconomic and financial variables used in the local-projection analysis. The underlying macro-financial database is a monthly country-level dataset. Quarterly observations for real GDP, the GDP deflator and total employment are converted to monthly frequency using linear interpolation in levels and subsequently transformed into natural logarithms. Daily and business-daily series are converted to monthly observations using the latest observation available within each month. Annex Table C.1 reports the definitions, transformations, sources and coverage of the variables entering the reported specifications. Annex Table C.2 reports the bank-level coverage of the matched analyst-report sample.

Table C.1: Variables used in the local-projection analysis: outcome variables, macro-financial controls and monetary policy shock variables

Variable	Role	Definition and units	Original frequency	Monthly treatment and estimation transformation	Source and series identifier	Non-missing coverage in designated sample
Real GDP	Outcome; control in other equations	Euro-area real GDP at market prices, calendar and seasonally adjusted, chain-linked volume	Quarterly	Linear interpolation in levels; natural logarithm	Eurostat via ECB Data Portal; MNA.Q.Y.I9.W2.S1.S1.B.B1GQ._Z._Z._Z.EUR.LR.N	166 months, June 2011–March 2025
GDP deflator	Outcome; control in other equations	Euro-area GDP deflator, calendar and seasonally adjusted	Quarterly	Linear interpolation in levels; natural logarithm	Eurostat via ECB Data Portal; MNA.Q.Y.I9.W2.S1.S1.B.B1GQ._Z._Z._Z.IX.D.N	166 months, June 2011–March 2025
Total employment	Outcome; control in other equations	Total employment, thousands, calendar and seasonally adjusted	Quarterly	Linear interpolation in levels; natural logarithm	Eurostat via ECB Data Portal; MNA.Q.Y.I9.W2.S1.S1._Z.EMP._Z._T._Z.PS._Z.N	166 months, June 2011–March 2025
1-month OIS rate	Outcome; control in other equations	EUR overnight-index-swap rate, percentage points	Business daily	End-of-month observation; level	Bloomberg Finance L.P.	166 months, June 2011–March 2025
3-month OIS rate	Outcome; control in other equations	EUR overnight-index-swap rate, percentage points	Business daily	End-of-month observation; level	Bloomberg Finance L.P.	166 months, June 2011–March 2025
2-year OIS rate	Outcome; control in other equations	EUR overnight-index-swap rate, percentage points	Business daily	End-of-month observation; level	Bloomberg Finance L.P.	166 months, June 2011–March 2025

US dollars per euro	Outcome; control in other equations	ECB euro foreign exchange reference rate, US dollars per euro	Monthly	Monthly average; level	ECB Data Portal; EXR.M.USD.EUR.SP00.A	166 months, June 2011–March 2025
10-year sovereign benchmark	Outcome; control in other equations	Euro-area 10-year government benchmark-bond yield	Monthly	End-of-month observation; percent per annum	ECB Data Portal; FM.M.U2.EUR.4F.BB.U2_10Y.YLD	166 months, June 2011–March 2025
CISS	Financial control	ECB Composite Indicator of Systemic Stress	Daily	End-of-month observation; natural logarithm	ECB Data Portal; CISS.D.U2.Z0Z.4F.EC.SS_CI.IDX	166 months, June 2011–March 2025
Commodity-price index	External-price control	Broad all-commodity price index	Monthly	Rebased so that the 2015 monthly average equals 100; natural logarithm	IMF	166 months, June 2011–March 2025
Pandemic indicator	Fixed control	Equals one from March 2020 through November 2021	Monthly	Binary indicator	Staff construction	166 months
Ukraine-war indicator	Fixed control	Equals one from March 2022 onwards	Monthly	Binary indicator	Staff construction	166 months
Policy interpretation shock	Main shock	Equal-weighted mean of available bank-level residuals from the preview-to-recap policy-tone revision regressions	Event-level	Assigned to the meeting month and zero in non-meeting months between first and last event; IRFs rescaled to a one-standard-deviation shock	BNP Paribas, Deutsche Bank, Goldman Sachs, J.P. Morgan, Morgan Stanley and Société Générale; staff calculations	165 months, July 2011–March 2025; 105 event months with an available shock
3-month OIS high-	Baseline shock control	High-frequency interest-rate surprise	Event-level	Divided by 100 in the data preparation and	Altavilla et al. (2019), EA-MPD	166 months; 111 non-zero months

frequency rate surprise		measured around ECB policy events		set to zero in non-event months		
Target shock	Robustness control	Target component of the ECB monetary-policy surprise decomposition	Event-level	Zero in non-event months	Akkaya et al. (2024)	166 months; 125 non-zero months
Path shock	Robustness control	Path component of the ECB monetary-policy surprise decomposition	Event-level	Zero in non-event months	Akkaya et al. (2024)	166 months; 125 non-zero months
Official ECB communication shock	Robustness control	Residual from the change in official ECB policy tone after removing contemporaneous changes in ECB inflation and economy tone	Event-level	No-constant residualisation with Newey–West bandwidth three; zero in non-meeting months	ECB Monetary Policy Statements and press-conference Q&A transcripts; staff calculations	166 months; 124 non-zero months

Table C.2: Coverage of matched analyst preview-recap observations

Bank	Events with preview	Events with recap	Complete preview–recap pairs	First complete pair	Last complete pair
BNP Paribas	49	54	44	2018m1	2025m3
Deutsche Bank	62	30	25	2015m1	2025m3
Goldman Sachs	85	94	67	2011m7	2025m3
J.P. Morgan	76	85	71	2014m3	2025m3
Morgan Stanley	64	27	26	2020m3	2025m3
Société Générale	40	55	32	2017m4	2025m3
Total bank–event observations	376	345	265		

Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; staff calculations.
Notes: Counts refer to bank–Governing Council event observations rather than individual PDF files. A complete pair requires non-missing preview and recap scores for policy, inflation and economic tone, so that the bank-level residualisation can be estimated. The 265 complete bank–event observations cover 105 distinct Governing Council event months from July 2011 to March 2025.

Annex D

Using the GPT-4.1 LLM to extract sentiment

This annex describes the prompts used to score the sentiment in analyst reports covering ECB monetary policy decisions along the three topics: monetary policy, inflation dynamics and the economic outlook. We use the GPT-4.1 LLM, accessed via the ECB's LLM safe environment. The codes are deployed in Azure ML.

We use a simple baseline prompt specification, which provides limited contextual information for the topic scores, and an alternative prompt, which provides more context. In each case, we specify (i) a persona, (ii) the topic, and (iii) output format prompts as follows. Note that the persona and output format are held fixed across the baseline and alternative exercises. The alternative prompt preserves the scoring task, the [−1,1] scale and the separation of policy, inflation and economic tone, but provides more detailed contextual guidance and more examples. Because the policy interpretation shock is constructed by residualising changes in policy tone against changes in inflation and economic tone, we report the topic instructions for all three dimensions.

Baseline

Common persona. You are a central banker at the ECB. You have a PhD in Economics. Your role is to read the reports about the ECB GovC's policy decision by an analyst at a major bank and provide an evaluation of the sentiment of the text with respect to the provided topic.

Baseline monetary policy instructions. Your job is to evaluate the analyst's assessment of the overall sentiment underlying monetary policy decisions by the ECB's Governing Council. Hawkish language signals a tightening bias in monetary policy, while dovish language signals a loosening bias. A score of +1 indicates a very hawkish tone, a score of -1 indicates a very dovish tone, and a score of 0 indicates a neutral tone. Only evaluate sentiment relating to ECB monetary policy.

Baseline inflation instructions. Your job is to evaluate the analyst's assessment of the overall inflation outlook. Inflationary language signals higher or rising inflation, while disinflationary language signals lower or falling inflation. A score of +1 indicates a very inflationary assessment, a score of -1 indicates a very disinflationary assessment, and

a score of 0 indicates a neutral assessment, consistent with inflation near the ECB's target. Only evaluate sentiment relating to inflation and the inflation outlook.

Baseline economy instructions. Your job is to evaluate the analyst's assessment of the overall state and outlook of the economy. Positive language signals strong or improving economic activity, while negative language signals weak or deteriorating economic activity. A score of +1 indicates a very positive economic assessment, a score of -1 indicates a very negative economic assessment, and a score of 0 indicates a neutral assessment. Only evaluate sentiment relating to economic activity and the economic outlook.

Common output. Return a dictionary with keys being the keys of the input JSON file, values as an array with two entries for each report, the 1st entry being a score between -1 and +1, and the 2nd entry being a short (max 2 sentences) explanation as to why you chose this score. This is how the array will look: '{ix_1: [score_1, short_explanation_1], ..., ix_n: [score_n, short_explanation_n]}' where ix_i is the ith report index (key of the input dictionary), and score_i is the decision score (a continuous number in the interval between -1 and 1, indicating how hawkish/dovish the tone of the report is regarding the input topic as discussed in the ECB text document).

Alternative

Common persona. You are a central banker at the ECB. You have a PhD in Economics. Your role is to read the reports about the ECB GovC's policy decision by an analyst at a major bank and provide an evaluation of the sentiment of the text with respect to the provided topic.

Alternative monetary policy instructions. Evaluate only the sentiment related to monetary policy decisions by the ECB, rather than the overall tone of the text. Monetary policy decisions include changes to ECB interest rates and liquidity conditions. Hawkish language signals a tightening of monetary policy intended to slow or reduce aggregate demand and lower inflation, or prevent inflation from rising too much. Dovish language signals a loosening of monetary policy intended to stimulate aggregate demand and increase inflation, or prevent inflation from falling too much. A neutral monetary policy stance is one in which interest rates and liquidity conditions are aligned with the economy's potential output and inflation target, neither stimulating nor restraining aggregate demand. For example, language indicating that further rate cuts are likely,

that policy can become less restrictive, or that a recent cut is unlikely to be the last signals a more dovish tone. Language suggesting that the reaction function has shifted towards responding more forcefully to inflation risks, that policy must remain restrictive for longer, or that further tightening may be needed signals a more hawkish tone. Statements that policy is in a good place, or references to a finely balanced or split decision, signal a more neutral or less strongly hawkish or dovish tone. A score of +1 indicates a very hawkish tone, a score of -1 indicates a very dovish tone, and a score of 0 indicates a neutral tone. Assess only sentiment related to ECB policy decisions, not the perceived state of the economy, inflation, or labour markets. When the report indicates that its author was surprised by a shift towards a more hawkish or more dovish stance, reflect that surprise in the resulting score.

Alternative inflation instructions. Evaluate only the sentiment related to the inflation outlook discussed in the text, rather than the overall tone of the text. The inflation outlook includes recent developments and the medium-term outlook for headline inflation, core inflation, specific inflation components, inflation expectations, domestic inflationary pressures, and international factors affecting inflation. Inflationary language signals rising inflation, a higher inflation outlook, or inflation remaining at an elevated level. Disinflationary language signals falling inflation, a lower inflation outlook, or inflation remaining at a low level. Neutral language signals inflation remaining close to, or moving towards, the ECB's 2 percent inflation target. For example, elevated inflation figures, increased inflation expectations, high negotiated wage growth, a weaker euro exchange rate, higher oil prices, or supply disruptions signal a more inflationary tone. Lower inflation figures, decreased inflation expectations, low negotiated wage growth, a stronger euro exchange rate, lower oil prices, or increased supply signal a more disinflationary tone. A score of +1 indicates a very inflationary tone, a score of -1 indicates a very disinflationary tone, and a score of 0 indicates a neutral tone. Assess only sentiment related to the inflation outlook, not ECB monetary policy decisions or the perceived state of the economy or labour markets.

Alternative economy instructions. Evaluate only the sentiment related to the perceived state of the economy, rather than the overall tone of the text. The state of the economy includes recent growth developments, domestic demand, investment, consumer confidence, financing conditions, the medium-term growth outlook, labour-market developments, the fiscal position, and external factors. Positive language signals strong or increasing levels of economic activity or growth. Negative language signals weak or decreasing levels of economic activity or growth. Neutral language signals that

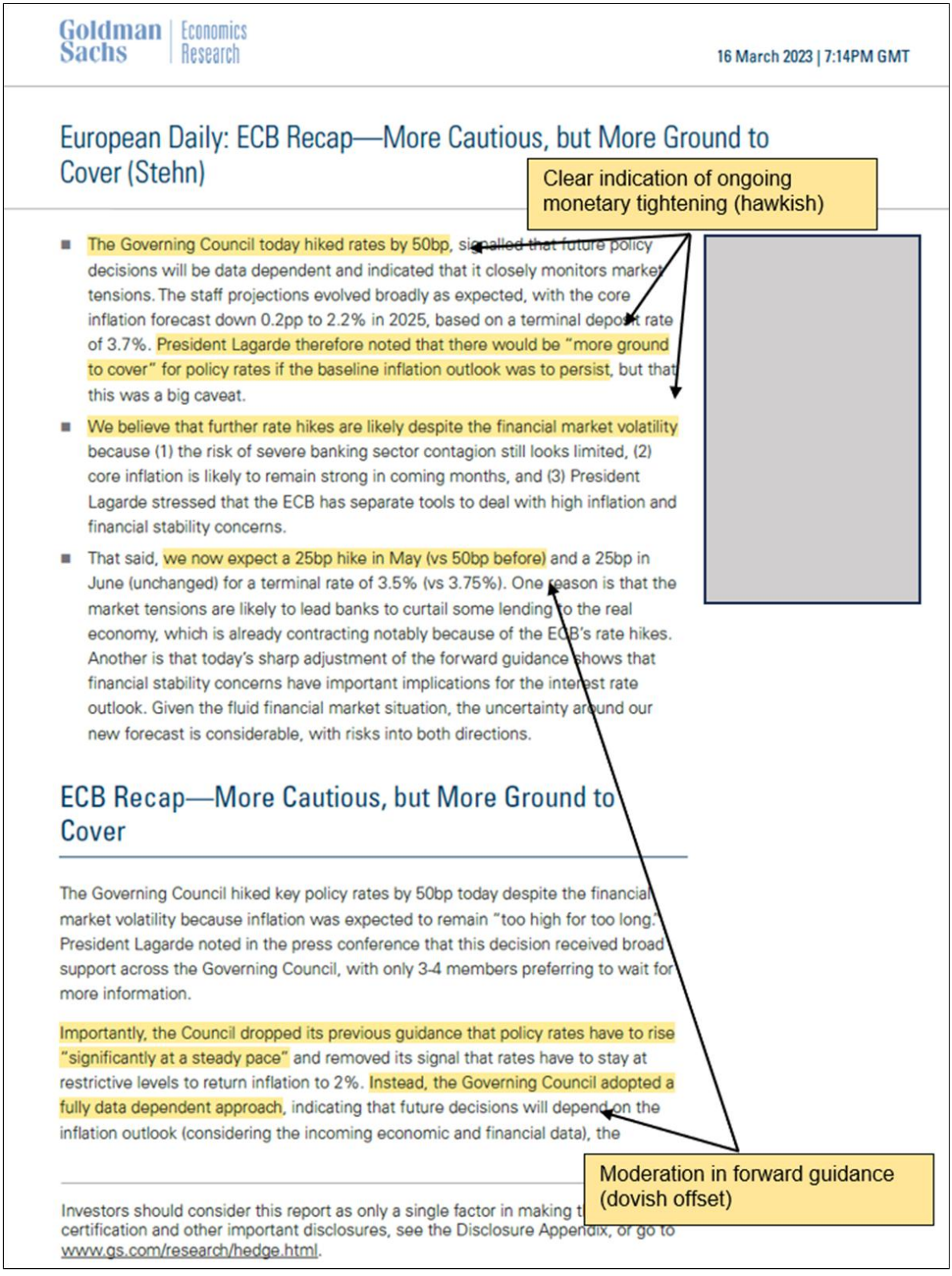
economic activity is broadly stable, with output close to its sustainable potential and growth near its trend rate. For example, high GDP growth, increased domestic demand, rising investment, stronger consumer confidence, improved financing conditions, higher expected output growth, higher employment, lower unemployment, increased job creation, an improved fiscal position, improved terms of trade, and stronger global demand signal a more positive tone. Low GDP growth, decreased domestic demand, lower investment, weaker consumer confidence, worse financing conditions, lower expected output growth, lower employment, higher unemployment, decreased job creation, a weaker fiscal position, deteriorating terms of trade, and weaker global demand signal a more negative tone. A score of +1 indicates a very positive tone, a score of -1 indicates a very negative tone, and a score of 0 indicates a neutral tone. Assess only sentiment related to the perceived state of the economy, not ECB monetary policy decisions or the inflation outlook.

Common output. Return a dictionary with keys being the keys of the input JSON file, values as an array with two entries for each report, the 1st entry being a score between -1 and +1, and the 2nd entry being a short (max 2 sentences) explanation as to why you chose this score. This is how the array will look: '{ix_1: [score_1, short_explanation_1], ..., ix_n: [score_n, short_explanation_n]}' where ix_i is the ith report index (key of the input dictionary), and score_i is the decision score (a continuous number in the interval between -1 and 1, indicating how hawkish/dovish the tone of the report is regarding the input topic as discussed in the ECB text document).

Below is an example of a Goldman Sachs report covering the 16 March 2023 Monetary Policy decision of the ECB Governing Council.

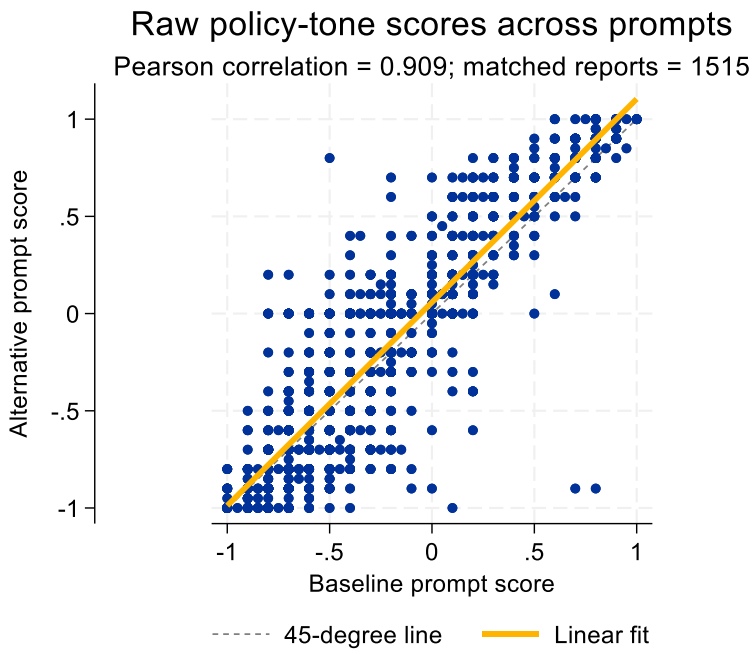
This report was given a monetary policy sentiment score of +0.5 (moderately hawkish). Importantly, however, the “recap” report updates the analysts’ policy outlook that was articulated in the “preview” report a few days prior, with a dovish offset and a smaller rate hike projection for the next meeting.

Chart D.1: Example of how GPT interprets an analyst report



Source: Goldman Sachs Research Portal
Notes: Report covering the 16 March 2023 Monetary Policy Decisions by the ECB Governing Council.

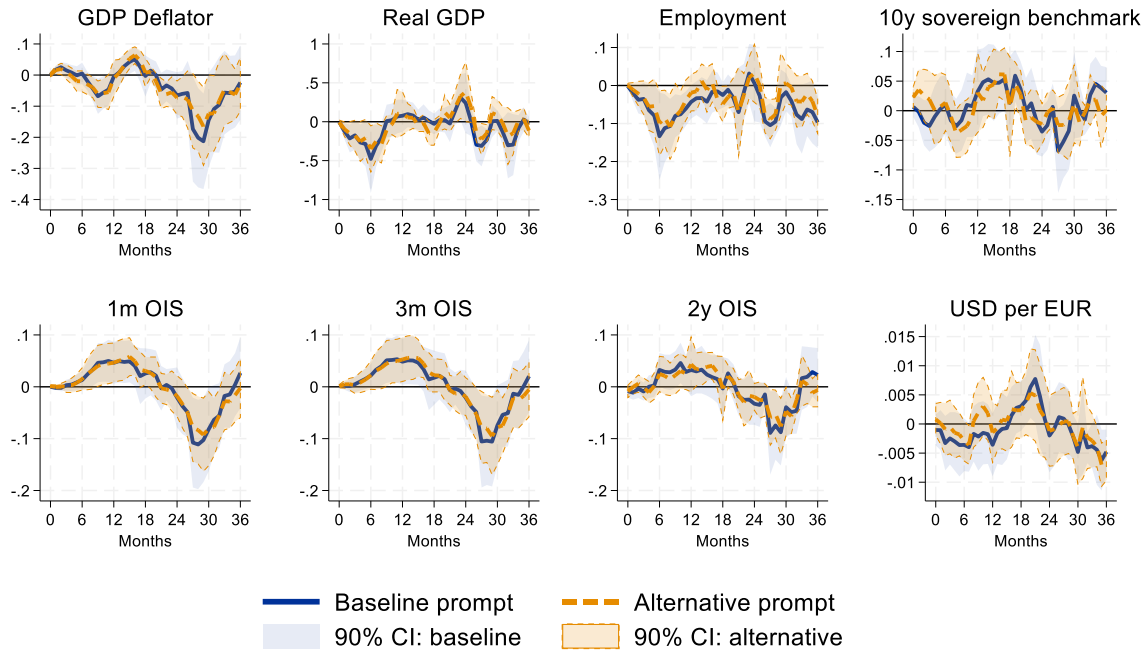
Chart D.2: Report-level monetary-policy tone scores under the baseline and alternative prompts



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; and staff calculations.
Notes: Each point represents the monetary-policy tone score assigned to the same analyst report under the baseline and alternative prompts. Scores range from −1, indicating a very dovish tone, to +1, indicating a very hawkish tone. The dashed line is the 45-degree line, and the solid line is the linear fitted relationship. The Pearson correlation is 0.909 across 1,515 matched reports.

The two prompts generate closely related classifications of monetary-policy tone. The correlation of 0.909 indicates that the extracted signal is largely preserved when more detailed contextual guidance and examples are added. The relationship is not mechanical, however, which motivates examining whether the downstream shock and its estimated effects are also robust to the expanded prompt.

Chart D.3: Comparison of responses under the baseline and expanded prompt specifications



Sources: BNP Paribas; Deutsche Bank; Goldman Sachs; J.P. Morgan; Morgan Stanley; Société Générale; Eurostat; ECB; Bloomberg Finance L.P.; Altavilla et al. (2019); and staff calculations.
Notes: Lines show impulse-response estimates based on policy interpretation shocks constructed using the baseline and expanded prompts. Both specifications contain two monthly lags and use identical data, controls, samples and shock-construction procedures; only the underlying LLM scores differ. Each shock is rescaled to one standard deviation of its own distribution. Shaded areas report pointwise 90% confidence intervals. Macroeconomic responses are expressed in percentage terms, interest rates and yields in percentage points, and the exchange rate in US dollars per euro.
Regression sample: June 2011–March 2025.
Latest observation used in the t+h responses: May 2025.

The expanded prompt produces response paths that are broadly similar to the baseline across the macroeconomic variables and the OIS curve. The timing of the initial macroeconomic contraction and the rise and subsequent reversal in OIS rates is preserved. Differences are more visible for employment, the sovereign yield and some longer-horizon responses, but the confidence intervals overlap substantially. Prompt formulation therefore affects some individual estimates without changing the central macro-financial pattern.

Acknowledgements

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