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IDENTIFYING MONETARY POLICY SHOCKS IN A SMALL OPEN ECONOMY: A HIGH-FREQUENCY AND NARRATIVE APPROACHES IN ARMENIA

WORKING PAPER WP-2026-01

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Artyom Ghazaryan ⁽¹⁾, Anahit Matinyan ⁽²⁾, Gevorg Minasyan ⁽³⁾, and Aleksandr Shirkhanyan ⁽⁴⁾

ABSTRACT

Quantifying the transmission of monetary policy in emerging markets remains a significant challenge due to data scarcity and structural shifts. This study addresses these constraints by identifying monetary policy shocks in Armenia through a dual approach: a high-frequency method following Bu et al. (2021) and a modified narrative strategy adapted from Romer & Romer (1989). We propose a specific modification to the narrative approach that allows identification even when qualitative information is limited, thereby extending the utility of narrative methods to economies outside the advanced-market spectrum. Despite their distinct methodologies, the shocks identified by both approaches exhibit qualitative consistency. Using these shocks within a Local Projection framework, we estimate the impulse responses of the economic activity index, inflation, the real effective exchange rate, and short-term government bond yields. Our findings indicate that while financial variables respond immediately and sharply to monetary policy, the effect on inflation materializes with a lag. These findings provide a refined empirical basis for understanding monetary policy propagation in Armenia and offer a methodological roadmap for identification in data-limited environments.

Keywords:	Monetary Policy; Shock Identification; High-Frequency; Narrative; Monetary Policy Transmission
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1. INTRODUCTION

Identifying exogenous monetary policy shocks is essential for understanding the functioning of its transmission channels. Because central banks systematically adjust interest rates in response to evolving macroeconomic conditions, observed policy changes are often endogenous to the economic environment. This simultaneity creates a fundamental identification challenge as it becomes difficult to disentangle whether an observed economic outcome was driven by the policy action itself or by the underlying conditions that prompted the central bank's move. As Romer & Romer (2004) underscore, using policy measures that are not purged of these systematic responses can severely bias our inferences. For example, if interest rates tend to rise during economic expansions as a reaction to strengthening conditions, a naive analysis might underestimate the contractionary impact of rate hikes because those hikes coincided with good times. Likewise, when central banks preemptively cut rates upon seeing signs of a looming recession, output may still fall after the cut of interest rates, not because the policy was ineffective, but because the cut was responding to adverse news.

While simultaneity constitutes a traditional challenge, the identification of shocks has become even more complex due to the evolving communication strategies of modern central banks. By expanding their use of forward guidance and information disclosure, policymakers have blurred the distinction between policy actions and private economic assessments. A growing body of research, including Romer & Romer (2000), Nakamura & Steinsson (2018), Hansen et al. (2019), Ciminelli et al. (2022), and Bauer & Swanson (2023), demonstrate that central bank communication plays an important role in the transmission of monetary policy. Policy announcements often contain two components: direct policy action (e.g., an interest rate change) and signals about the central bank's economic outlook and assessment of underlying fundamentals. Recent research emphasizes that failing to disentangle these channels can lead to biased conclusions about the effectiveness of monetary policy (see Campbell et al., 2012; Jarociński & Karadi, 2020). In theory, a standard or “pure” monetary tightening raises discount rates and lowers the present value of future cash flows, which should pressure stock prices downward. However, if stock prices rise alongside an interest rate increase, it suggests that market participants interpreted the central bank's action not as a mere policy tightening but as a signal of favorable economic news. In such a scenario, the announcement may have revealed stronger-than-expected growth prospects or other improved fundamentals that bolstered investor confidence, overshadowing the mechanical effect of higher discount rates.

Therefore, ignoring the informational content embedded in policy announcements can distort estimates of monetary transmission.

Despite significant methodological progress in the identification of monetary policy shocks, important gaps remain in the literature, particularly in relation to small open economies within emerging regions. While most empirical studies have concentrated on advanced economies that benefit from deep financial markets and abundant quantitative and qualitative data, the application of these methods to less-developed settings remain relatively underexplored. Economies of smaller scale often encounter several constraints, including shallow financial markets and frequent structural shifts that complicate the reliable identification of exogenous policy shocks. Moreover, these countries are especially susceptible to external disturbances such as global interest rate fluctuations, commodity price volatility, or capital flow reversals, which can obscure the effects of domestic monetary interventions. Consequently, there exists a limited number of empirical studies that explicitly identify monetary policy shocks in emerging country contexts (see Mallick & Sousa, 2012; Aruoba et al., 2021; Abramov et al., 2022). In addition, although methodological interest in comparing identification strategies has grown, direct empirical assessments of high-frequency and narrative approaches remain uncommon in these economies, despite evidence from more data-rich environments suggesting that both approaches yield consistent macroeconomic conclusions (Ramey, 2016).

To address this gap, this study focuses on identifying exogenous monetary policy shocks in the Armenian context by applying and adapting two established identification strategies: the high-frequency (market-based) approach and the narrative approach. Armenia represents a data-constrained environment in which deep futures or options markets are absent and qualitative information is limited, while recent changes in policy communication may provide new opportunities for shock identification. We implement the heteroskedasticity-based high-frequency approach developed by Bu et al. (2021), which allows us to distinguish between pure policy shocks and information effects using only government bond yields across different maturities. In parallel, we develop a modified narrative identification procedure tailored to the available institutional information, drawing on monetary policy statements, inflation reports, and scenario analyses to construct a transparent and replicable series of narrative shocks.

The first strategy exploits asset price movements in narrow windows around policy announcements. Following the seminal work of Kuttner (2001) and others (e.g., Gürkaynak, Sack, & Swanson, 2005; Gertler & Karadi, 2015), this method assumes that immediate changes in financial

instruments following a central bank decision reflect the unexpected component of that decision, as other macroeconomic information is unlikely to influence prices within such a narrow window. Recent advances have extended this framework to decompose these market surprises into “pure” policy shocks and information shocks, utilizing co-movements between interest rates and stock prices (e.g., Jarociński & Karadi, 2020; Cieslak & Schrimpf, 2019). We demonstrate the feasibility of identifying exogenous shocks in a data-constrained environment by implementing the heteroskedasticity-based high-frequency approach suggested by Bu et al. (2021) and further developed by Ciminelli et al. (2022). This methodology is particularly advantageous for our purposes as it enables the distinction between pure policy shocks and information effects using only government bond yields across maturities. Importantly, this allows us to bypass the reliance on deep futures or options markets, which are often unavailable in emerging economies. Conversely, the narrative approach provides a qualitative alternative to market-based identification. Pioneered by Friedman & Schwartz (1963) and formalized by Romer & Romer (1989, 2023), this method utilizes historical records to pinpoint policy actions that were not routine responses to economic conditions. By examining minutes, reports, or transcripts, researchers isolate dates when policymakers deliberately tightened or eased policy based on judgment or concerns not captured by standard policy rules.

To operationalize this in Armenia, we developed a modified narrative identification procedure tailored to the available qualitative data, especially the lack of monetary policy transcripts. Our methodology for identifying narrative shocks relies on a continuous, systematic analysis of qualitative data—specifically monetary policy minutes, statements, and inflation reports—across the full sample period. Although this core identification strategy does not change, the introduction of the Prudent Risk Management Approach to Price Stability (also known as FPAS Mark II; Archer et al., 2022) in 2024 expanded the volume of available policy communication. Consequently, for the post-2024 period, our methodology incorporates these newly available and richer materials, such as scenario analyses and Board discussions. We apply a consistent decision rule to identify episodes where policy deviated from its expected path due to non-systematic factors, offering a transparent and replicable methodology for other researchers facing similar data limitations.

Finally, using Jordà’s (2005) local projection method, we trace the impulse responses of output (proxied by the economic activity index), inflation, exchange rates, and government bond yields to both the high-frequency and narrative shocks. This comparative analysis allows us to assess the impact of monetary policy. The Local Projection estimates indicate that financial variables are

sensitive to monetary policy shocks, reacting quickly, intuitively, and significantly. A distinction arises between shock types: 'pure' shocks lead to a significant disinflationary effect after 16 months. In contrast, narrative shocks, which are identified during periods of elevated economic volatility, yield wider confidence bands. Despite this uncertainty in the case of narrative shocks, the short-term impact on financial variables remains statistically significant.

The rest of the paper is organized as follows. Section 2 describes the data and methodology, presenting our high-frequency and narrative shock identification strategies. Section 3 reports the results and interpretation, including discussion of monetary policy shocks, comparison of the shock measures, an analysis of the macroeconomic responses using local projections, and robustness checks to ensure our findings are not sensitive to specific assumptions. The final part of the paper discusses the policy implications and concludes with a summary of the key findings.

2. DATA AND METHODOLOGY

2.1. Data

To analyze the impact of monetary policy, this study constructs exogenous monetary policy shocks using two different identification approaches, covering the period from July 2013 to June 2025. The first approach employs a high-frequency identification method based on quantitative data, following Bu et al. (2021), which requires only a limited amount of data for implementation. This approach relies on daily yield curve data (from 1 year to 30 year) and monetary policy announcement dates obtained from the CBA.

Table 1. Summary Statistics for Yield Curve Data

Maturity	Obs.	Mean	Std. Dev.	Min	Max
1y	3028	8.63	2.15	5.49	15.59
2y	3028	9.22	2.19	5.92	14.22
3y	3028	9.66	2.20	6.19	14.84
5y	3028	10.23	2.19	6.61	15.42
7y	3028	10.60	2.15	7.02	15.84
10y	3028	10.97	2.08	7.61	16.17
20y	3028	11.46	2.04	8.12	16.44
30y	3028	11.81	2.08	8.45	16.72

Source: Central Bank of Armenia

Note: The sample period covers daily data from July 2013 to June 2025

Table 1 summarizes daily yield curve data from 2013 to 2025 collected from CBA, showing an average upward-sloping term structure where mean of yields rise from 8.63% (1-year) to 11.81% (30-year). The statistics indicate higher volatility at the short end of the curve compared to the long end, while the wide range between minimum and maximum values reflects significant shifts in economic conditions over the sample period.

The second approach (Romer & Romer, 1989, 2023) requires qualitative data. We apply this identification methodology uniformly across our entire sample, simply adapting to the volume of information available at the time. Prior to 2024, our analysis relies on CBA’s monetary policy minutes, press releases, and quarterly inflation reports. Starting from January 2024, the CBA introduced the Prudent Risk Management Approach to Price Stability. Through new publications like the Transparency Report and the Executive Monetary Policy Statement, alongside quarterly meetings with financial analysts, the CBA provides deeper insights into domestic and external economic conditions. While our core approach remains unchanged, this newly qualitative information allows for a better understanding of the underlying thinking that guides the monetary policy decisions of each Board member. During the analysis, we reviewed 72 monetary policy minutes, 48 inflation reports, 84 press releases, 12 transparency reports, and 12 executive monetary policy statements.

Table 2. Summary Statistics for Variables of Interest

Variable	Obs.	Mean	Std. Dev.	Min	Max
Economic Activity Index	144	5.63	6.67	-16.70	23.40
CPI	144	2.91	3.3	-2.41	10.54
Real Effective Exchange Rate	144	155.28	52.60	107.81	270.38
1-Year Gov. Bond Yield	144	8.61	2.15	5.52	14.37

Source: Statistical Committee of Armenia and Central Bank of Armenia.

Note: The sample period covers monthly data from July 2013 to June 2025

Table 2 summarizes descriptive statistics of key macroeconomic variables employed in our Local Projection framework. The dependent variables include the economic activity index from the Statistical Committee of Armenia, the consumer price index, the real effective exchange rate, and short-term government bond yields collected from the CBA. All variables are measured at monthly frequency and are seasonally adjusted.

2.2. Methodology

This section outlines the empirical strategy used to identify exogenous monetary policy shocks in Armenia and to assess their macroeconomic effects. We proceed in three steps. First, we describe the construction of the monetary policy shock series by using a high-frequency approach. The second step is a discussion of the definitions of the narrative shocks. Each approach relies on different sources of information and identification assumptions, which are discussed in detail in the corresponding subsections. Third, we present the framework used to evaluate the dynamic effects of these shocks on key macroeconomic and financial variables. Together, this structure allows for a transparent comparison of alternative identification strategies and their implications for monetary policy transmission in a data-constrained environment.

2.2.1. High-Frequency Identification Approach

Our first identification strategy adopts the high-frequency approach of Bu et al. (2021), extracting monetary policy surprises from changes in government bond yields observed around policy announcement days. The key assumption is that within a narrow window surrounding an announcement, movements in bond yields primarily reflect unexpected monetary policy changes, rather than broader macroeconomic developments. Within this framework, we distinguish between two components of the surprise, including pure monetary policy shocks, which capture unanticipated shifts in the policy stance unrelated to prevailing economic conditions, and information shocks, which reflect new signals communicated by the central bank about the economic outlook and fundamentals or its expected future policy path.

To implement this approach, we utilize Armenian government bond yield data, which are available at fifteen distinct maturities. To construct a smooth term structure extending from one to thirty years, we apply the same interpolation technique employed by the CBA in its official yield curve methodology. While longer-term yields tend to be less responsive to short-term policy shifts, they nonetheless carry valuable information that aids in disentangling policy shocks from information effects (Bu et al., 2021; Brennan et al., 2024). To understand the main deviation caused by monetary policy, we measure the change in the policy indicator on announcement days and subtract the corresponding change from the week before the meeting, which helps filter out the usual noise in the yield curve.

In this framework, the true monetary policy shock is unobservable, and yield movements around policy announcements reflect either a pure policy shock or an information news shock. We identify the shocks using the Fama & MacBeth (1973) two-step procedure. In the first step, we estimate the sensitivity of each outcome variable (government bond yields with maturities of 1 to 30 years) to monetary policy via time-series regressions, according to:

$$\Delta R_{it} = \alpha_i + \beta_i e_t + \varepsilon_{it} \quad (1)$$

where ΔR_{it} is the change of yield of bond with maturity i -year, e_t is the pure monetary policy shock, and ε_{it} is the error term. We assume the error term ε_{it} is uncorrelated with the unobserved monetary policy shock e_t , and that the identification assumptions follow those outlined in Bu et al. (2021) and Hansen et al. (2019).

We then normalize the policy shock to have a one-to-one relationship with the 3-year yield to maturity¹, which captures both level and slope dynamics of the yield curve. Due to our normalization, we can rewrite Equation (1) as:

$$\Delta R_{it} = \theta_i + \beta_i \Delta R_{3t} + \xi_{it} \quad (2)$$

where $\xi_{it} = -\beta_i e_{3t} + \varepsilon_{it}$ and θ_i is a constant. Since ε_{it} is the error term in the policy indicator, the regressor ΔR_{3t} is correlated with the error term ξ_{it} (due to common component $-\beta_i e_{3t}$), resulting in biased OLS estimates of β_i . This presents a classical errors-in-variables problem, which we address using the heteroskedasticity-based estimator proposed by Rigobon (2003) and Rigobon and Sack (2004). Specifically, we estimate β_i using an instrumental variables (IV) approach, based on the assumption that the variance of the true monetary policy shock increases on CBA announcement days, while the variance of non-policy-related news remains unchanged.

In the second step, by analogy to Fama & MacBeth (1973), we extract the pure monetary policy shock by performing cross-sectional regressions of ΔR_{it} on the estimated sensitivity coefficients $\hat{\beta}_i$ for each policy announcement date t .

¹ The monetary policy shocks identified using one-year and three-year government bond yields as instruments are nearly identical. The correlation between the two series is 0.98 for pure monetary policy shocks and 0.99 for information news shocks. Similar robustness across instrument maturities has been documented in the literature, including Bu et al. (2021) and Ciminelli et al. (2022).

$$\Delta R_{it} = \delta_i + e_t^{\text{pure}} \hat{\beta}_i + v_{it} \quad (3)$$

where e_t^{pure} is the coefficient of interest. The pure monetary policy shock series is then obtained as the series of these estimated coefficients.

In our estimation procedure, for the final step, we follow Ciminelli et al. (2022), which involves isolating the residual component from regressing policy indicator on pure monetary policy shock. Information news shocks reflect the central bank's private assessment of the economy, where a rise in interest rates is interpreted by markets as a confirmation of stronger future growth rather than a tightening of financial conditions.

2.2.2 Narrative Identification Approach

The main idea of the narrative approach is to use qualitative data to analyze the topics of interest. In this case main purpose of this methodology to identify the monetary policy shocks. For this approach, we follow Romer & Romer (1989, 2023). For this method to be effective, it is essential to have a reliable source of data and to employ unbiased judgment. To achieve this, it is crucial to establish clear definitions and present findings transparently.

The narrative approach was introduced by Friedman & Schwartz (1963) in their Monetary History of the United States. The approach gained significant popularity following the influential work of Romer & Romer (1989), which provided a robust framework for this type of analysis. As highlighted by Romer & Romer (2023, Appendix A), their primary data sources for identification include the Minutes, the Memoranda of Discussion, and the Transcripts. Before 2024, the FPAS Mark I framework prioritized discussions regarding the baseline scenario. For this period, our primary sources of qualitative data are monetary policy minutes and press releases. We also review Inflation Reports to support these findings. Starting from January 1, 2024, the Central Bank of Armenia introduced a new framework for monetary policy implementation. Under the risk management framework, instead of relying on a single baseline scenario, they now consider multiple scenarios and each quarter publish at least two of them, where Case A requires higher policy path compared to market expectations. In contrast Case B requires lower policy path compared to market expectations. By doing so, the CBA aims to implement policy in a more transparent way and clearly communicate the various risks facing the domestic and global economies. Through the publication of the Transparency Report and the Executive Monetary Policy Statement, the CBA provides

deeper insights into policymakers' perceptions of risks, the future path of monetary policy, and the state of domestic and external economic conditions. This new qualitative information supports a better understanding of the underlying thinking that guides the monetary policy decision of each Board member, but it does not fully capture the deliberative nuances preserved in monetary policy transcripts.

Following Romer & Romer (2023), the evidence supporting the classification of each event as a shock will be reviewed in this paper, thereby enhancing the credibility and transparency of the results. A thorough reading of the full publication and detailed documentation of each policy meeting are essential for understanding the decision-making process. This is particularly important in narrative methodology, as it enables more accurate identification of policymakers' intentions and responses to economic conditions. With the implementation of monetary policy shock identification, a careful approach is now required to track the Board's evolving views on the future policy path. To that end, this shock identification approach will continue following the Romer & Romer (2023) methodology to detect instances where the policymakers' views on inflation shift, potentially leading to deviations from the standard policy rule. Definitions for positive and negative shocks will be presented in the following form:

Negative Shock: Negative monetary policy shock is defined as an unanticipated tightening of policy. The analysis also considers indicators that policymakers were prepared to accept the potential short term negative impact on output in order to reduce inflation. This occurs when policymakers raise the policy rate despite relatively stable inflation, arguing that the current inflation rate is not at a satisfactory level or expect an upcoming increase in future inflation expectations.

Positive Shock: Positive monetary policy shock defined as an unanticipated expansion of monetary policy. Policymakers' understanding that this type of policy can have short term consequences on output will be considered. The analysis focuses on periods of relatively stable inflation during which policymakers were dissatisfied with that level of inflation or there is sudden decrease in future inflation expectations and they began reducing interest rates.

Due to the unavailability of full monetary policy transcripts, including Board discussions, the *sufficient level of inflation* will be assessed by analyzing past monetary policy decisions. Specifically, the analysis will examine whether policymakers previously adjusted policy rates in response to similar inflationary conditions, as well as the broader stance reflected in monetary policy minutes. By a *similar inflationary environment*, we refer to periods in which no new or significant inflationary pressures emerged relative to the previous monetary policy meeting.

Finally, while narrative analysis aims to date shocks based on instances when policymakers show a willingness to bear short-term output costs in pursuit of price stability, this criterion may be only partially satisfied due to the limited availability of Board discussions documents. In this context, *output cost* refers to the potential short term adverse effects on real activity arising from contractionary monetary policy during periods of recession or weak demand and vice versa for positive shock. In such circumstances, a tightening policy may impose additional economic costs. Observing policy actions under these conditions offers insight into policymakers' commitment to reducing inflation, even when this entails possible short term output losses to deliver long term macroeconomic stability. We use similar intuition for expansionary cases.

Possible reasons for these unanticipated policy movements may include possible future unexpected fluctuating inflation expectations, heightened uncertainty, or other events affecting medium-term price stability target.

2.2.3 Analyzing the Impact of Shocks on Macroeconomic Variables

To analyze the impact of identified monetary policy shocks, we follow Jordà (2005) and employ the Local Projection method. As discussed in Jordà (2023), to capture the cumulative percentage change in the outcome variable following a shock, the long-difference approach is used in the left-hand side of the equation. The model is specified as follows:

$$\mathbf{y}_{t+h} - \mathbf{y}_{t-1} = \alpha_h + \beta_h \mathbf{mp_shock}_t + \gamma_h \mathbf{inf_shock}_t + \sum_{j=1}^p \delta_{hj} \mathbf{X}_{t-j} + \epsilon_{t+j} \quad (4)$$

where, $\mathbf{t}$ denotes time, $\mathbf{h}$ represents horizon, the $\mathbf{y}_{t+h} - \mathbf{y}_{t-1}$ is the long difference (cumulative change over the horizon $\mathbf{h}$) of the variable of interest, $\mathbf{mp_shock}$ and $\mathbf{inf_shock}$ are the pure monetary policy and information news shock variables², respectively. $\mathbf{p}$ is the number of lags for the control variables, which is 3 in this case. $\mathbf{X}_{t-j}$ is a set of control variables (economic activity index, consumer price index, real effective exchange rate and short-term interest rates lagged by j periods, and ϵ_{t+j} is the error term. We report Newey-West standard errors to correct for potential heteroskedasticity and serial correlation. An identical model was estimated for the narrative shocks,

² Pure monetary policy and information news shocks standardized to have unit variance and zero mean. It was done for comparability and interpretation of the shock's impact

where the shock event is captured by a dummy variable equal to 1 in the shock period and 0 in all other periods.

3. RESULTS AND INTERPRETATION

3.1 Discussion of Identified Narrative Shocks

Shock № 1

Date: 23.12.2014

Decision: At the December 23, 2014 meeting, the Board of the Central Bank decided to raise the refinancing rate by 1.75 percentage points to 8.5%, with Lombard Repo and Deposit Facility rates increased to 20.0% and 7.0%, respectively³.

In late 2014, Armenia was hit by a severe external shock originating from Russia, its primary trading partner. Escalating geopolitical tensions involving Russia, combined with a sharp decline in global oil prices, triggered a pronounced deterioration in the Russian economy. The sharp depreciation of the Russian ruble spilled over into Armenia's foreign exchange market, leading to a rapid increase in volatility and risk premia. This contagion effect was largely driven by Armenia's dependence on the Russian economy. At the time, approximately 73.2% of total money transfers to individuals originated from Russia, making household income and domestic demand highly vulnerable to Russian economic shifts. Furthermore, as an import-oriented country, Armenia faced heightened sensitivity to exchange rate shocks, as currency fluctuations directly threatened price stability and especially inflation expectations. These developments generated negative spillovers to Armenia through trade, remittance, and financial channels.

The external shock was accompanied by heightened financial market stress. The sharp depreciation of the Russian ruble spilled over into Armenia's foreign exchange market, leading to a rapid increase in volatility and risk premia. On December 17, 2014, the exchange rate depreciated sharply, recording a daily loss of 7.52 percent. Tensions in money markets intensified concurrently: the monthly average interbank repo rate increased by 12.7 percentage points, reaching 19.8 percent by

³ Central Bank of Armenia, December 2014, Monetary Policy Minutes.

late December. These developments reflected a sudden tightening of financial conditions amid rising uncertainty and capital outflow pressures.

At the time of the shock, inflationary pressures were subdued. In September and November 2014, headline inflation remained below the CBA's target, and the policy rate was held unchanged at 6.75 percent. Annual inflation stood at 1.0 percent in October 2014, compared with 0.3 percent a year earlier, while 12-month inflation reached 2.2 percent, approaching the lower bound of the confidence band. Policymakers initially expected inflation to continue converging toward the target and to stabilize around it.

By November 2014, inflation edged up modestly: headline inflation rose to 1.3 percent year-on-year, and 12-month inflation increased to 2.6 percent. This acceleration was driven primarily by food prices, which rose by 3.2 percent, with the largest increases observed in fruits, vegetables, and potatoes. Core inflation remained low at 1.5 percent, indicating that inflationary pressures were largely supply-driven rather than the result of strengthening domestic demand. While the 12-month inflation remained generally low, an analysis of monthly data reveals a significant shift in price dynamics. The momentum shifted abruptly from the November to December: monthly core inflation rose by 0.4% in November, followed by a substantial 2.5% surge in December. Such rapid month-on-month increases suggest that the market was reacting to immediate shocks and heightened uncertainty, volatility that the smoothed annual averages failed to capture.

Despite the weak growth outlook and inflation remaining below target, the CBA responded decisively to the external shock and the associated economic uncertainties which may cause unanchored inflation expectations. In late November 2014, the CBA increased the Lombard Repo Facility Rate to 8.25 percent, followed by a sharp increase to 21.0 percent in December. This was followed in mid-December by a substantial tightening of liquidity conditions through an increase in the reserve requirement ratio on foreign-currency liabilities from 12.0 percent to 24.0 percent. Short-term market rates adjusted rapidly and stabilized around the Lombard Repo Facility Rate, reflecting the broader tightening of monetary and liquidity conditions.

The CBA's decision was driven by concerns that exchange rate depreciation and rising risk premia could de-anchor inflation expectations, even in an environment of weak output and subdued current inflation. Policymakers also noted elevated uncertainty in global financial conditions and expectations of monetary tightening in advanced economies, particularly the United States. Although inflation was projected to converge toward the target by the following year, the CBA judged that maintaining an accommodative stance could amplify inflationary risks in the medium

term. Moreover, the policy response should not be interpreted narrowly as a standard increase in the refinancing rate. Rather, it constituted a broader and forceful tightening of monetary conditions through multiple instruments. The overall degree of tightening exceeded what would be implied by the 1.75 percentage point increase in the policy rate alone.

This episode is classified as a monetary policy shock because the CBA explicitly acknowledged the potential short-term costs to output. The tightening was implemented during a period of weak economic activity and below-target inflation, reflecting a deliberate decision to prioritize the stabilization of expectations and financial conditions in the face of a large, externally driven shock. In this sense, policymakers demonstrated a willingness to accept short-term output losses to mitigate the macroeconomic risks and heightened uncertainties.

Shock №2

Date: 15.12.2020

Decision: At the December 15, 2020 meeting, the Board of the Central Bank of Armenia decided to raise the refinancing rate by 1.0 percentage point to 5.25%⁴.

The Armenian economy was hit by a sequence of large, exogenous shocks in 2020, beginning with the outbreak of the COVID-19 pandemic and compounded later by the escalation of regional hostilities. COVID-19 first emerged in December 2019 and spread rapidly across countries, prompting the World Health Organization to declare a global pandemic on March 11, 2020. The pandemic severely disrupted economic activity worldwide and placed significant strain on healthcare systems. In Armenia, these effects were amplified by heightened geopolitical uncertainty following a severe escalation of the regional conflict in late September 2020, creating an unusually adverse and uncertain macroeconomic environment.

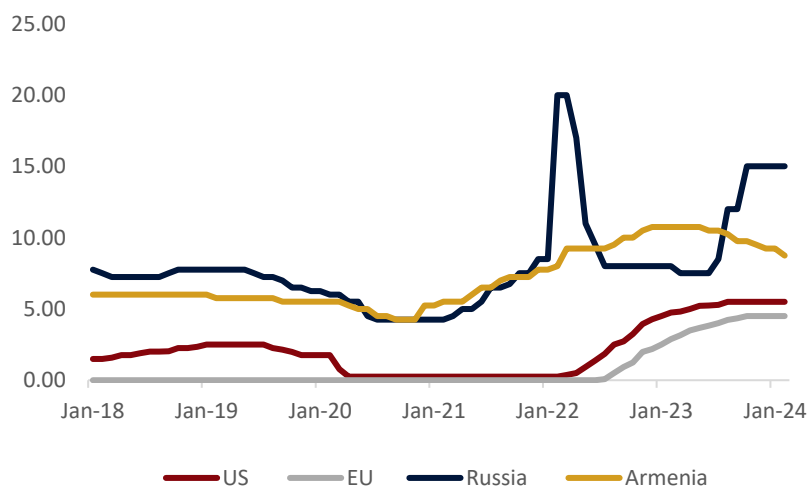
The impact of these shocks on economic activity was severe. Containment measures, mobility restrictions, and disruptions to services led to a sharp contraction in output, particularly in contact-intensive sectors. Economic activity remained weak throughout the year, with GDP contracting by 9.1 percent year-on-year in the third quarter of 2020, driven largely by declines in services. The declaration of martial law on September 27 further intensified uncertainty regarding the depth and persistence of the economic downturn. At the onset of the crisis, inflationary pressures were muted.

⁴ Central Bank of Armenia, December 2020, Monetary Policy Minutes

Following a shift toward a stimulative monetary policy stance that began in January 2019, the CBA maintained an accommodative policy in early 2020, complemented by expansionary fiscal measures. In September 2020, inflation registered a slight deflation of 0.2 percent, compared with inflation of 0.2 percent in the same month of the previous year, while 12-month inflation stood at 1.4 percent, well below the 4 percent target. These developments reflected weak domestic demand amid the pandemic and ongoing uncertainty.

By November 2020, headline inflation increased modestly to 1.3 percent year-on-year, compared with 1.1 percent a year earlier, and 12-month inflation rose to 1.6 percent. Core inflation reached approximately 2.0 percent, remaining below target but suggesting some firming in underlying price dynamics. But measures of inflation already indicated the accumulation of uncertainty. Economic volatility was evident on a month-over-month basis in late 2020, with core inflation reaching 0.5% in October and 0.4% in November. Despite the deep contraction in economic activity, expansionary fiscal measures were expected to provide partial support to aggregate demand, and the annual growth outlook for 2020 remained broadly unchanged at that time.

Figure 1. Comparative Policy Rates: Armenia Pioneers Earlier Monetary Policy Tightening



Source: CBA, FRED, CBR

Against this backdrop, the CBA reassessed the balance of risks. While the Board initially considered keeping the policy rate unchanged to preserve an expansionary stance and support the recovery, concerns emerged regarding the persistence of inflation and the risk of de-anchoring inflation expectations. The combination of pandemic-related disruptions, geopolitical uncertainty, and rising risk premia complicated the inflation outlook. Moreover, as illustrated in Figure 1, major partner central banks initially maintained unchanged policy rates, continuing their expansionary stance

throughout 2021. In contrast, economic agents could interpret the CBA's earlier tightening as excessively contractionary relative to these external conditions.

Following these deliberations, the Board voted to raise the policy rate by 1 percentage point, marking the beginning of a tightening cycle. The decision reflected concerns that inflationary pressures could prove more persistent than initially anticipated and that pre-emptive action was needed to safeguard price stability. Importantly, the CBA was operating under conditions of heightened uncertainty, facing not only the global pandemic but also an additional, country-specific geopolitical shock. This episode is classified as a monetary policy shock because the CBA explicitly recognized the potential short term adverse impact on output. The policy tightening was implemented despite inflation remaining below target and economic activity being weak. Policymakers responded to exogenous increases in risk premiums and the associated rise in the natural interest rate, aiming to prevent an excessively expansionary policy stance that could undermine inflation expectations. In this sense, the decision reflected a deliberate willingness to accept short-term output costs to anchor expectations and mitigate macroeconomic risks arising from extraordinary external shocks.

3.2 Comparison of Monetary Policy Shocks

As discussed previously, we employ high-frequency identification to separate surprises into pure monetary policy shocks and information news shocks. The summary statistics of the identified shocks are presented below.

Table 3. Summary Statistics for Yield Curve Data

Variable	Obs.	Mean	Std. Dev.	Min	Max
Pure monetary policy shock	143	0.0487	0.2571	-0.6166	0.9085
Information news shock	143	-0.0000	0.1252	-0.5138	0.7062

Source: Authors' estimations.

Note: Monetary policy shocks were identified using the Bu et al (2021) and Ciminelli et al. (2022). The analysis covers the period from July 2013 to June 2025. Note that pure monetary policy and information news shocks are in percentage points.

We also identify monetary policy shocks using a narrative approach, through which we detect two contractionary monetary policy shocks, one in December 2014 and another in December 2020.

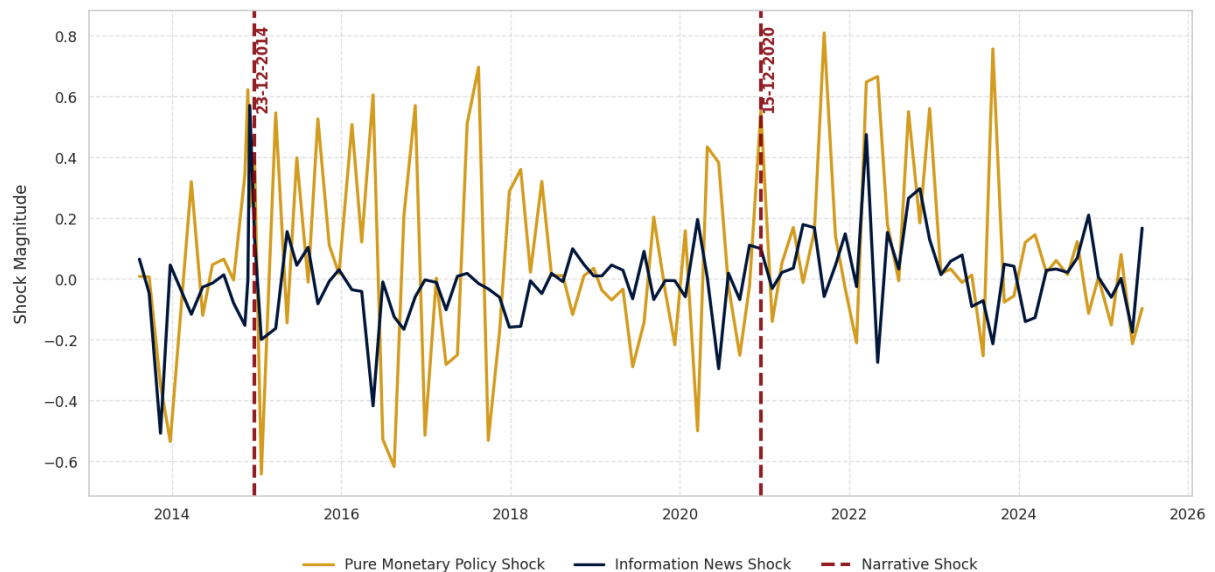
Table 4. Monetary Policy Shocks Identified with the Narrative Approach

Shock Date	Shock Type
December, 2014	Contractionary
December, 2020	Contractionary

Source: Authors' estimations.

Note: Monetary policy shocks were identified using the Romer & Romer (1989, 2023) framework with consistent modifications. The analysis covers the period from July 2013 to June 2025.

Comparing shocks with fundamentally different methodologies is only meaningful if the focus is on their signs only. In high-frequency shock identification by design, contractionary (expansionary) shocks are represented by positive (negative) values. This can serve as a robustness check for both shocks—if their directions align. Figure 2 graphically illustrates the combination of both shocks and their comparison.

Figure 2. Comparison of Monetary Policy Shocks Identified Through Different Approaches

Source: Authors' estimations.

Note: The pure monetary policy shocks and information news shocks have been identified using the methodology of Bu et al. (2021) and Ciminelli et al. (2022). These shocks are presented in their original form and are measured in percentage points. Following Romer & Romer (1989, 2023), the narrative approach is implemented with several previously discussed modifications.

As observed, the identified monetary policy shocks in both cases show consistent directionality. Both cases reveal contractionary monetary policy shocks, which align with the high-frequency shocks identified. On the corresponding dates, both the pure monetary policy and information news shocks exhibit an increase.

3.3 Monetary Policy Shocks Impact on Macroeconomic Variables

Our analysis evaluates the transmission of exogenous monetary policy shocks across various macroeconomic indicators. We specifically monitor the economic activity index to capture output effects, the price level to evaluate the impact of policy shocks to inflation. Furthermore, the inclusion of the real effective exchange rate and one-year government bond yield is to demonstrate the impact of monetary policy on financial market. This allows for an assessment of how unanticipated changes in the policy rate propagate through both the real economy and the external sector.

Figure 3 introduces the dynamic responses to a one-standard-deviation contractionary monetary policy shock. The initial impact is concentrated in financial markets, causing a statistically significant appreciation of the real effective exchange rate and an increase in the 1-year government bond yield. This quick response occurs because financial asset prices are inherently forward-looking, immediately capitalizing on the shift in interest rate policy. Additionally, the pass-through to consumer prices occurs with a substantial lag, as inflation only begins to fall significantly after approximately 18 months. The impact on the Economic Activity Index is not statistically significant.

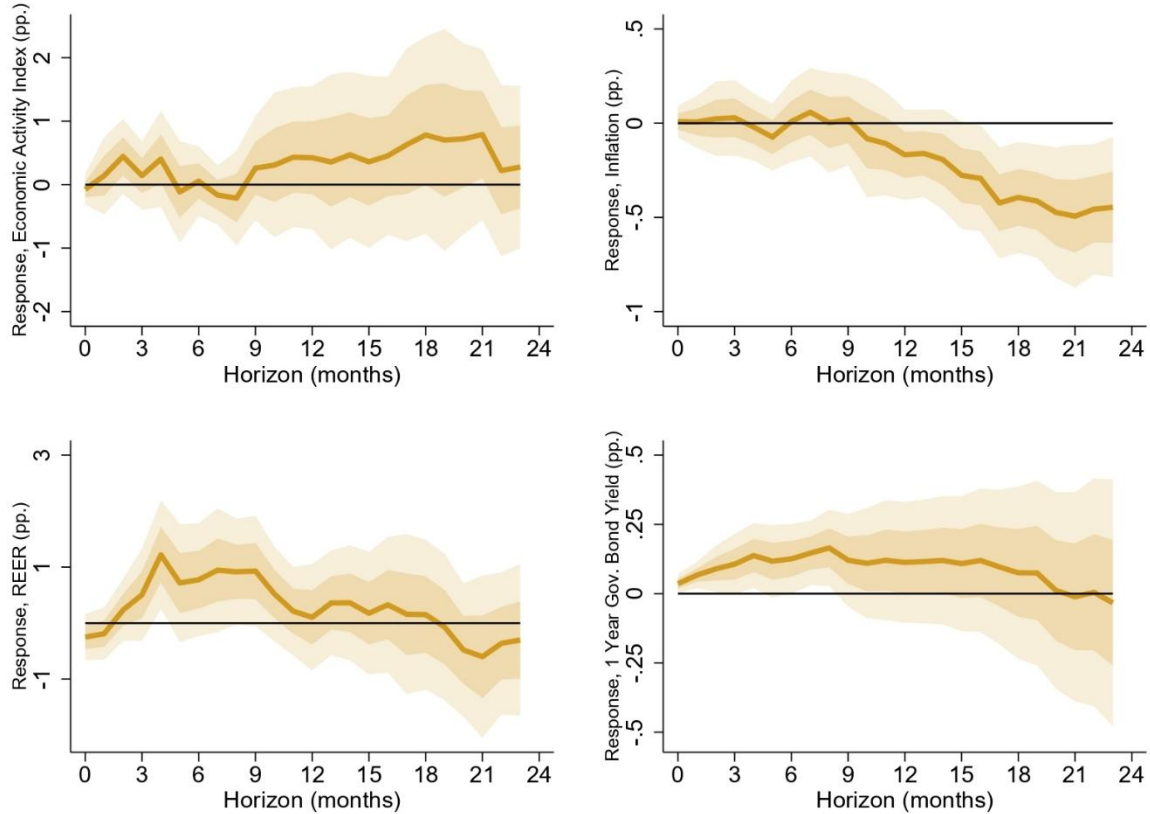
To achieve their mandates, central banks have expanded their policy tools, with communication emerging as an additional instrument in modern monetary policy. Information news shocks reflect positive revelations about the economy within central bank announcements, causing interest rates to increase in response to higher expected growth and capital demand.

Figure 4 illustrates the dynamic impact of an information news shock on the same macroeconomic variables. This shock is interpreted as an unexpected piece of communication from the central bank that shifts market expectations about the future path of monetary policy, essentially, a surprise signal that the policy rate will be higher or lower than previously thought.

The impact is statistically significant and persistent for both real effective exchange rate and 1-year government bond yields. This finding underscores the critical role of the central bank's communication in the transmission of monetary policy in Armenia, highlighting that "managing" financial agents' beliefs about the future policy path is a powerful tool for influencing financial conditions. Unlike a temporary shock to the current rate, a change in the expected future path of rates leads to a sustained adjustment in bond prices, and because of higher expected returns,

appreciation of the real effective exchange rate until the expected policy path is executed or changes again.

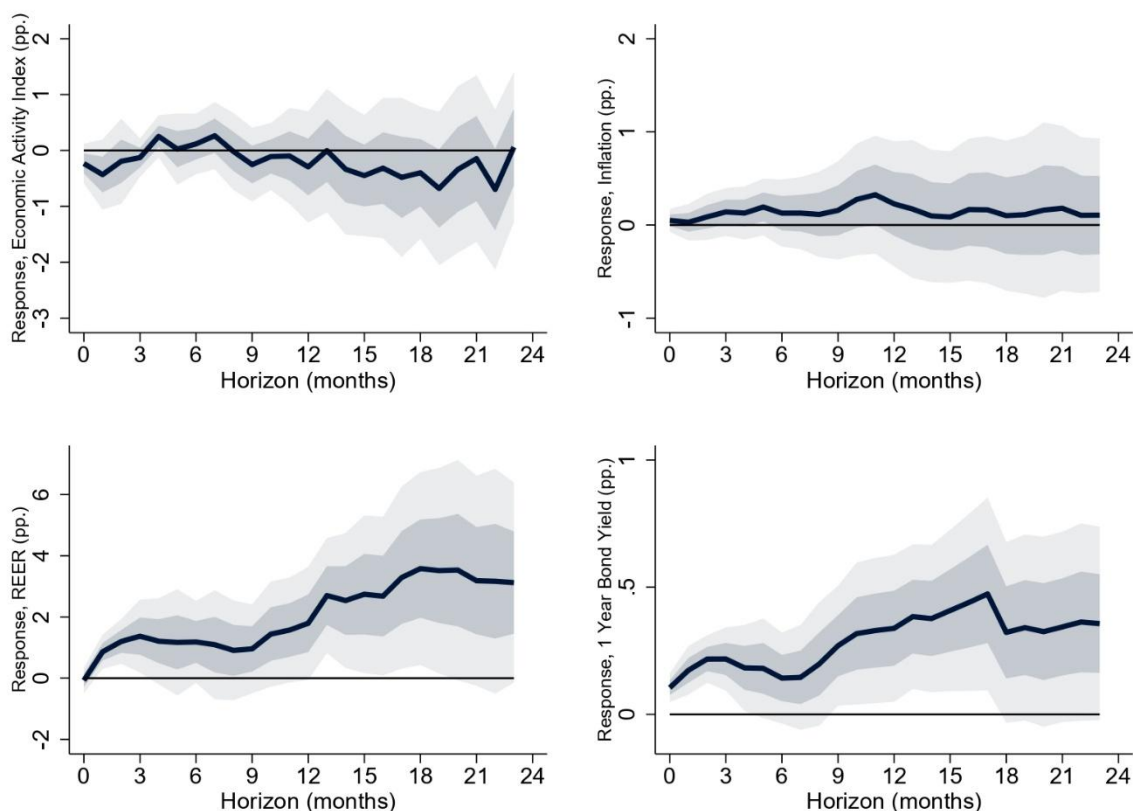
Figure 3. Pure Monetary Policy Shock Impact on Macroeconomic Variables



Source: Authors' estimations.

Note: The outcome variable reflects cumulative changes in each variable of interest. The vertical axis shows percentage points, and the horizontal axis indicates forecast horizons (in months). The sample covers July 2013 to June 2025. The shock corresponds to a pure monetary policy shock identified following Bu et al. (2021). The specification includes three lags of the economic activity index, inflation, the real effective exchange rate, and the one-year government bond interest rate. Shaded areas denote one- and two-standard-deviation pointwise confidence intervals based on heteroskedasticity- and autocorrelation-robust standard errors. The shock is standardized to have zero mean and unit variance. For the real effective exchange rate, a positive response indicates an appreciation.

From the second shock identification approach, the two primary narrative shocks, occurring in December 2014 and December 2020, coincide with periods of exceptionally high macroeconomic and geopolitical uncertainty for the Armenian economy.

Figure 4. Information News Shock Impact on Macroeconomic Variables

Source: Authors' estimations.

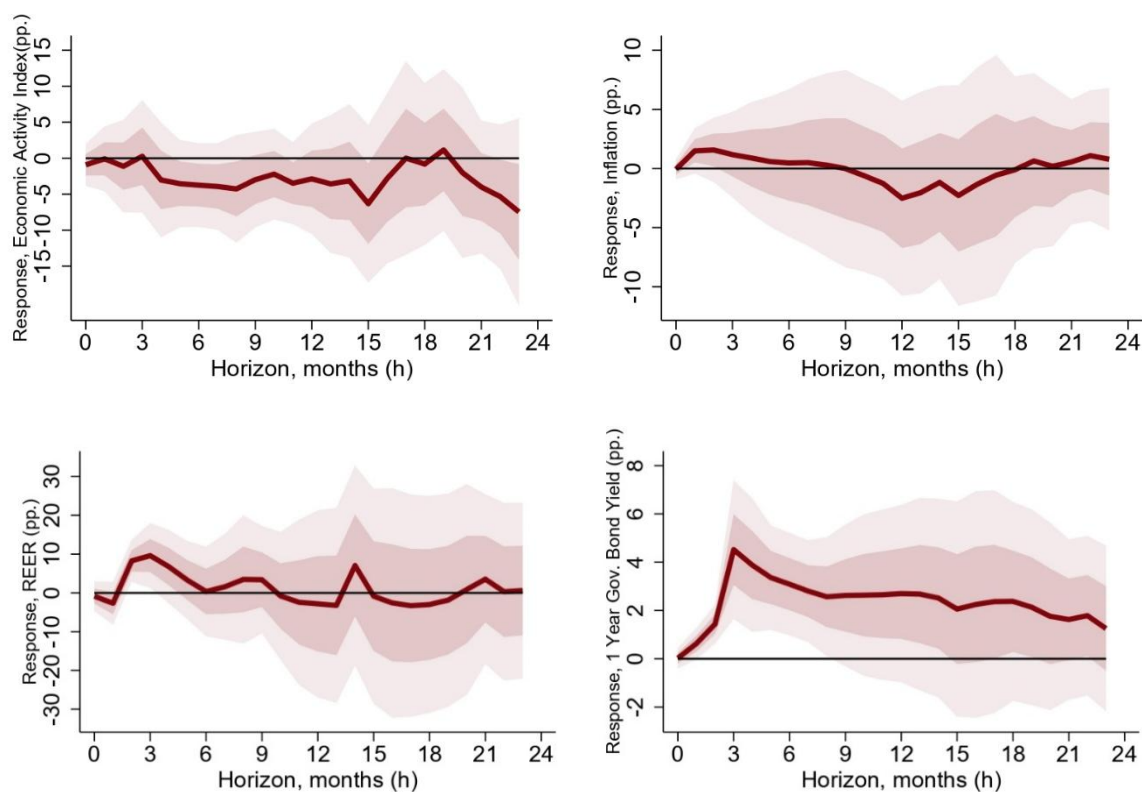
Note: The outcome variable reflects cumulative changes in each variable of interest. The vertical axis shows percentage points, and the horizontal axis indicates forecast horizons (in months). The sample covers July 2013 to June 2025. The shock corresponds to an information (news) shock identified following Bu et al. (2021) and Ciminelli et al. (2022). The specification includes three lags of the economic activity index, inflation, the real effective exchange rate, and the one-year government bond interest rate. Shaded areas denote one- and two-standard-deviation pointwise confidence intervals based on heteroskedasticity- and autocorrelation-robust standard errors. The shock is standardized to have zero mean and unit variance. For the real effective exchange rate, a positive response indicates an appreciation.

Figure 5 introduces the impact of narrative shocks. While the signs of the responses are mainly intuitive, they are generally not statistically significant, except for the real effective exchange rate and 1-year government bonds, which reacted significantly in short horizons.

One possible reason for the broader lack of significance is the high uncertainty during those periods; indeed, the two primary narrative shocks identified (December 2014 and December 2020) coincide with periods of exceptionally high macroeconomic and geopolitical uncertainty for the Armenian economy. High macroeconomic and geopolitical uncertainty increases the "noise-to-signal" ratio, making it difficult for agents to isolate the central bank's policy from broader information. This

accelerating volatility introduces greater estimation uncertainty, which widens the confidence bands and pushes the estimated policy response toward statistical insignificance.

Figure 5. Narrative Shock Impact on Macroeconomic Variables



Source: Authors' estimations.

Note: The outcome variable reflects the cumulative change in each variable of interest. The vertical axis denotes the unit of measurement in percentage points, while the horizontal axis represents forecast horizons in months. The sample covers the period July 2013 to June 2025. The shock corresponds to a narrative shock identified following the methodology of Romer & Romer (1989, 2023). The specification includes twelve lags of the economic activity index, inflation, the real effective exchange rate, and the one-year government bond interest rate. Shaded areas depict one- and two-standard-deviation pointwise confidence intervals, computed using heteroskedasticity and autocorrelation robust standard errors. For the real effective exchange rate, a positive response indicates an appreciation.

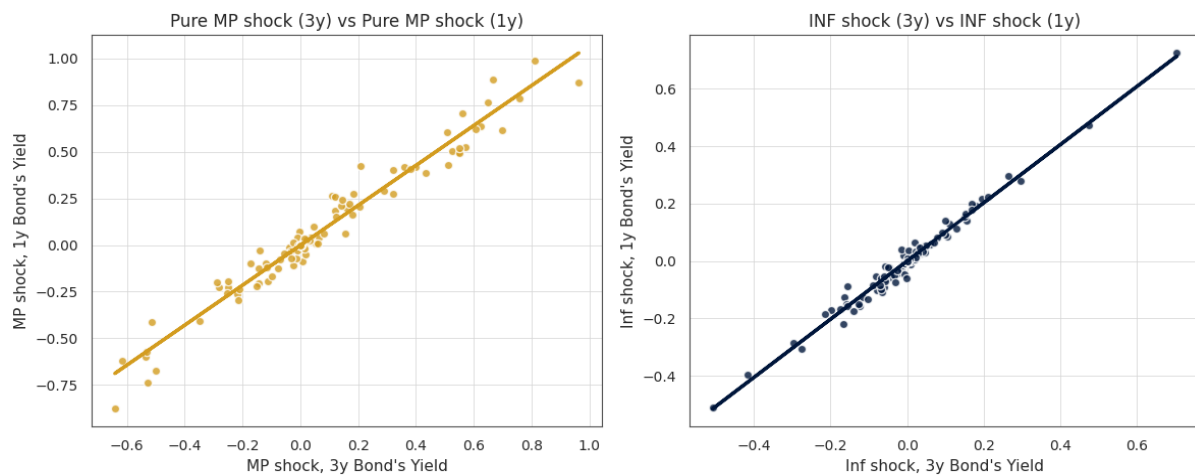
Moreover, the economic context of these shocks may also dampen the estimated impact. During these periods of high uncertainty, risk premiums tend to increase significantly, which pushes up the natural rate of interest. Consequently, the CBA's communication of tightening may have been an effort to align the policy rate with this higher natural rate rather than to impart a purely restrictive shock (Nurbekyan et al., 2017). If the policy moves merely neutralized the rise in risk premiums, the net impact on the economy would be muted, further explaining the lack of a

statistically significant response in the macroeconomic variables. Another potential reason is the small number of narrative shocks over the entire time period. With fewer observations, the model has less data to reliably estimate a robust average response, contributing to the wider, often zero-crossing confidence intervals.

3.3 Robustness Checks

To ensure that our baseline results are not driven by idiosyncratic factors specific to the 3-year maturity, such as liquidity premiums or specific term structure dynamics, we test the sensitivity of our findings to the choice of the government bond maturity. Figure 6 introduces the positive and strong correlation of two shock series. The shocks identified using 1-year and 3-year government bonds as instruments are highly correlated. Specifically, the correlation is 0.98 for pure monetary policy shocks and 0.99 for information news shocks. This is additional evidence to the existing literature that the choice of different government bond maturities yields similar, highly correlated results in this approach.

Figure 6. High-Frequency Shocks Identified by Using Different Maturities of Government Bonds



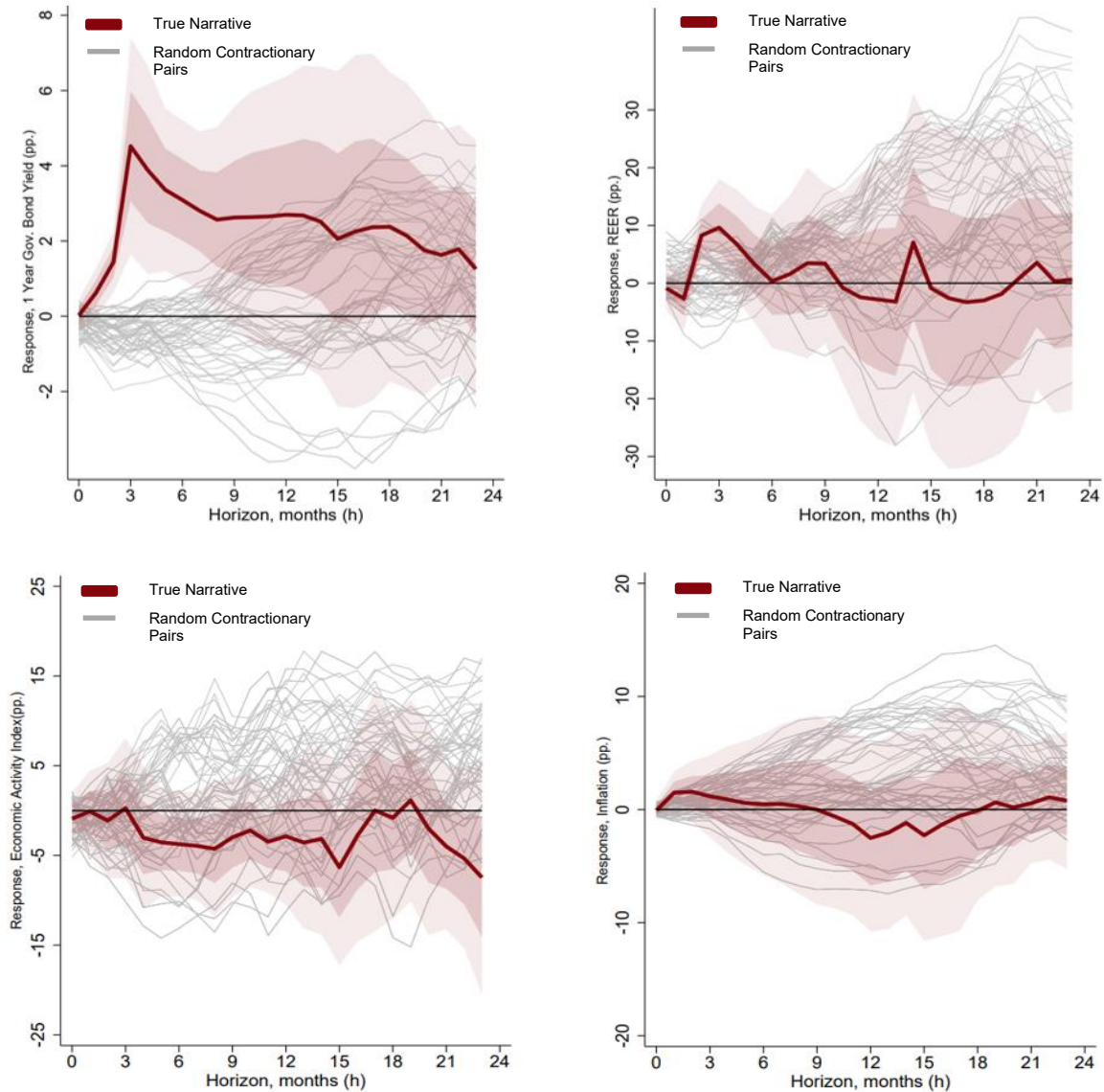
Source: Author's estimations.

Note: The shock identification was done in the same way for the 1-year and 3-year government bond yields (Bu et al., 2021, Ciminelli et al., 2022).

The robustness of the Local Projection model was also checked against alternative lag choices. The core findings remained unchanged, as no significant changes were observed after altering the number of lags included in the model. Moreover, the estimated IRFs were also found to be robust

to different time periods. We confirmed this by re-estimating the model on various sub-samples. The core results remained consistent and were not sensitive to the choice of sample period.

Figure 7. True Narrative Shocks vs. Randomly Selected Contractionary Policy Actions



Source: Author's estimations.

Note: The impulse responses are estimated using the same local projection framework of Jorda (2005) applied earlier in the analysis. To evaluate the difference between policy actions considered as a narrative shocks and usual contractionary policy, we generate random pairs of contractionary policy decisions and estimate their effects on the variables of interest.

Figure 7 introduces another robustness check that involves implementing a placebo test for our narrative shocks. For this purpose, we estimate the response of financial variables to randomly generated pairs of contractionary monetary policy actions and compare these results with the responses to our true narrative shocks. The focus of this exercise is exclusively on financial

variables, as these variables exhibited the most differentiable and significant reactions to the narrative shocks.

Verifying that these specific market reactions are not spurious is the primary objective of this robustness check. This allows us to assess how narrative shocks differ from other contractionary policy actions. To ensure a clear and meaningful comparison, we exclude monetary tightening episodes that occurred immediately after our first identified narrative shock, as these actions were driven by the same underlying forces. We apply this exclusion only to the first narrative shock, December 2014, in order to account for the unusually large tightening during that period, which was discussed earlier in the paper.

CONCLUSION

This study provides new evidence on the effects of monetary policy in an emerging economy by identifying exogenous monetary policy shocks and tracing their macroeconomic consequences. By separating these shocks from endogenous policy responses, we address endogeneity concerns and obtain a clearer picture of monetary policy's true causal impact on the economy.

Methodologically, we emphasize the application of shock-identification frameworks, historically used predominantly in the U.S. and advanced economies, within the context of an emerging economy. We demonstrate that shock identification remains feasible even with limited quantitative and qualitative data, providing a modification of the Romer & Romer (1989, 2023) narrative approach. This adaptation offers a framework applicable to other emerging economies facing similar data limitations. Additionally, by comparing narrative and high-frequency monetary policy shocks, we find that both methodologies yield consistent results in terms of shock signs.

Using the Local Projection method, we show that contractionary monetary policy primarily affects financial variables, with strong and immediate responses in government bond yields and the real effective exchange rate, while the impact on inflation materializes only with a lag. These findings underscore the importance of the interest rate and exchange rate channels in the transmission of monetary policy in Armenia. More broadly, the results highlight the central role of communication as a policy tool. In a small open economy, the credibility and clarity of the monetary authority are as important as the policy rate itself. Strengthening transparency, consistency, and forward guidance can therefore play a critical role in anchoring expectations and enhancing policy effectiveness.

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