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How Does Monetary Policy Affect Inflation in Norway?*

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Abstract

We study the effects of monetary policy shocks on inflation and monetary transmission in Norway, a small open economy characterized by widespread variable-rate borrowing and a floating exchange rate. Using high-frequency monetary policy surprises around Norges Bank announcements as external instruments, we estimate the effects of monetary policy shocks with Proxy SVAR and Local Projection Instrumental Variables (LP-IV) methods. Contractionary monetary policy shocks lead to a gradual and persistent decline in inflation. This result is remarkably robust across alternative instruments, identification strategies, estimation methods, and empirical specifications. The disinflationary effects are strongest for imported prices and are accompanied by an appreciation of the Norwegian krone, highlighting the importance of exchange-rate transmission. Domestic inflation, house prices, and economic activity also decline over time, indicating that both exchange-rate and demand-side channels contribute to lower inflation. Overall, the findings support the conventional view that monetary policy is effective in reducing inflation and underscore the importance of both exchange-rate and domestic transmission channels in a small open economy.

JEL classification codes: E31, E52, F41.

Keywords: Monetary policy shocks; Inflation; Exchange-rate transmission; Imported inflation; High-frequency identification; Small open economy.

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1 Introduction

How monetary policy affects inflation remains one of the central questions in macroeconomics and monetary economics. A large international literature finds strong and consistent evidence that contractionary monetary policy shocks reduce inflation over time (Christiano et al., 1999; Romer and Romer, 2004; Coibion, 2012). More recently, advances in high-frequency identification have substantially improved researchers' ability to isolate exogenous monetary policy shocks from the endogenous response of interest rates to macroeconomic conditions (Gürkaynak et al., 2005; Gertler and Karadi, 2015; Ramey, 2016; Altavilla et al., 2019; Jarociński and Karadi, 2020; Miranda-Agrippino and Ricco, 2021; Bauer and Swanson, 2023). This literature generally finds that contractionary monetary policy shocks lower inflation and economic activity over time.

At the same time, the transmission of monetary policy may differ substantially across economies depending on institutional features, financial structures, and the relative importance of different transmission channels. Norway provides a particularly informative small open economy setting for studying these mechanisms. Compared with many larger economies, Norwegian households are highly exposed to floating interest rates, implying rapid pass-through from policy rates to borrowing costs and household cash flows. In addition, Norway is a small open economy with free capital mobility, a floating exchange rate, and substantial exposure to imported inflation. These features suggest that monetary policy may affect inflation not only through domestic demand, but also through exchange-rate movements and household cash-flow channels.

A substantial literature emphasizes the importance of exchange-rate transmission in small open economies, where monetary policy affects domestic prices both through import prices and broader effects on economic activity (Svensson, 2000; Galí and Monacelli, 2005). The relative importance of these channels may differ considerably across countries depending on trade openness and exchange-rate pass-through (Campa and Goldberg, 2005; Burstein and Gopinath, 2014). Recent research has also highlighted the importance of household balance sheets and cash-flow effects for monetary transmission, particularly in economies with widespread variable-rate borrowing (Auclert, 2019; Cloyne et al., 2020). These features also raise the possibility that exchange-rate movements may influence inflation through a broader set of mechanisms than the direct pass-through to imported consumer goods, including effects on domestic costs, competitiveness, and aggregate demand. The combination of high household indebtedness, widespread use of variable-rate mortgages, and a highly responsive exchange rate therefore provides a useful laboratory for studying monetary transmission.

The role of interest rates in influencing inflation has also become a subject of extensive public debate in Norway in recent years. Alongside the tightening cycle led by Norges Bank, questions have increasingly been raised about whether higher interest rates may themselves contribute to higher inflation through increased financing costs, higher rents, or other cost-related channels. These arguments have received considerable public attention and reflect broader uncertainty about how monetary policy operates in practice.

More broadly, similar questions have re-emerged internationally following the post-pandemic inflation surge, where debates surrounding cost channels, imported inflation, housing costs, and the effectiveness of monetary policy have received renewed attention. Recent research has also emphasized the role of expectations and information frictions in monetary transmission (Coibion and Gorodnichenko, 2015; Coibion et al., 2022). Understanding whether monetary policy lowers inflation, and through which channels these effects operate, therefore remains highly relevant for both monetary policy practice and macroeconomic research.

A central challenge is that interest rates respond systematically to macroeconomic conditions, especially inflation and economic activity. When inflation rises, Norges Bank typically increases interest rates to stabilize prices. As a result, simple correlations between interest rates and inflation do not necessarily reveal the causal effects of monetary policy (Christiano et al., 1999). Identifying the causal effects of monetary policy requires isolating exogenous policy shocks from the endogenous response of interest rates to macroeconomic conditions (Christiano et al., 1999; Ramey, 2016).

To address these questions, we use high-frequency data around monetary policy announcements by Norges Bank to identify unexpected monetary policy shocks. Specifically, we exploit changes in financial market expectations within narrow windows surrounding policy announcements to isolate the unanticipated component of monetary policy decisions. This approach has become a widely used identification strategy in the modern monetary policy literature because it provides a credible way of separating exogenous policy variation from the endogenous response of interest rates to macroeconomic conditions, see, among others, Gürkaynak et al. (2005), Gertler and Karadi (2015), and Jarociński and Karadi (2020).

To study the transmission of these shocks, we employ both a Proxy SVAR and a Local Projection Instrumental Variables (LP-IV) framework. Beyond aggregate inflation, we examine the responses of imported and domestic inflation, exchange rates, house prices, economic activity, labor market conditions, financial variables, and inflation expectations.

Our main finding is that contractionary monetary policy shocks lead to a gradual and persistent decline in inflation in Norway. Following a 25-basis-point increase in the interest rate, inflation, measured as the 12-month rate of change in CPI-ATE, declines steadily and reaches a trough of about 0.3 percentage points after roughly one year. The effects are particularly strong for imported inflation and are accompanied by an appreciation of the Norwegian krone, although domestic inflation, house prices, and economic activity also decline over time. A counterfactual exercise further suggests that exchange-rate movements account for an important part of the transmission of monetary policy to both imported and domestic inflation. These findings are remarkably robust across alternative instruments, policy-rate measures, identification strategies, and estimation methods.

A growing Norwegian literature has examined different aspects of monetary policy transmission. Earlier work emphasizes the importance of exchange-rate responses following monetary policy shocks and the role of housing markets in amplifying monetary transmission (Bjørnland, 2008; Bjørnland and Jacobsen, 2010; Robstad, 2018). More recent work has studied the effects of monetary policy communication and forward guidance using high-frequency identification methods (Brubakk et al., 2022). Studies have further emphasized the importance of household balance sheets and cash-flow channels (Holm et al., 2021; Ahn et al., 2024), while emerging evidence points to heterogeneous responses across expenditure categories and individual prices (Bowe et al., 2025; Seland and Holm, 2025). More broadly, a growing international literature has used high-frequency identification methods to study the transmission of monetary policy shocks across countries. While much of the evidence comes from the United States (Gertler and Karadi, 2015; Bauer and Swanson, 2023) and the euro area (Altavilla et al., 2019), similar approaches have also been applied to individual small open economies, including the United Kingdom (Cesa-Bianchi et al., 2020; Braun et al., 2025) and Sweden (Almerud et al., 2024). These studies generally find that contractionary monetary policy shocks lower inflation and economic activity over time while affecting financial conditions and exchange rates. Despite these contributions, there is still limited evidence on how monetary policy affects inflation and its underlying components in Norway using modern high-frequency identification methods.

The main findings and contributions of the paper can be summarized as follows. First, we provide new causal evidence that contractionary monetary policy shocks reduce inflation in Norway. The result is remarkably robust across a large set of identification approaches, including alternative high-frequency instruments spanning the yield curve, factor-based surprise measures, narrative shocks, information-adjusted shocks, and both Proxy SVAR and LP-IV estimators. Across these specifications, higher interest rates consistently lead to a gradual and persistent decline in inflation. To our knowledge, this paper provides the first comprehensive analysis of high-frequency identified monetary policy shocks and inflation transmission in Norway.

Second, we provide new evidence on the transmission channels through which monetary policy affects inflation in a small open economy. Imported inflation falls sharply and persistently following contractionary monetary policy shocks, accompanied by an appreciation of the Norwegian krone. Domestic inflation also declines, but more gradually, while house prices and economic activity weaken over time. Taken together, these findings suggest that both exchange-rate movements and domestic demand channels contribute to monetary transmission in Norway. While imported inflation responds particularly strongly following monetary policy tightening, the evidence also suggests that exchange-rate movements contribute importantly to the responses of domestic inflation, economic activity, and asset prices.

Third, we document substantial heterogeneity in the transmission of monetary policy across inflation components and economic agents. Across inflation components, rent inflation responds considerably more sluggishly than other domestic price categories and initially exhibits patterns consistent with financing-cost channels. At the same time, the overall effect on aggregate inflation remains clearly negative. We also find heterogeneous responses in inflation expectations across groups of agents. Expectations among economists, firms, and social partners decline following contractionary shocks, whereas household expectations initially increase before gradually reverting. Taken together, these findings suggest that monetary policy transmission differs across both prices and economic agents.

Methodologically, the paper contributes by combining multiple identification strategies and robustness exercises, including alternative high-frequency instruments, narrative shocks, information-adjusted shocks, and LP-IV estimation. Across all specifications, the qualitative conclusions remain remarkably stable.

Overall, our findings support the conventional view that monetary policy remains effective in stabilizing inflation in Norway. At the same time, the results underscore the importance of distinguishing between different inflation components and transmission mechanisms when assessing the effects of monetary policy in a small open economy.

The remainder of the paper is organized as follows. Section 2 describes the data and empirical methodology, including the construction of the high-frequency monetary policy shocks and the identification strategy. Section 3 presents the empirical results. We first document the effects of monetary policy shocks on inflation and assess the robustness of the findings across alternative instruments, specifications, and estimation methods. We then examine the transmission channels underlying these effects, focusing on imported and domestic inflation, exchange rates, asset prices, economic activity, and inflation expectations. Section 4 concludes.

2 Data and empirical methodology

This section describes the data and empirical methodology used to analyze the effects of monetary policy on inflation in Norway.

2.1 High-frequency surprises

Building on a well-established strand of the literature, we identify the unexpected component of monetary policy decisions using high-frequency movements in financial market expectations on policy announcement days (Gürkaynak et al., 2005; Gertler and Karadi, 2015; Altavilla et al., 2019). The sample spans January 2001 - June 2025, reflecting the availability of market data. We construct monetary policy surprises from changes in market-implied expectations of current and future policy rates, using the first four forward rate agreements (FRAs) and a set of swap rates linked to six-month NIBOR (NIBOR6M), with maturities ranging from one to ten years. This gives us 14 potential external instruments for isolating exogenous variation in monetary policy.

The instruments differ in the horizon of policy expectations they capture. FRA rates mainly reflect expectations of short-term money-market rates over the coming year, whereas longer-maturity swap rates incorporate revisions to expected short rates over more extended horizons. For each instrument, the monetary policy surprise is measured as the change in the corresponding market rate within a narrow window around Norges Bank announcements, from 10 minutes before to 20 minutes after the release. By focusing on such a tight interval, the approach minimizes contamination from other macroeconomic news, ensuring that the measured changes primarily reflect the policy announcement itself (Gürkaynak et al., 2005). This high-frequency identification strategy has become a widely accepted benchmark in empirical monetary economics, as it provides a credible way to isolate exogenous variation in monetary policy from the endogenous response of interest rates to economic conditions (Gertler and Karadi, 2015; Altavilla et al., 2019). We convert the high-frequency monetary policy surprises to monthly frequency by assigning each announcement-window rate change to the calendar month of the policy announcement. For each instrument, the monthly surprise equals the sum of all announcement-window changes within the month and is set to zero in months without policy announcements.[1]

We use the six-month NIBOR rate as our baseline interest rate measure in the VAR and local projection below. This choice is motivated by the role of NIBOR as a key money-market reference rate in Norway and by its close connection to the transmission of monetary policy to private-sector financing conditions. Unlike very short overnight rates, the six-month NIBOR incorporates expectations about near-term policy decisions over a horizon that is directly relevant for banks, firms, and households. At the same time, it remains sufficiently close to the policy-controlled segment of the yield curve to provide a clean measure of domestic monetary conditions. The six-month maturity therefore strikes a useful balance: it captures forward-looking revisions to the expected path of short-term rates while avoiding the stronger influence of term premia and global factors that may affect longer-maturity rates. This choice is also consistent with the construction of the majority of external instruments, which are based on swap rates linked to six-month NIBOR. The identified monetary policy shocks therefore capture high-frequency revisions in the same money-market reference-rate curve that underlies the policy-rate measure used in the VAR.

For identification, our baseline external instrument is the high-frequency change in the two-year NIBOR6M swap rate around monetary policy announcements. This choice follows the Proxy SVAR and high-frequency identification literature, where medium-maturity interest rates are commonly used to capture the surprise component of monetary policy announcements (Gertler and Karadi, 2015; Jarociński and Karadi, 2020; Altavilla et al., 2019; Bauer and Swanson, 2023). Monetary policy announcements affect not only the current policy rate but also the expected future path of policy. The two-year maturity is therefore well suited for measuring policy surprises because it captures market revisions to the expected path of short-term rates over a horizon that is central for macroeconomic transmission. This interpretation is particularly relevant in the Norwegian context, where Norges Bank communicates an explicit policy-rate path and where previous work has shown that revisions to the expected future path of policy have important macroeconomic effects (Brubakk et al., 2022). Accordingly, the identified shocks should primarily be interpreted as unexpected revisions to the expected path of monetary policy over the coming years rather than as pure surprises to the current policy rate alone. Compared with shorter-maturity FRA rates, the two-year swap rate is less dominated by near-term timing surprises and transitory market

[1] Because our surprises are measured from FRA and NIBOR6M swap rates rather than current-month average policy-rate futures, we do not apply the Kuttner (2001) timing adjustment, which is specific to contracts whose payoff reflects the average policy rate over the remaining days of the month.

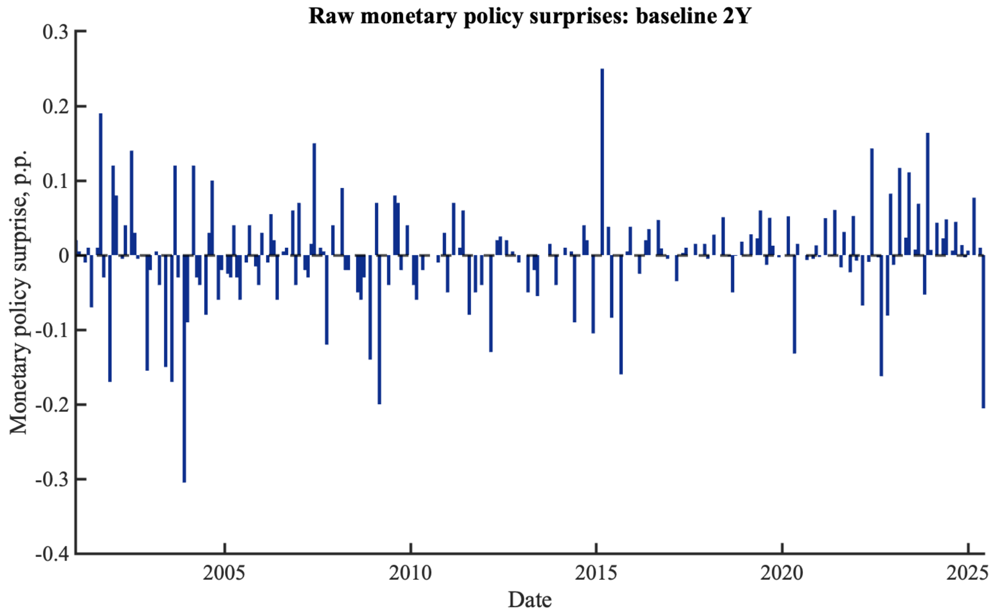
fluctuations. Compared with longer-maturity swap rates, it is less likely to reflect movements in term premia, global rates, or longer-run macro-financial expectations. We therefore view the two-year NIBOR6M swap surprise as a natural benchmark measure of monetary policy surprises.

The distinction between the interest-rate measure used in the VAR and the external instrument is intentional. The six-month NIBOR captures the money-market rate most directly relevant for domestic monetary conditions, while the two-year swap-based instrument isolates announcement-induced revisions in the expected policy path. Because the instrument is based on swaps linked to six-month NIBOR, it remains closely aligned with the same reference-rate curve that underlies the VAR interest-rate measure, while exploiting variation at a maturity that is well suited to capturing policy-path revisions.

Figure 1 plots the resulting monthly monetary policy surprises based on the baseline two-year NIBOR6M swap-rate instrument. The size of the surprises is broadly comparable to those reported in the high-frequency identification literature for the United States and the euro area (Gertler and Karadi, 2015; Altavilla et al., 2019), suggesting that the Norwegian announcement-window changes are economically meaningful and of a similar order of magnitude. The high-frequency surprise series varies more frequently than the actual policy-rate-change series and is relatively balanced between positive and negative observations. Specifically, the two-year surprise is equal to zero in 116 monthly observations, positive in 92 observations, and negative in 86 observations, where zero values reflect either months without policy announcements or announcement windows in which the two-year rate did not move. By comparison, actual policy-rate changes are more concentrated at zero: 126 monthly observations are equal to zero, 39 are positive, and 26 are negative, reflecting the fact that policy-rate adjustments occur less frequently than market-based revisions in expectations.

To assess whether the results depend on this particular maturity choice, we also construct the same series for all alternative FRA and NIBOR6M swap-rate instruments and report the corresponding plots in Appendix Figure A.9. The alternative instruments are highly correlated with one another and display broadly similar announcement-window movements, especially from the one-month FRA through the shorter- and medium-term swap maturities. The longer-maturity swaps, from six to ten years, exhibit somewhat more distinct patterns, consistent with the possibility that movements at the far end of the yield curve also reflect changes in longer-run expectations or term premia.

Our main results are not sensitive to these choices. We assess robustness both to alternative interest-rate measures in the VAR, including the three-month NIBOR, the two-year swap



Note: The baseline instrument is the 2-year NIBOR6M swap-rate surprise, measured as the change in the market price from 10 minutes before to 20 minutes after each monetary policy announcement. The high-frequency surprises are converted to monthly frequency by summing all announcement-window changes within each month and setting the value to zero in months without policy announcements.

Figure 1: Monetary policy surprises

rate, and the ten-year swap rate, and to all the 13 alternative external instruments mentioned above. Some alternative instruments exhibit somewhat stronger first-stage relationships than the baseline two-year swap surprise (see Table A.1). Moreover, the estimated responses remain remarkably stable across instruments with substantially different first-stage strengths, suggesting that weak-instrument concerns are unlikely to be driving the main findings. However, the estimated impulse responses remain qualitatively and quantitatively similar across these specifications, indicating that our findings do not hinge on a specific interest-rate measure or instrument. This robustness also reduces concerns that the baseline results are driven by ex post selection of a particular maturity or by the fact that the two-year instrument might not be the strongest first-stage candidate. We therefore interpret the two-year swap surprise as a conceptually natural benchmark rather than as a mechanically selected instrument.

2.2 Macroeconomic data

To study how monetary policy affects consumer prices in Norway, we compile a broad set of macroeconomic and financial variables that capture the main transmission channels of policy. First, we include short- and medium-term market interest rates, measured by 3-month NIBOR (NIBOR3M), 6-month NIBOR (NIBOR6M), and 2-year and 10-year swap rates, to capture the pass-through of monetary policy to financing conditions and expectations of future policy rates. These variables are central, as changes in interest rates are the primary tool through which policy affects economic activity.

We then consider several measures of CPI inflation, including CPI-ATE (a core measure that excludes energy and tax changes), and more disaggregated indicators such as domestic CPI-ATE inflation including and excluding rents, imported CPI-ATE inflation and CPI-ATE estimated rent costs. This breakdown allows us to better understand which components of inflation respond most to monetary policy and through which channels.

To capture exchange rate dynamics, an important channel in a small open economy like Norway, we include the I44 index, which measures movements in the Norwegian krone against a basket of trading partner currencies. Since exchange rate fluctuations directly affect import prices, they likely play a key role in shaping inflation. We also include monthly mainland GDP[2] and the total industrial production index from Statistics Norway (SSB) as proxies for real economic activity, helping us assess how monetary policy influences output and demand conditions.

Finally, we incorporate stock prices (Oslo Stock Exchange, OSEBX index) as a forward-looking indicator of economic expectations, as well as house prices and Brent oil prices, which are particularly relevant for Norway given the importance of the housing and energy sectors. For example, oil prices affect both domestic activity and the exchange rate, and therefore indirectly influence inflation, even excluding energy and tax changes. Taken together, this set of variables provides a comprehensive view of how monetary policy transmits through the Norwegian economy to affect consumer prices.

2.3 Econometric models

To estimate the effects of monetary policy on consumer prices, we use two complementary high-frequency identification frameworks: a Proxy Structural Vector Autoregression (Proxy SVAR) and a Local Projection Instrumental Variables model (LP-IV). Both rely on external instruments constructed from monetary policy surprises to isolate exogenous variation in interest rates and identify the causal effects of monetary policy shocks. The Proxy SVAR

[2]Monthly mainland GDP is based on Statistics Norway's monthly national accounts. Prior to 2016, we use the historical monthly GDP series constructed by Norges Bank, which extends the series back to 1990 using a mixed-frequency VAR and a broad set of monthly indicators. This series is described in Appendix B of Bowe et al. (2023).

follows the external-instrument approach developed by Stock and Watson (2012) and Mertens and Ravn (2013), while the LP-IV approach combines local projections Jordà (2005) with external instruments as discussed in Stock and Watson (2018). Following standard practice in the literature, we treat the Proxy SVAR as our baseline specification and use the LP-IV framework to assess the robustness of the results.

2.3.1 Proxy SVAR

The Proxy SVAR builds on a reduced-form vector autoregression in which a set of macroeconomic variables are modeled jointly to capture their dynamic interactions over time. Following Stock and Watson (2012), Mertens and Ravn (2013), and Gertler and Karadi (2015), identification is achieved using an external instrument that is correlated with the monetary policy shock but orthogonal to other structural disturbances. The key challenge in this framework is identifying exogenous monetary policy shocks. To address this, we use external instruments, derived from high-frequency financial market data around policy announcements, to proxy for unexpected changes in monetary policy. This allows us to isolate exogenous monetary policy shocks from the systematic response of interest rates to macroeconomic conditions. Once identified, the model traces out how these shocks propagate through the system, providing impulse response functions that show how variables such as inflation, output, and exchange rates react over time.

Specifically, consider the reduced-form VAR(p):

$$Y_t = C + \sum_{j=1}^{p} A_j Y_{t-j} + u_t, \tag{1}$$

where Y_t is an $n \times 1$ vector of endogenous variables, C is a vector of constants, A_j are coefficient matrices associated to p lags of the dependent variable Y_t, and $u_t \sim WN(0, \Omega)$ are reduced-form residuals. In the baseline specification, Y_t contains monthly data on the 6-month NIBOR rate, the logarithm of CPI-ATE, the I44 exchange rate index, industrial production, stock prices, and the Brent oil price (denominated in USD), with all variables except the interest rate expressed in logarithms and multiplied by 100. The baseline specification is deliberately parsimonious, focusing on a core set of variables that capture the main macro-financial environment relevant for monetary policy transmission. The VAR is estimated with six lags, as selected by the AIC criterion, over the sample 1999:M1–2025:M6. This sample largely corresponds to the inflation-targeting period in Norway. Although the inflation-targeting mandate was formally introduced in 2001, monetary policy had already become increasingly oriented toward price stability during the preceding years. The estimation period therefore reflects a relatively homogeneous monetary-policy regime. We keep the same lag length and sample period throughout the baseline empirical analysis. Nonetheless, we assess in what follows the sensitivity of our findings to alternative model and variable specifications. In particular, we expand the information set further by including additional variables to examine the main transmission channels. To identify the structural monetary policy shock, we relate the reduced-form residuals to the underlying structural shocks through the standard representation. Let $u_t = S\epsilon_t$, where ϵ_t are structural shocks and $\mathbf{s}$ denotes the column of S associated with the monetary policy shock ϵ_t^p.

Identification relies on external instruments derived from high-frequency financial data around policy announcements. Let Z_t denote the external instrument, defined in the baseline as the high-frequency change in the 2-year swap rate measured within a 30-minute window around monetary policy announcements. Validity requires that Z_t is correlated with the monetary policy shock and orthogonal to all other structural shocks:

$$E(Z_t\epsilon_t^p) \neq 0, \quad E(Z_t\epsilon_t^q) = 0. \tag{2}$$

The VAR is first estimated by OLS to obtain residuals $\hat{u}_t$. The instrument is then used to isolate the component of the policy residual that is driven by the structural monetary policy shock. This allows us to recover the relative responses of the remaining variables to the policy shock through a projection of $\hat{u}_t^q$ onto the instrumented policy residual. Normalizing the impact of the shock on the policy variable to correspond to a 25 basis point increase yields an estimate of the structural impact vector $\mathbf{s}$.

Impulse responses are then obtained by propagating the identified shock through the estimated VAR using the standard VMA representation of the model.

2.3.2 Local Projections

As a complementary approach, we use Local Projections with Instrumental Variables (LP-IV) as a robustness exercise. This methodology combines the local projection framework of Jordà (2005) with external instruments to identify dynamic causal effects, following the approach discussed by Stock and Watson (2018). Rather than modeling the full system dynamics, local projections estimate the response of a variable of interest directly at each horizon following a monetary policy shock. By instrumenting the policy variable with the same high-frequency surprises, the LP-IV approach isolates exogenous variation in monetary policy in a way analogous to the Proxy SVAR.

Formally, for each horizon h, we estimate:

$$y_{t+h} - y_{t-1} = \alpha_h + \beta_h \hat{i}_t + \Gamma_h(L)Y_{t-1} + \Xi_h(L)Z_{t-1} + \varepsilon_{t+h}, \tag{3}$$

where $y_{t+h} - y_{t-1}$ is the cumulative response of the variable of interest, $\hat{i}_t$ is the policy rate instrumented using the instrument Z_t, $\Gamma_h(L)Y_{t-1}$ denotes the same set of controls as in the VAR, namely lags of Y_t, and $\Xi_h(L)Z_{t-1}$ includes lags of the monetary policy surprise. The impulse responses to a monetary policy shock at a given horizon h are given by β_h. In the baseline specification, we consider six lags for both the controls and the instrument.

This method is particularly flexible, as it is more robust to model misspecification, at the cost of more uncertain estimates. In simple terms, this reflects a trade-off between bias and variance. Because LP-IV makes fewer assumptions about the underlying structure of the economy, it is less likely to produce systematically misleading (biased) results if the model is not perfectly specified. However, this flexibility also means that the estimates tend to be noisier, with wider confidence intervals. In contrast, more structured approaches like SVARs can yield more precise estimates, but only if the model is correctly specified. LP-IV therefore prioritizes robustness over precision, providing a useful complement to the SVAR results.

Taken together, these two methods provide complementary approaches for assessing the effects of monetary policy. While the Proxy SVAR efficiently captures the joint dynamics of the macroeconomic system, the LP-IV framework offers a more flexible way to estimate dynamic responses and is less sensitive to model misspecification. As we show in the next section, both approaches yield qualitatively similar results, strengthening the credibility of our findings.

3 Main findings

We begin by presenting the impulse responses of the interest rate and CPI-ATE from our baseline Proxy SVAR specification identified using high-frequency monetary policy surprises. We then assess the robustness of these findings across alternative instruments, policy-rate definitions, and LP-IV specifications, where the latter provides a complementary estimation framework. Next, we move beyond the parsimonious baseline specification by expanding the information set with additional variables that help characterize the transmission of monetary policy shocks. We first decompose the CPI-ATE response into domestic, imported, and rent cost components. We then examine the effects of monetary policy shocks on the remaining variables in the extended VAR, focusing on exchange rates, financial variables, and real activity. Finally, we look at the effects of monetary policy shocks on inflation expectations using survey data.

3.1 The effects of monetary policy on inflation

We begin by presenting the impulse responses of the baseline policy rate measure (NIBOR6M) and consumer prices adjusted for tax changes and excluding energy products (CPI-ATE) to a contractionary monetary policy shock. Figure 2 shows that the shock generates an immediate increase in the interest rate, with the response peaking on impact before gradually declining and turning slightly negative at longer horizons. The response of CPI-ATE in log levels falls after the shock and remains below baseline over the forecast horizon, indicating that tighter monetary policy exerts a disinflationary effect.

The figure also reports the implied response of twelve-month CPI-ATE inflation. This response is constructed directly from the estimated price-level response. Since CPI-ATE enters the VAR in log levels multiplied by 100, the price-level response can be interpreted as a percent response. Let p_h denote the response of the CPI-ATE price level at horizon h. The corresponding response of twelve-month inflation is computed as

$$\pi_h^{12} = p_h - p_{h-12}.$$

For horizons $h < 12$, the pre-shock price-level response is set to zero. The same transformation is applied draw by draw to the bootstrap impulse responses, so that the confidence bands for twelve-month inflation reflect the uncertainty in the underlying price-level response.

The baseline VAR is estimated with CPI-ATE in log levels, rather than with inflation directly, in line with standard practice in the literature. This specification preserves the low-frequency comovement between nominal variables: estimating the VAR in levels allows for potential cointegrating relationships and is therefore more robust to the presence of common nominal trends. By contrast, estimating the VAR with inflation would difference out these trends and could obscure long-run relationships relevant for identification and interpretation. The twelve-month inflation response is therefore obtained as a transformation of the estimated price-level response as described above, rather than from a separate VAR specification.

The responses are economically plausible and broadly consistent with standard monetary transmission. The policy rate rises strongly on impact, which suggests that the identified shock captures an exogenous monetary tightening. The CPI-ATE price level declines gradually

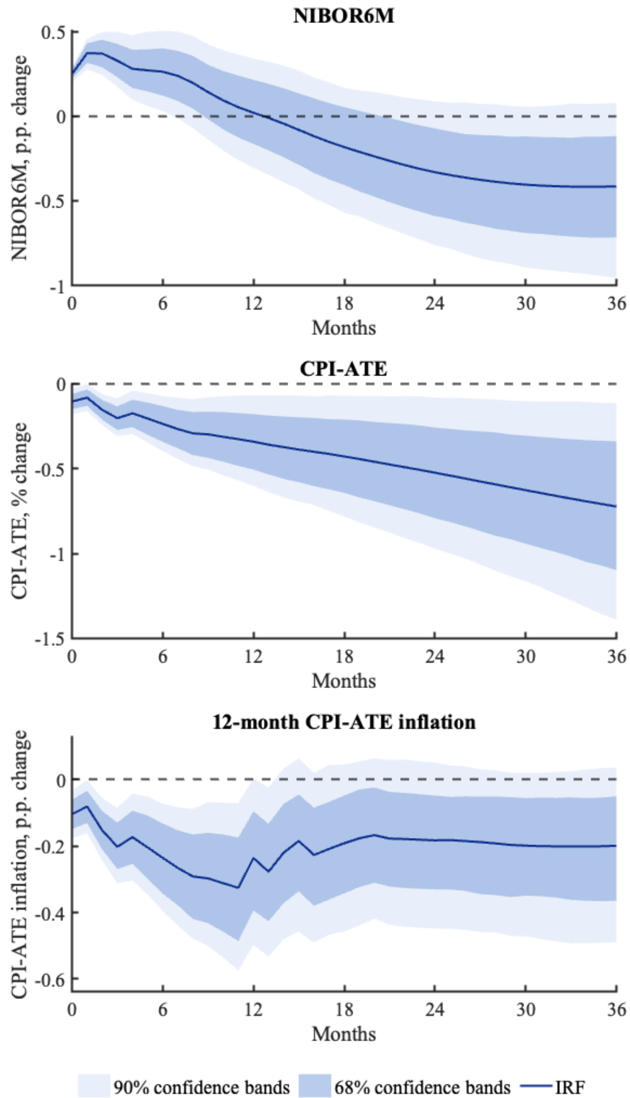


Figure 2: Impulse responses to a monetary policy shock

and persistently, and the implied twelve-month inflation response is also negative over the forecast horizon, reaching a trough of around 0.3 percentage points approximately twelve months after the shock. This pattern is consistent with a standard disinflationary effect of monetary tightening. At the same time, the confidence bands widen materially at medium and long horizons, so inference is strongest at shorter horizons, in line with the literature.

A further point worth emphasizing is that the impulse responses are estimated using monthly data. Consequently, an impact response at horizon 0 should not be interpreted as implying that all prices or economic activity react immediately on the day of the monetary policy announcement. Rather, it indicates that a measurable response occurs within the same calendar month as the shock. This interpretation is particularly relevant for variables that can adjust rapidly, such as exchange rates and financial asset prices. It may also help explain why some prices and measures of economic activity display responses already at short horizons.

3.2 Robustness

Before moving to the analysis on the underlying channels of monetary policy transmission, we perform a battery of robustness checks to assess the sensitivity of our findings. For clarity of exposition, we focus on the response of CPI-ATE and the implied inflation response in the subsequent analysis.

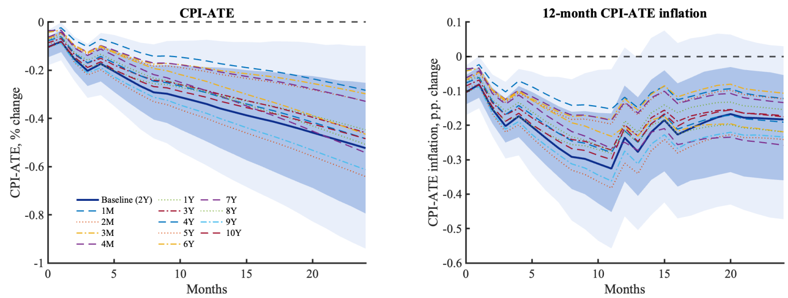
3.2.1 Alternative instruments

We consider two sets of robustness exercises based on alternative measures of monetary policy surprises.

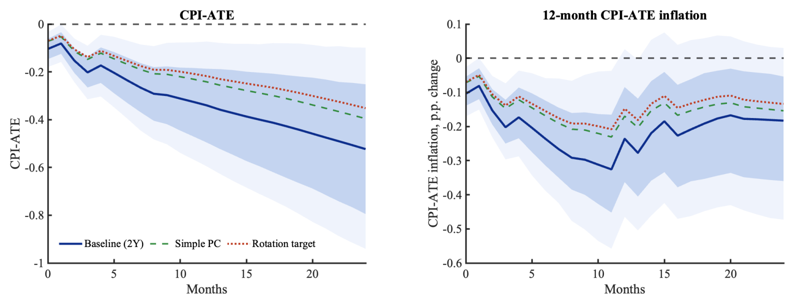
First, we re-estimate the baseline proxy SVAR using alternative external instruments constructed from high-frequency interest-rate changes around monetary policy announcements. Throughout this exercise, the six-month NIBOR remains the policy-rate variable in the VAR, while only the external instrument is varied. Specifically, we consider FRA contracts from FRA1 to FRA4 (1M to 4M), as well as interest-rate changes at maturities from 1 year to 10 years (1Y to 10Y). This exercise allows us to assess whether the results depend on the specific maturity used to identify monetary policy shocks.

Second, we consider factor-based measures of monetary policy surprises, following the high-frequency identification literature (Gürkaynak et al., 2005; Gertler and Karadi, 2015; Altavilla et al., 2019). We first use the first principal component of FRA1-FRA4 as a summary measure of short-rate surprises. We then construct two principal components from a broader set of market rates: the first is based on FRA1-FRA4 together with the 1-year rate, while the second is based on rates from 2 years to 10 years. We subsequently rotate these factors to obtain a target factor and a path factor, following the approach of Gürkaynak et al. (2005). This decomposition makes it possible to distinguish between surprises associated primarily with the current policy decision and those associated with revisions to the expected future path of policy.

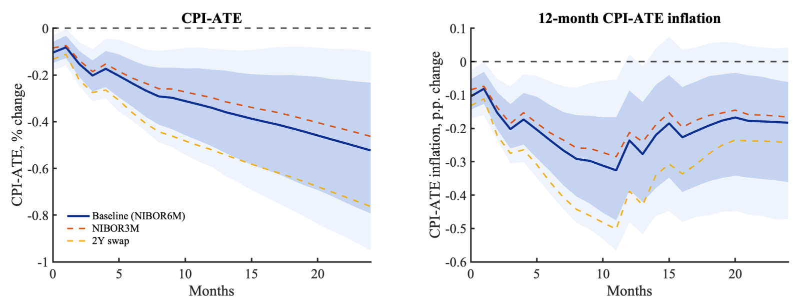
Figures 3a and 3b show the impulse responses of the CPI-ATE index and the implied



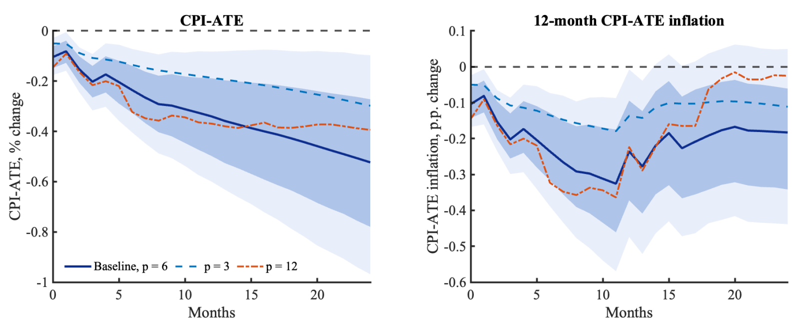
(a) Baseline vs alternative instruments



(b) Baseline vs factor-based instruments



(c) Baseline vs alternative interest-rate measures



(d) Baseline vs alternative lag specifications

Figure 3: Impulse responses of the CPI-ATE price level (left column) and implied twelve-month inflation (right column) to a contractionary monetary policy shock (25 basis points) across alternative specifications.

twelve-month inflation to a contractionary monetary policy shock using alternative measures of monetary policy surprises. Panel (a) compares the baseline 2-year instrument with alternative instruments across maturities. The results are highly robust: all instruments consistently imply a decline in inflation following a contractionary shock, with only moderate variation in magnitude. While short-maturity instruments tend to produce somewhat smaller responses and longer maturities somewhat stronger and more persistent effects, the qualitative pattern is uniform across specifications. In particular, the response typically reaches its maximum effect after around 12 months across the different exercises. Panel (b) compares the baseline with shocks constructed using a simple principal component and a rotation-based target. All approaches deliver the same qualitative conclusion.

3.2.2 Alternative interest rate measures in the SVAR

We also consider the robustness of our findings to alternative specifications to the interest rate measure in the VAR.

Figure 3c shows the impulse responses of the CPI-ATE index to a contractionary monetary policy shock when alternative interest-rate measures are used in the VAR. In contrast to the previous exercise, the external instrument is now held fixed at the baseline two-year swap surprise, while the interest-rate variable included in the VAR is varied. The baseline specification employs the 6-month NIBOR rate, while alternative specifications replace it with 3-month NIBOR (NIBOR3M) and the longer-term 2-year swap rate (2Y swap).

The results are robust across specifications. Regardless of which yield is used to represent the policy stance in the VAR, a contractionary monetary policy shock leads to a persistent decline in the price level. In all cases, inflation falls steadily following the shock. While the qualitative pattern is unchanged, the estimated effects are larger when the longer-maturity swap rates are used. Since the external instrument is held fixed across specifications, these differences should not be interpreted as arising from alternative high-frequency measures of the policy shock. Rather, they suggest that longer-maturity yields may better summarize the broader monetary-financial conditions through which policy is transmitted, including expectations about the future path of short rates and term-premium movements. This interpretation is consistent with the high-frequency identification literature, which emphasizes that monetary policy surprises are transmitted along the yield curve and that longer-maturity rates capture policy-path and term-structure components that may be macroeconomically relevant (see Altavilla et al. (2019), Bauer and Swanson (2023), Miranda-Agrippino and Ricco (2021) and Jarociński and Karadi (2020)).

These findings provide strong evidence that the main result is not driven by a particular choice of policy rate. Instead, they reinforce the conclusion that an increase in interest rates systematically leads to a decline in prices.

As an additional robustness check, Appendix Figure A.1 augments the baseline SVAR with the 6-month U.S. Treasury bill rate. We choose the 6-month Treasury bill rate to match the maturity of the baseline 6-month NIBOR measure, thereby allowing us to control for foreign short-term interest-rate conditions in a comparable way. This exercise complements the baseline controls for oil prices and the stock market by accounting more explicitly for global monetary-financial conditions. The impulse responses are essentially unchanged relative to the baseline specification, with somewhat narrower confidence bands. This suggests that the estimated decline in prices following a contractionary monetary policy shock is not driven by omitted foreign interest-rate conditions, reinforcing the robustness of the main result.

3.2.3 Alternative lag length

We further assess the robustness of the baseline results to alternative lag specifications in the Proxy SVAR. While the baseline model includes six lags, we re-estimate the model using three and twelve lags, keeping the external instrument fixed across specifications. The three-lag specification corresponds to the lag length selected by the BIC criterion, whereas the twelve-lag specification is commonly used in the monthly VAR literature to allow for richer dynamics and seasonality.

The results are qualitatively very similar across lag choices (see Figure 3d). With three lags, the estimated response of CPI-ATE is somewhat smaller than in the baseline specification, but it follows the same overall pattern, with prices declining after a contractionary monetary policy shock. By contrast, the twelve-lag specification produces a slightly larger response at short horizons, followed by a faster decay at longer horizons. Overall, the evidence indicates that the main conclusions are not sensitive to the choice of lag length: across all specifications, a contractionary monetary policy shock leads to a persistent decline in prices, with only moderate differences in magnitude and timing.

3.2.4 Alternative identification strategies

We assess the robustness of our results across alternative identification strategies. In addition to the baseline high-frequency proxy instrument, we consider a narrative monetary policy shock based on an updated version of the Norwegian Romer–Romer shock series originally developed by Holm et al. (2021), which adapts the methodology of Romer and Romer (2004) to the Norwegian setting. Unlike the baseline instrument, this shock measure does not rely on high-frequency financial market variation and is incorporated into the same proxy SVAR framework. While Holm et al. (2021) study the effects of monetary policy using annual data, our empirical framework is estimated at the monthly frequency. This allows us to trace the timing of monetary-policy transmission in considerably greater detail and to study the evolution of inflation, exchange rates, and economic activity at shorter horizons.

We also implement an identification strategy based on Jarociński and Karadi (2020), which distinguishes monetary policy surprises from central bank information surprises using joint high-frequency movements in interest rates and stock prices. We use the same 30-minute event windows around Norges Bank monetary policy announcements used to construct the baseline surprise measures, recording changes from 10 minutes before to 20 minutes after each announcement. Specifically, we combine high-frequency interest-rate surprises with changes in the OSEBX index over the same window and identify an information-adjusted monetary policy shock by imposing that a contractionary interest-rate surprise is associated with a negative contemporaneous stock-market response. This sign restriction distinguishes monetary policy surprises from information surprises, since the latter would imply interest rates and stock prices moving in the same direction. The resulting series is then used as an external instrument in the proxy SVAR.

Figure 4 reports the corresponding impulse responses. The results are qualitatively unchanged and quantitatively very similar to the baseline specification. Across both the narrative Romer-Romer shock series and the information-adjusted Jarociński-Karadi shock measure, a contractionary monetary policy shock leads to a gradual and persistent decline in CPI-ATE. Both the timing and magnitude of the responses closely mirror those obtained in the baseline specification, further reinforcing the robustness of our findings across fundamentally different identification strategies.

Taken together, these results provide strong and robust evidence that a contractionary monetary policy shock, corresponding to an increase in the policy rate, leads to a sustained decline in prices.

3.2.5 Local projection with instrumental variables

As an additional robustness check, we test whether the results are sensitive to the empirical model used to estimate the dynamic effects of monetary policy. Specifically, we complement the baseline Proxy SVAR with a local projection instrumental variables specification (LP-IV) following Jordà (2005) and Stock and Watson (2018), which imposes less structure on the

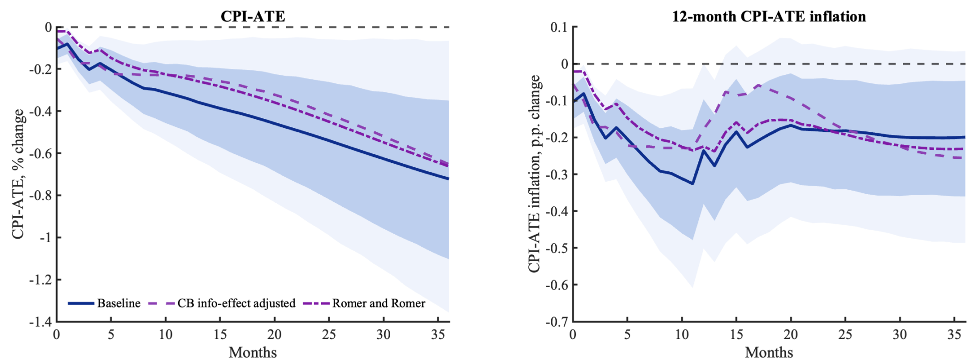
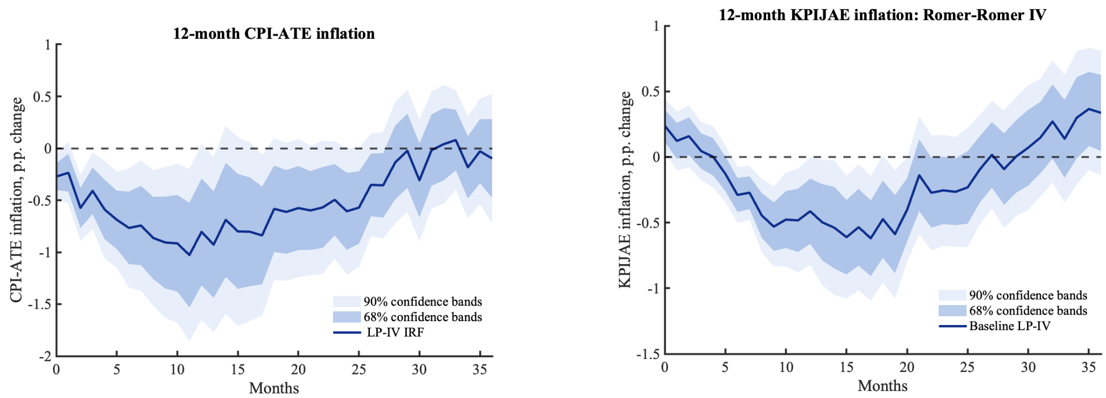


Figure 4: Impulse responses of consumer prices (CPI-ATE) to a contractionary monetary policy shock (25 basis points) across alternative identification strategies.

propagation of shocks over the forecast horizon.

Figure 5 reports the LP-IV impulse response of CPI-ATE inflation to a contractionary monetary policy shock using two alternative instruments. For comparability, the full set of impulse responses for each variable in Y_t is reported in the Appendix. We also report in the Appendix the full set of local projection robustness plots obtained using the alternative high-frequency instruments, allowing us to assess whether the results are driven by the choice of instrument maturity, as for the Proxy SVAR model. Panel (a) presents the baseline specification using the high-frequency instrument. The point estimates indicate a decline in prices on impact, which becomes more pronounced over the first year, reaching a trough after roughly 10–12 months. This pattern is broadly consistent with the transmission mechanism identified in the Proxy SVAR, where higher interest rates lead to a gradual and persistent decline in inflation. However, the confidence bands are relatively wide. This reflects the lower statistical efficiency of the LP-IV approach relative to the Proxy SVAR, a common consequence of imposing less structure on the propagation of shocks. The point estimates are generally somewhat larger in magnitude than those obtained from the Proxy SVAR, particularly at medium horizons, although the confidence intervals are also considerably wider. Thus, while the LP-IV estimates are less precise, they reinforce the conclusion that contractionary monetary policy leads to a sustained decline in inflation.

Panel (b) reports the corresponding results using an updated version of the Norwegian Romer–Romer shock series originally developed by Holm et al. (2021), which adapts the methodology of Romer and Romer (2004) to the Norwegian setting. The estimated response is qualitatively similar to the baseline specification, with CPI-ATE inflation declining following the shock. The main difference is in the timing of the adjustment: while the baseline response shows an effect on impact, the Romer and Romer-style instrument implies no immediate



(a) Baseline LP-IV

(b) LP-IV with Romer and Romer (2004)-style instrument

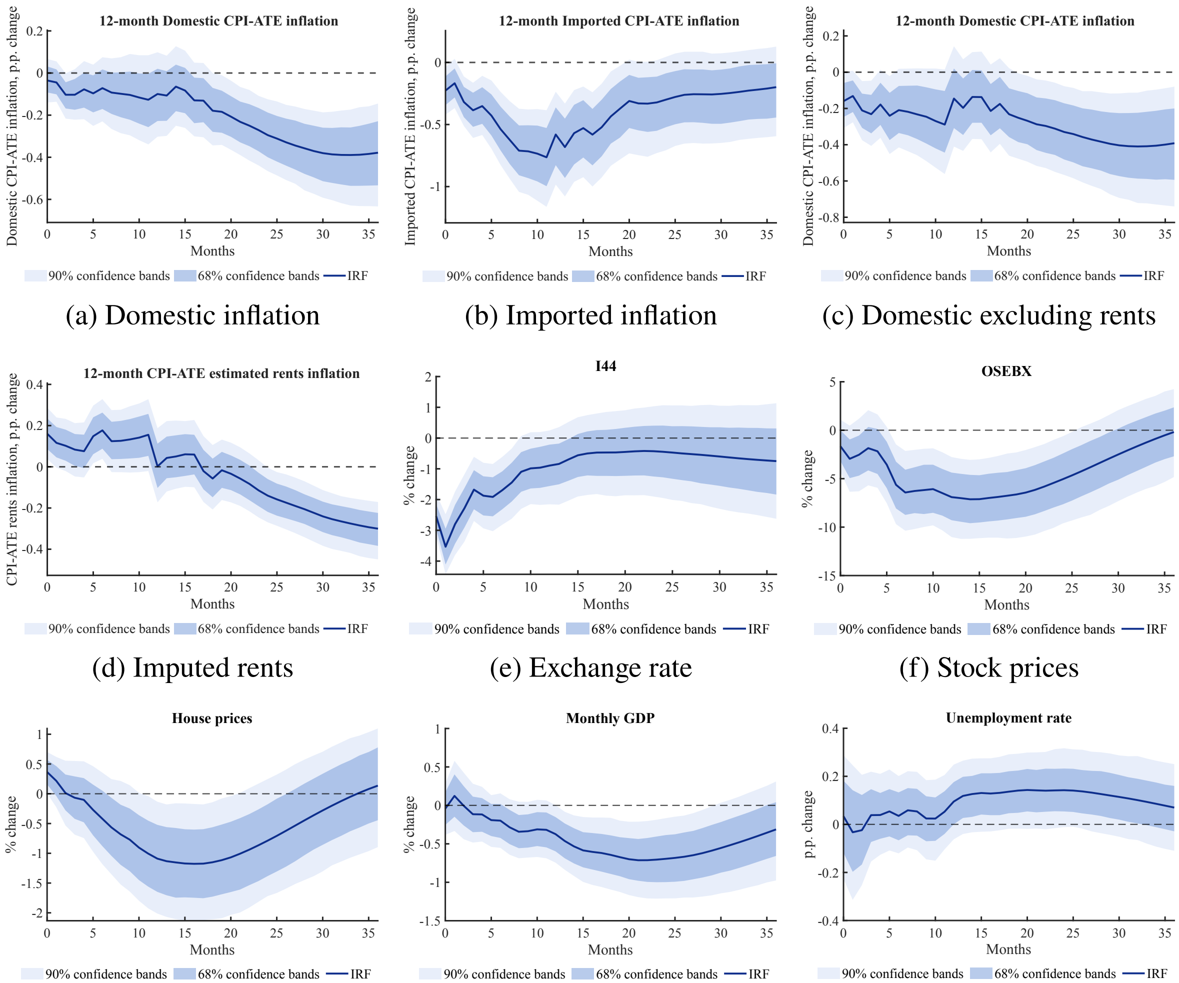
Figure 5: LP-IV impulse responses of CPI-ATE inflation to a contractionary monetary policy shock using alternative instruments.

response, followed instead by a more gradual decline over subsequent horizons. However, the direction of the estimated effect is unchanged, pointing to a fall in inflation after the shock.

Overall, both specifications confirm that a contractionary monetary policy shock leads to a decline in prices. Although the LP-IV estimates are less precise than the corresponding Proxy SVAR estimates, they deliver qualitatively similar responses and, in some cases, somewhat larger point estimates. The results therefore provide additional evidence that the main findings are not driven by the particular empirical framework used to estimate the effects of monetary policy shocks.

3.3 Transmission channels and inflation decomposition

We now examine the transmission channels through which monetary policy affects prices and real activity. To better understand these channels, we augment the baseline SVAR by replacing aggregate CPI-ATE index with more disaggregated price measures. Specifically, we substitute CPI-ATE with domestic CPI-ATE either including or excluding rents, imported CPI-ATE, and CPI-ATE imputed rent costs. We also include the house price index to capture housing-market dynamics. All price indexes are included in levels, as in the baseline specification, but we report impulse responses for the implied inflation rates. The resulting specification allows us to jointly analyze the responses of the main transmission variables, the exchange rate, domestic demand, stock prices, and house prices, together with the different components of inflation. The impulse responses are reported in Figure 6. For comparability,



(a) Domestic inflation (b) Imported inflation (c) Domestic excluding rents

(d) Imputed rents (e) Exchange rate (f) Stock prices

(g) House prices (h) Monthly mainland GDP (i) Unemployment rate

Figure 6: Impulse responses of inflation components and key transmission variables to a contractionary monetary policy shock.

we also perform the full set of the same robustness checks to alternative instruments, policy rate measures and specifications of the model in the Appendix.

A contractionary monetary policy shock reduces both domestic and imported inflation. Domestic inflation falls after the shock, indicating that monetary policy affects underlying domestic price pressures. Imported inflation also declines sharply and persistently, pointing to an important role for external price pressures in the overall disinflationary effect. The imported inflation response is both larger and more immediate than the response of domestic inflation. This difference in timing is consistent with the view that exchange-rate movements affect prices relatively quickly, whereas domestic demand effects operate more gradually through consumption, investment, and labor-market adjustment.

The response of domestic inflation becomes clearer when imputed rents are excluded. Domestic CPI excluding rents declines more visibly after the shock, suggesting that non-rent domestic prices are responsive to monetary policy. By contrast, CPI-ATE estimated rent costs respond much more gradually. Rent inflation initially increases somewhat following the monetary policy shock and remains relatively elevated compared with other domestic price components over the first part of the horizon. However, the response eventually turns negative, implying that rent costs also contribute to lower inflation at longer horizons. This pattern suggests that housing-related inflation dampens the short-run response of broader domestic inflation, while contributing to disinflation over time.

The initial increase in rent inflation contrasts with the stronger and more immediate response of other domestic price components. One possible interpretation is that housing-related prices are affected by cost pressures that partially offset the standard demand effects of monetary tightening in the short run. This interpretation is related to recent discussions of cost channels, where higher interest rates may raise financing costs for some agents even as aggregate demand weakens (Barth and Ramey, 2001; Ravenna and Walsh, 2006; Choi et al., 2024; Chang et al., 2025; Suveg, 2026). However, our results do not allow us to separately identify the quantitative importance of these mechanisms, nor to distinguish them from other factors affecting rent dynamics. Regardless of the underlying mechanism, the estimated longer-run response remains negative, indicating that rent inflation ultimately moves in the same direction as broader inflation following a monetary tightening.

The exchange rate response helps explain the decline in imported inflation. The I44 index falls sharply on impact, indicating an appreciation of the krone. The rapid exchange-rate response may partly explain why some inflation components and measures of activity display responses already within the same month as the shock. This pattern is consistent with a standard exchange-rate channel: tighter monetary policy increases the attractiveness of domestic assets, strengthens the domestic currency, and lowers the domestic-currency price of imported goods. Since Norway is a small open economy, this channel is particularly relevant for imported inflation. We return to this mechanism below and show that it is quantitatively important by shutting down the response of the I44 index. The strength of the exchange-rate response is broadly consistent with evidence from other small open economies such as Sweden (Almerud et al., 2024) and the United Kingdom (Cesa-Bianchi et al., 2020), where exchange-rate movements have also been found to play an important role following monetary policy shocks. The Norwegian responses appear economically large, which is consistent with the importance of imported inflation and the relatively high sensitivity of the krone to monetary policy surprises.

Financial markets also react strongly to the monetary policy shock. Stock prices fall sharply and remain persistently below baseline for an extended period. Although the OSEBX contains a relatively large share of energy-related firms, the response is consistent with a broad tightening of financial conditions and weaker expected economic activity following a contractionary monetary policy shock. Higher discount rates and a weaker macroeconomic outlook are likely to contribute to the decline in equity valuations.

House prices decline more gradually, with a more noticeable response only after several months. This lagged adjustment highlights the gradual transmission of monetary policy to the housing market and suggests that housing-market dynamics may affect rent inflation only slowly over time. The decline in house prices is particularly relevant in the Norwegian context given the high level of household indebtedness and widespread use of variable-rate mortgages. Lower house prices may reinforce the effects of higher interest rates on household spending through wealth and balance-sheet channels, complementing the direct cash-flow effects emphasized in recent studies of Norwegian monetary transmission (Holm et al., 2021; Ahn et al., 2024) and the broader literature on redistribution and cash-flow channels (Auclert, 2019).

The real-activity response provides evidence of a demand channel. Monthly mainland GDP decreases significantly approximately one year after the shock, indicating that tighter monetary policy eventually dampens aggregate demand and real economic activity. The decline in economic activity is consistent with the gradual transmission of monetary policy through consumption and investment decisions. Together with the decline in domestic inflation, the GDP response provides evidence that weaker aggregate demand contributes to the overall disinflationary process. To assess whether this contraction in real activity is also reflected in the labor market, we estimate an alternative version of the same augmented VAR in which monthly mainland GDP is replaced by the unemployment rate. This allows us to study labor-market adjustment while keeping the specification parsimonious, which is important given the already relatively large number of variables in the model. For this specification, we also include a dummy variable for the lockdown period to account for the exceptional dynamics in unemployment associated with the Covid-19 shock (see Cascaldi-Garcia (2022)).

The unemployment rate increases following the contractionary monetary policy shock. This response is qualitatively consistent with standard economic theory: higher interest rates dampen aggregate demand, reduce labor demand, and therefore raise unemployment.

However, the response is gradual and imprecisely estimated, with confidence bands that generally include zero over much of the horizon. This suggests that, while the direction of the labor-market response is economically plausible, the data do not provide strong evidence of a robust and precisely estimated unemployment effect in this specification. The relatively imprecise estimates are unsurprising given the persistence and low-frequency adjustment typically observed in labor-market variables.

Taken together, the results suggest a clear sequencing of monetary transmission in Norway. Exchange-rate movements occur immediately following the shock and are associated with a rapid decline in imported inflation. Domestic inflation responds more gradually and is accompanied by weaker asset prices, lower economic activity, and higher unemployment, consistent with a demand-driven transmission mechanism. The stronger and more immediate response of imported inflation suggests that exchange-rate transmission plays a particularly important role in Norway. By contrast, the slower responses of domestic inflation and real activity point to the importance of domestic demand channels. The sluggish adjustment of rent inflation further highlights that different price components may respond very differently to monetary policy shocks. Finally, the gradual decline in house prices suggests that housing-market and household balance-sheet channels reinforce the effects of monetary tightening over time.

3.3.1 Robustness

The transmission results are robust across the same set of alternative specifications considered above. In particular, the qualitative responses of the inflation components and the main transmission variables are very similar when we use alternative high-frequency instruments, including surprises constructed from different maturities along the FRA and NIBOR6M swap curves (see Figures A.2 and A.3) and factors (see Figure A.4). The decline in imported inflation, the appreciation of the krone, and the gradual weakening of domestic inflation, house prices, and real activity are therefore not driven by the particular choice of the baseline two-year swap-rate instrument.

The results are also robust to alternative measures of the interest rate included in the VAR. Replacing the baseline 6-month NIBOR with other short- and medium-term yield measures leaves the main transmission patterns essentially unchanged (see Figure A.5). Similarly, augmenting the baseline specification with the 6-month U.S. Treasury bill rate does not materially alter the responses (see Figure A.6). This suggests that the estimated transmission channels are not driven by the specific yield used to summarize domestic monetary conditions, nor by omitted foreign short-term interest-rate movements.

Finally, the evidence from local projections points to the same qualitative conclusions. Using LP-IV rather than the Proxy SVAR, both with the baseline high-frequency instrument (see Figure A.7) and with the Romer–Romer-style instrument (see Figure A.8), yields similar responses of inflation and its components following a contractionary monetary policy shock. Although the LP-IV estimates are less precise, they confirm the main pattern documented in the VAR: monetary tightening lowers inflation, with particularly strong effects on imported inflation and with accompanying responses in the exchange rate, asset prices, and real activity. Taken together, these robustness checks show that the transmission results do not hinge on a specific instrument, yield measure, foreign-rate control, identification strategy, or empirical framework.

3.3.2 Shutting down the exchange rate response

We now perform a thought exercise to examine the relevance of the exchange rate in the transmission of monetary policy shocks in Norway. We construct a counterfactual scenario in which the response of the I44 exchange rate index is shut down at every horizon. Importantly, this counterfactual is not obtained by mechanically replacing the I44 impulse response with zero. Rather, we introduce a sequence of offsetting I44 innovations, period by period, such that the total I44 response is zero in each month following the monetary policy shock (see Kilian and Lewis (2011)). This allows us to trace the response of the remaining variables to the same monetary policy shock under the restriction that the exchange-rate channel is inactive. Comparing the baseline responses with this counterfactual provides a measure of the quantitative importance of the exchange-rate channel: the difference between the two responses captures the part of the transmission that operates through movements in I44. Conceptually, the exercise asks how the economy would respond to the same monetary policy shock if the exchange rate were prevented from reacting. As with any counterfactual exercise in a VAR framework, the results should be interpreted as illustrative rather than as a fully structural decomposition of transmission channels.

Figure 7 shows the results. The blue line corresponds to the baseline impulse responses, while the dashed black line shows the counterfactual responses obtained when the exchange-rate response is shut down. The most striking finding is that shutting down the exchange-rate response substantially attenuates the decline in both imported and domestic inflation. As expected, the effect is particularly pronounced for imported inflation: when the appreciation of the krone is neutralized, the decline in imported inflation becomes substantially smaller.

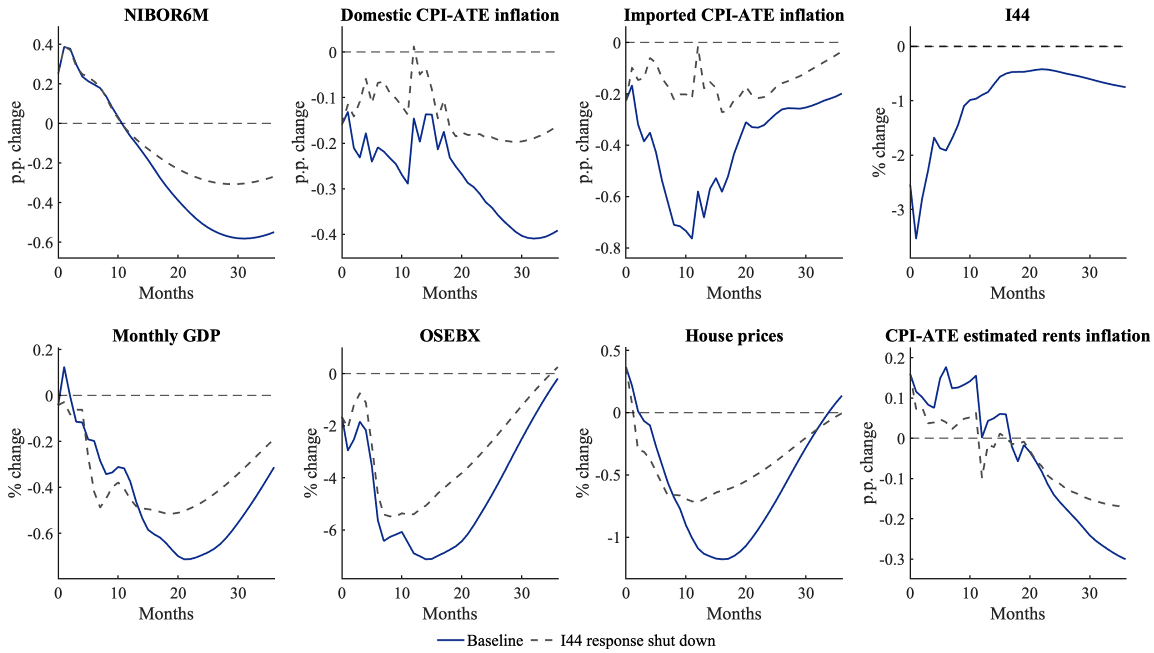


Figure 7: Impulse responses to a contractionary monetary policy shock: baseline versus counterfactual responses with the exchange-rate channel shut down.

However, the response of domestic inflation is also reduced substantially. The peak decline in domestic inflation is roughly halved in the counterfactual, suggesting that exchange-rate movements affect inflation through broader channels than the direct pass-through to imported consumer goods.

One possible interpretation is that exchange-rate movements affect a broad range of domestic costs and prices through imported intermediate inputs. In addition, exchange-rate fluctuations may influence wage formation and domestic cost pressures through their effects on competitiveness and activity in the tradable sector. More generally, the results suggest that exchange-rate movements contribute not only to imported inflation but also to the broader inflation process in Norway.

The responses of monthly mainland GDP, stock prices, and house prices are also somewhat smaller in absolute value when the I44 response is shut down. In particular, these variables display a milder decline relative to the baseline, suggesting that part of the contractionary effect of monetary policy operates through the exchange-rate channel. A stronger krone can reduce external demand and weigh on activity and asset prices; once this response is removed, the real and financial effects of the shock are less pronounced. The response of rent costs is also slightly smaller than in the baseline, but it continues to move in the same direction. Overall, the counterfactual exercise indicates that the exchange rate is an important amplification mechanism in the transmission of monetary policy in Norway. The effects are particularly pronounced for imported inflation, but the results also suggest a substantial role for exchange-rate movements in the transmission of monetary policy to domestic inflation, economic activity, and asset prices. Taken together, these findings suggest that exchange-rate movements are not merely a source of imported disinflation, but an important component of the broader monetary transmission mechanism in Norway.

3.4 The effects on inflation expectations

We now turn to the effects of monetary policy shocks on inflation expectations. The Norges Bank Expectations Survey (NBES) provides quarterly data, available continuously from 2002:Q1, on average inflation expectations for four different groups of agents (see Granziera et al. (2025)): households, social partners (trade unions and employer organizations), and economists (professionals and academics).

As highlighted in Granziera et al. (2025), the survey has several features that make it particularly well suited for our analysis. First, it is harmonized across agent groups: all respondents are surveyed over the same period, using comparable questions and a unified survey design. This facilitates direct comparisons across groups, since differences in expectations are less likely to reflect differences in survey wording, timing, or design.[3] Second, the survey includes social partners, namely representatives of employer organizations and trade unions, who are especially relevant in the Norwegian context given their role in wage-setting and economic coordination.

Given the lower frequency and shorter sample of the survey data, we depart from the baseline SVAR framework and instead employ the same local projection approach as above. Specifically, we aggregate the high-frequency monetary policy surprise to the quarterly frequency using a simple time sum and estimate a LP-IV specification in which the 6-month NIBOR rate is instrumented with the surprise measure. The surprise measure corresponds to the baseline two-year NIBOR6M swap-rate surprise used throughout the paper. The local projection includes four lags of the variables in the baseline VAR aggregated at the quarterly frequency as well as four lags of the instrument. The resulting impulse responses are reported in Figure 8.

[3] The fieldwork is scheduled so that no major CPI release, National Accounts release, or monetary policy decision occurs during the interview window, which helps ensure that the different groups form expectations under broadly comparable information conditions.

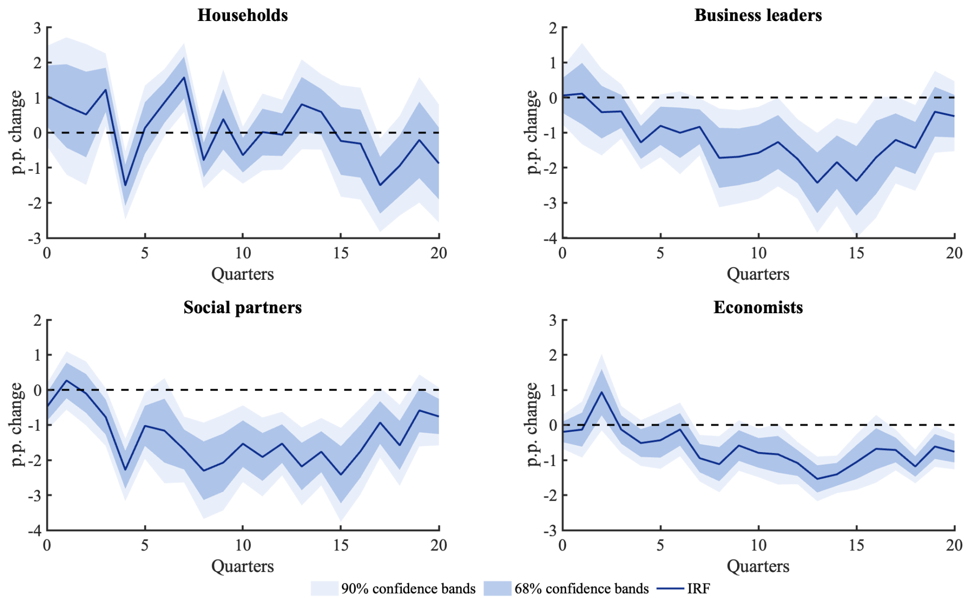


Figure 8: Impulse responses of inflation expectations from the Norges Bank Expectations Survey (NBES) for households, business leaders (firms), social partners, and economists following a contractionary monetary policy shock.

The results indicate a heterogeneous response of inflation expectations across agent groups. Expectations of economists, business leaders (firms) and social partners decline over the horizon considered following a contractionary monetary policy shock. The response is statistically significant and displays a smooth and persistent adjustment, suggesting that professional forecasters, firms and social partners incorporate monetary policy signals and update their expectations in a forward-looking manner. The response of social partners is particularly noteworthy in the Norwegian context, given their role in wage formation and collective bargaining. The results suggest that monetary policy influences the expectations of agents that are directly involved in setting future labor costs and prices.

By contrast, household inflation expectations display a short-run increase following the monetary policy shock, before reverting and showing little systematic response at longer horizons. The initial rise may reflect the salience of the policy move or a tendency for households to associate interest rate increases with higher inflation in the near term. This pattern is consistent with a growing literature showing that households often respond differently to monetary policy announcements than professional forecasters, reflecting differences in information, attention, and economic exposure (Coibion and Gorodnichenko, 2015; Coibion et al., 2022; D'Acunto et al., 2021). However, the response quickly dissipates, and the estimates become imprecise and close to zero thereafter. This pattern suggests that household expectations respond only weakly and temporarily to monetary policy innovations.

Overall, the evidence suggests that inflation expectations among professional forecasters, firms, and social partners are more responsive to monetary policy shocks than household expectations. The response of firms and social partners is particularly relevant because these groups play a direct role in wage and price setting, suggesting that monetary policy may influence inflation partly through its effects on the expectations of key economic decision makers. At the same time, the more limited response among households points to important heterogeneity in expectation formation and suggests that monetary policy may affect different groups through different channels. Taken together, the results indicate that monetary policy appears to have its strongest effects on the expectations of agents most directly involved in future wage and price formation.

4 Concluding remarks

This paper provides new evidence on the effects of monetary policy on inflation in Norway. Using high-frequency monetary policy surprises around Norges Bank announcements as external instruments, and combining Proxy SVAR and LP-IV methods, we find clear and robust evidence that contractionary monetary policy shocks reduce consumer prices.

The results are remarkably consistent across specifications. The main finding holds when alternative high-frequency instruments are used, when the policy variable in the VAR is replaced by alternative interest rate measures, when different identification strategies are employed and when the responses are estimated with LP-IV rather than a Proxy SVAR. Taken together, these exercises indicate that the conclusion does not depend on a particular modeling choice, variable definition, or identification strategy.

Beyond documenting the effects of monetary policy on inflation, the paper also provides evidence on the channels through which monetary policy operates in a small open economy. Imported inflation responds strongly following monetary policy tightening and is accompanied by an appreciation of the Norwegian krone, pointing to an important role for exchange-rate transmission. At the same time, domestic inflation, house prices, and economic activity also decline over time, suggesting that domestic demand channels remain an important part of the monetary transmission mechanism. A counterfactual exercise that shuts down the exchange-rate response indicates that exchange-rate movements contribute materially not only to imported inflation, but also to domestic inflation and real economic activity. Taken together, these findings suggest that exchange-rate movements are an important component of the broader monetary transmission mechanism in Norway. More broadly, the results highlight the importance of considering multiple transmission channels when evaluating the effects of monetary policy in small open economies.

The findings contribute to a growing literature that uses high-frequency identification methods to study monetary policy transmission. While much of this literature focuses on the United States and the euro area, our results show that similar methods can provide useful insights in a small open economy characterized by widespread variable-rate borrowing, high household indebtedness, and a floating exchange rate. In particular, the paper provides new evidence on how monetary policy affects imported and domestic inflation through both exchange-rate and domestic demand channels, and on the role of exchange-rate movements as an amplification mechanism in monetary transmission.

Overall, the evidence supports the conventional view that contractionary monetary policy lowers inflation in Norway. Across a broad range of identification strategies, instruments, and empirical specifications, this conclusion remains remarkably stable. The results further suggest that exchange-rate movements play an important role in the transmission of monetary policy in a small open economy. Taken together, the findings provide strong support for the effectiveness of monetary policy as a tool for stabilizing prices in Norway.

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A Appendix

A.1 Instrument relevance

Panel A: First-stage relevance test						
Instrument	N	$\hat{\beta}$	t-stat.	F-stat.	R^2	Corr.
FRA1M	288	0.478	4.307	18.546	0.061	0.247
FRA2M	288	0.435	4.086	16.692	0.055	0.235
FRA3M	288	0.404	3.878	15.035	0.050	0.223
FRA4M	288	0.446	4.088	16.710	0.055	0.235
1Y	288	0.455	3.302	10.906	0.037	0.192
2Y baseline	288	0.391	3.054	9.324	0.032	0.178
3Y	288	0.447	3.189	10.168	0.034	0.185
4Y	288	0.567	3.452	11.914	0.040	0.200
5Y	288	0.561	3.077	9.468	0.032	0.179
6Y	288	0.732	3.761	14.145	0.047	0.217
7Y	288	0.688	3.269	10.689	0.036	0.190
8Y	288	0.807	3.618	13.090	0.044	0.209
9Y	288	0.740	3.166	10.025	0.034	0.184
10Y	288	0.947	3.682	13.559	0.045	0.213
Panel B: p-values for correlation with VAR residuals						
Instrument	NIBOR6M	CPI-ATE	I44	GDP	OSEBX	Brent
FRA1M	0.000	0.609	0.004	1.000	0.601	0.662
FRA2M	0.000	0.421	0.004	0.752	0.598	0.785
FRA3M	0.000	0.457	0.006	0.645	0.437	0.793
FRA4M	0.000	0.474	0.005	0.584	0.751	0.735
1Y	0.001	0.323	0.003	0.085	0.726	0.942
2Y baseline	0.002	0.369	0.007	0.905	0.972	0.605
3Y	0.002	0.440	0.004	0.319	0.949	0.957
4Y	0.001	0.454	0.003	0.700	0.910	0.664
5Y	0.002	0.431	0.000	0.521	0.865	0.715
6Y	0.000	0.656	0.001	0.447	0.523	0.865
7Y	0.001	0.743	0.002	0.543	0.408	0.769
8Y	0.000	0.467	0.002	0.470	0.521	0.841
9Y	0.002	0.351	0.001	0.499	0.647	0.969
10Y	0.000	0.277	0.001	0.526	0.960	0.884

Notes: Panel A reports first-stage regressions of the reduced-form policy-rate residual on each candidate external instrument. The F-statistic is the square of the reported t-statistic. Panel B reports two-sided p-values from tests of zero correlation between each candidate instrument and the VAR residuals. NIBOR6M is the policy-rate residual. CPI-ATE, I44, mainland GDP, OSEBX, and Brent are non-policy residuals. The baseline instrument is the 2-year surprise.

A.2 Additional figures

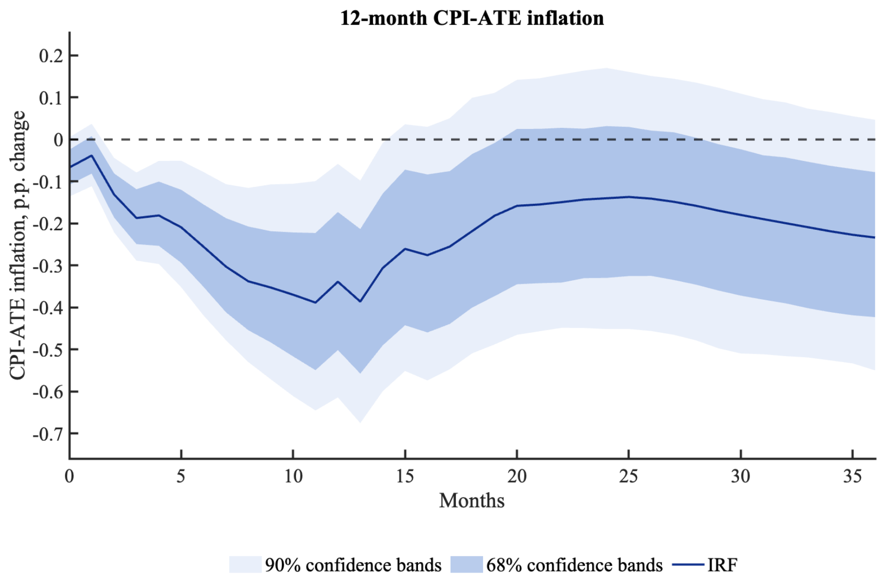


Figure A.1: Impulse responses to a contractionary monetary policy shock of 25 basis points adding 6-month US Treasury Bill in the SVAR.

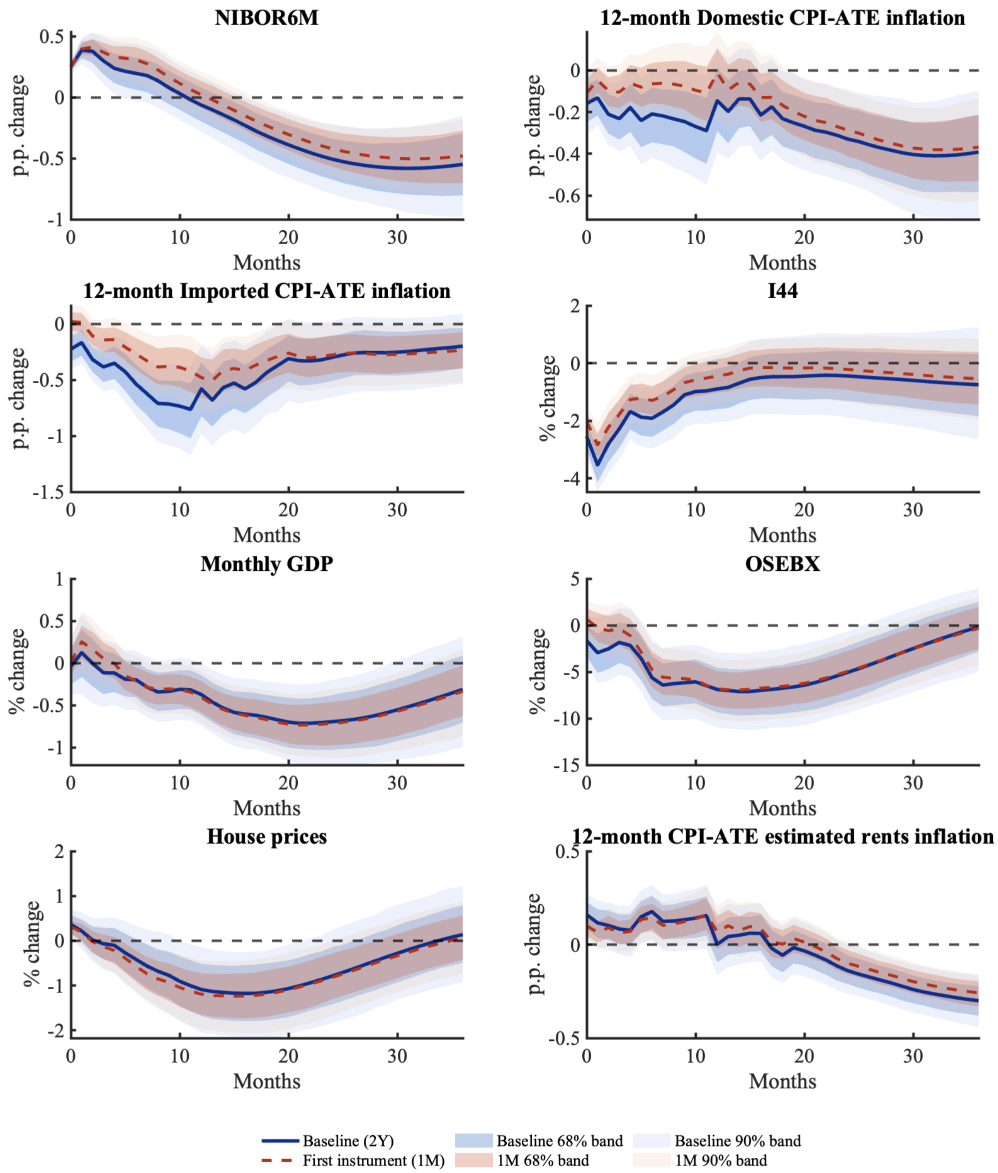


Figure A.2: Impulse responses to a contractionary monetary policy shock of 25 basis points using alternative instruments.

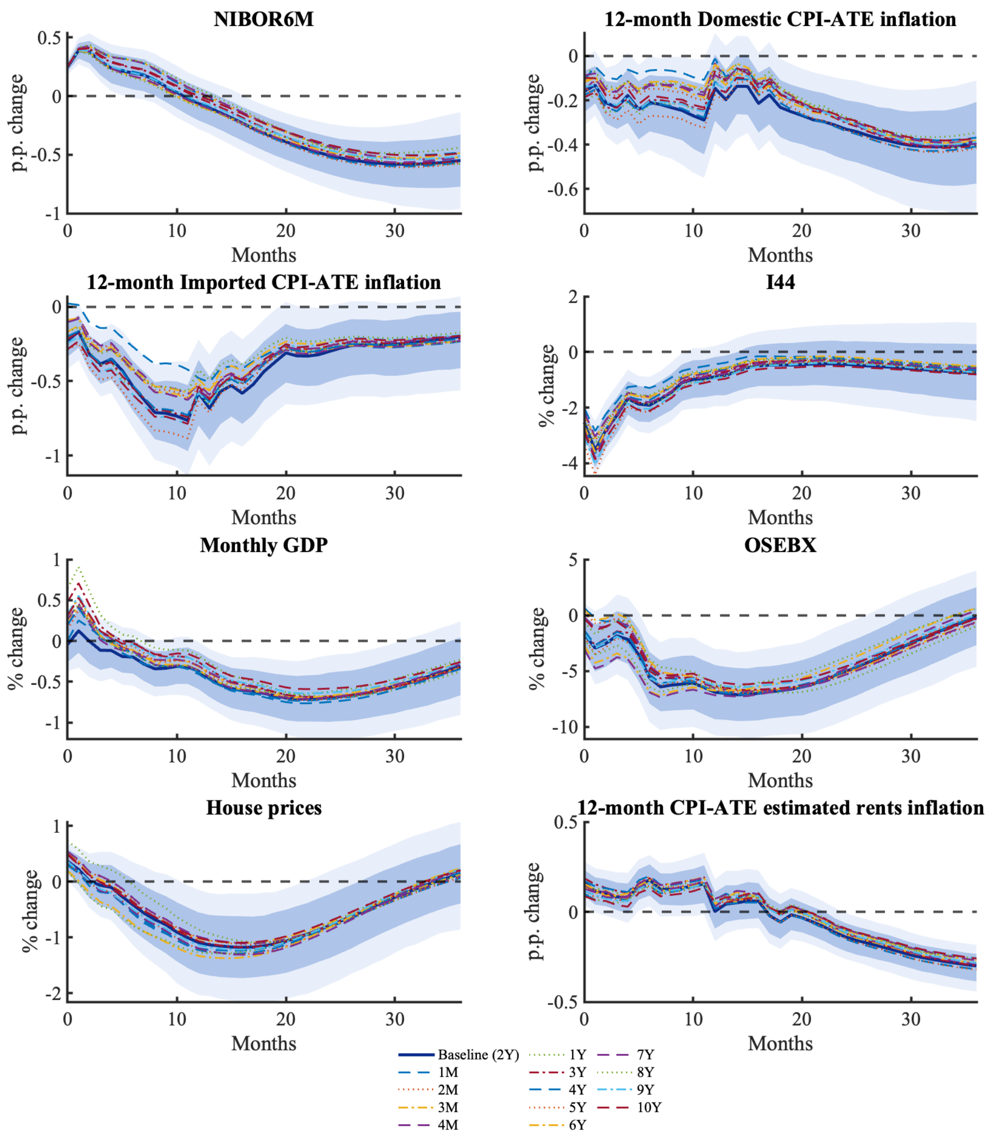


Figure A.3: Impulse responses to a contractionary monetary policy shock of 25 basis points using alternative instruments.

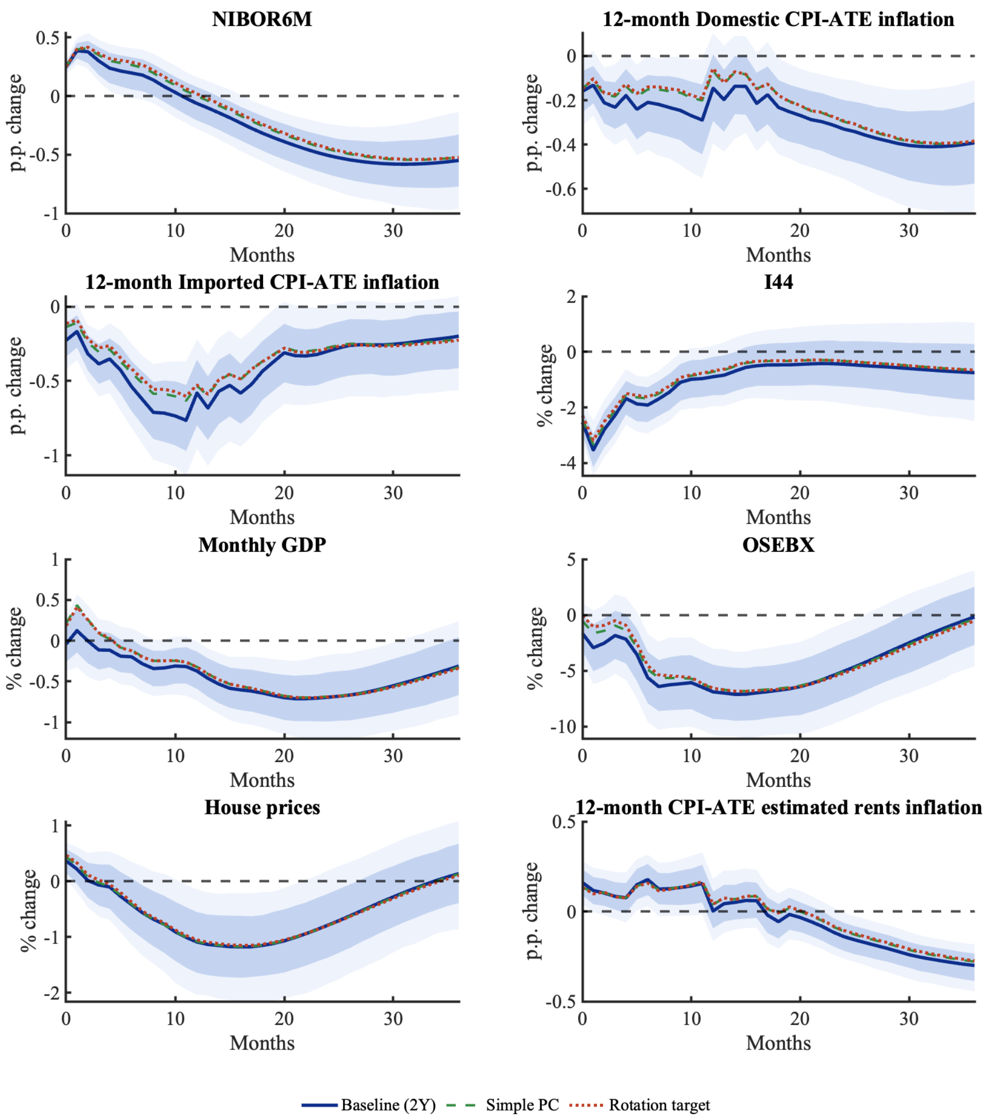


Figure A.4: Impulse responses to a contractionary monetary policy shock of 25 basis points using alternative principal components.

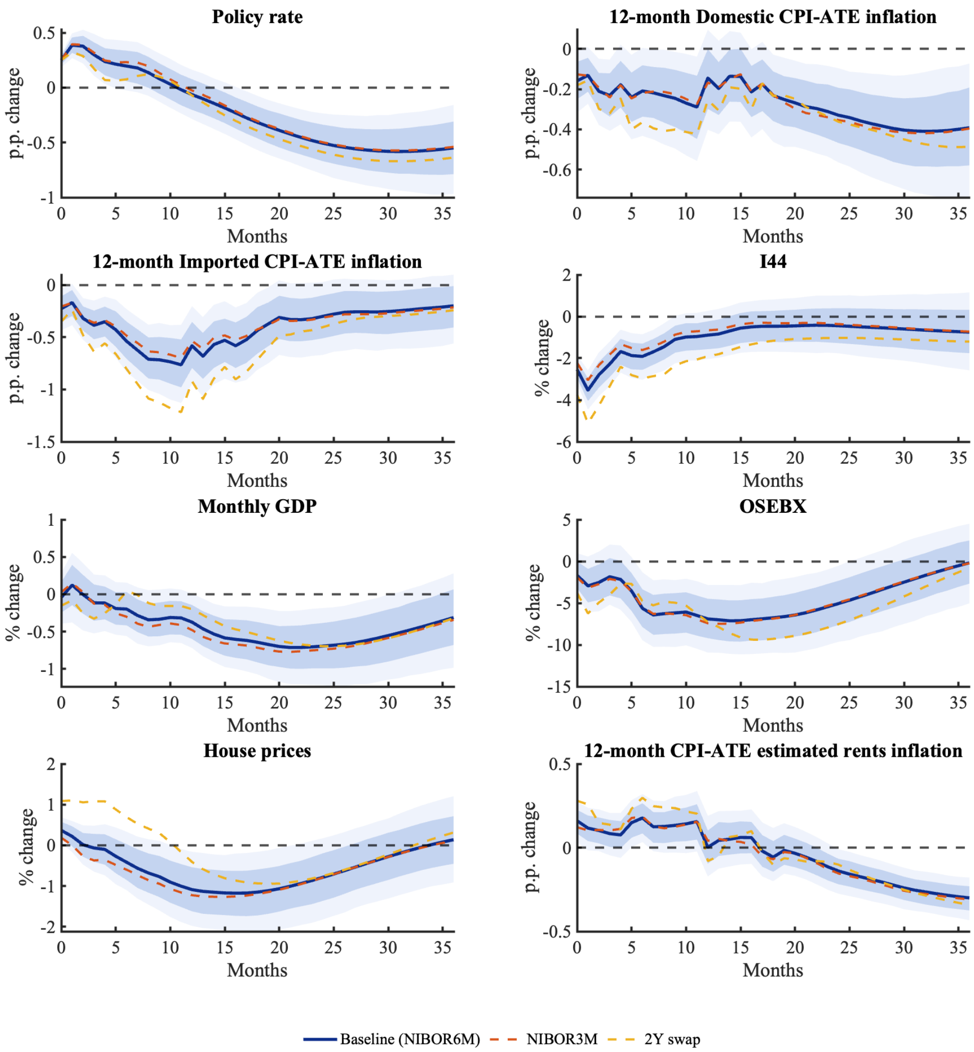


Figure A.5: Impulse responses to a contractionary monetary policy shock of 25 basis points using alternative policy rate measures.

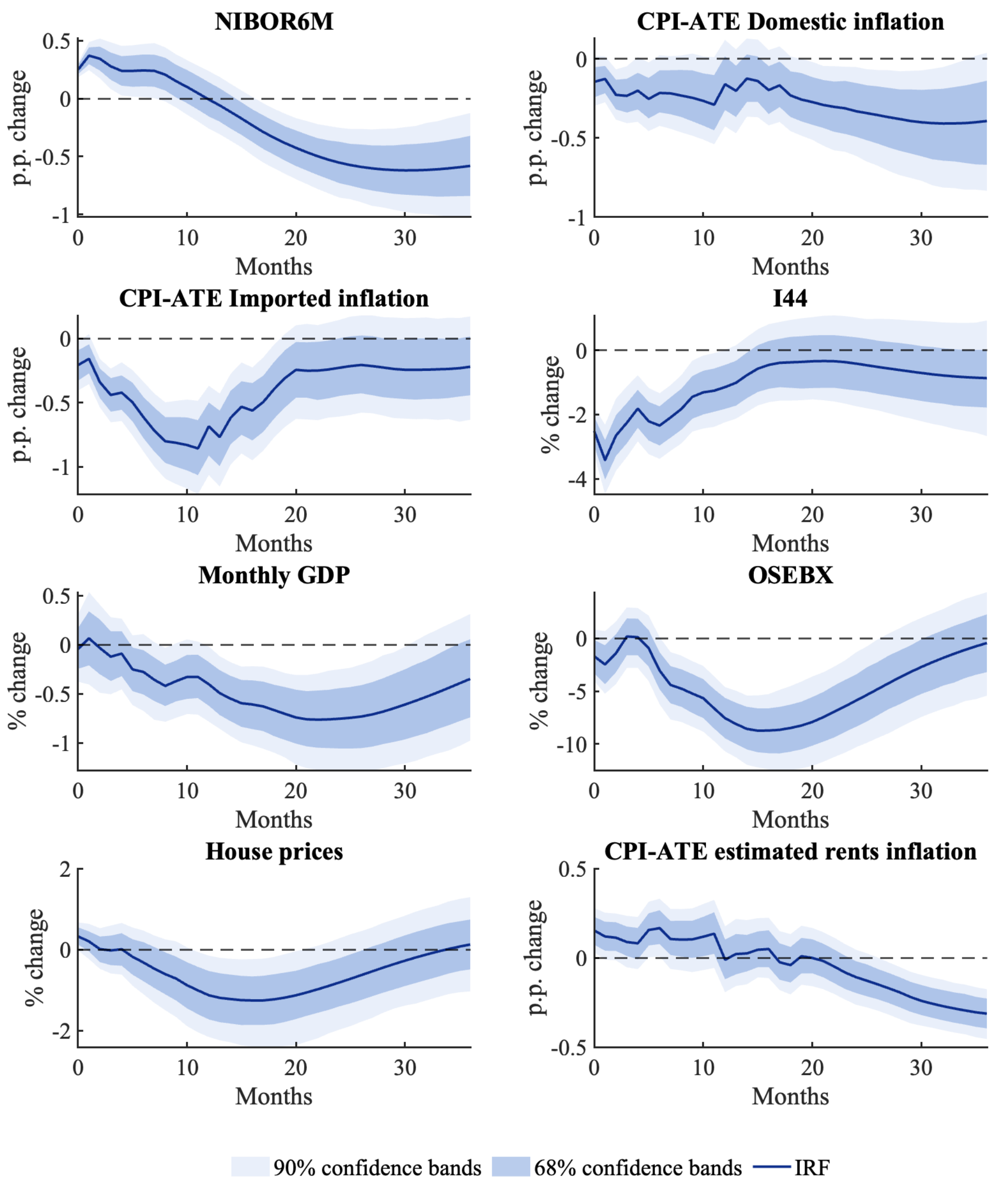


Figure A.6: Impulse responses to a contractionary monetary policy shock of 25 basis points adding 6-month US Treasury Bill in the SVAR.

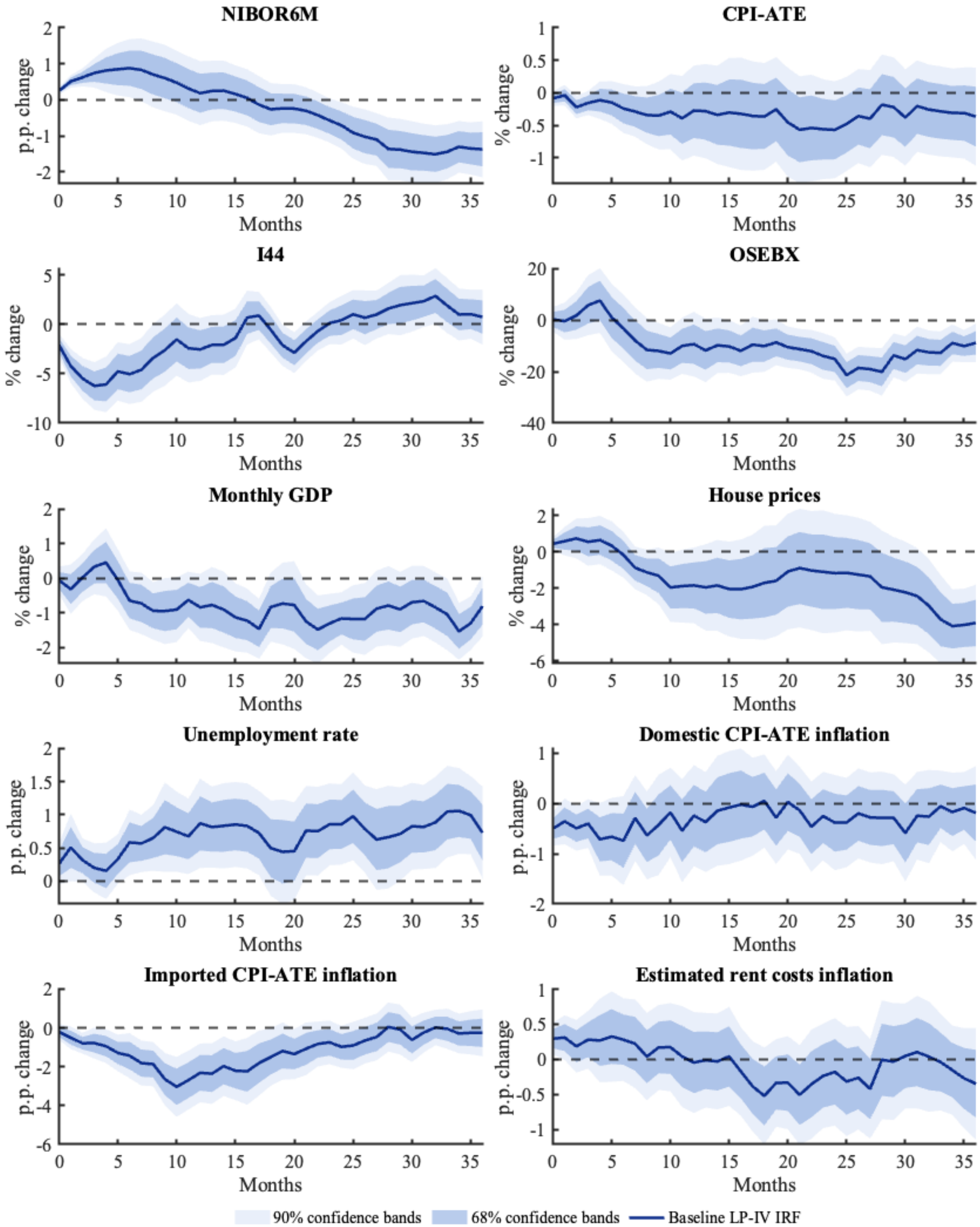


Figure A.7: Impulse responses to a contractionary monetary policy shock of 25 basis points using LP-IV approach.

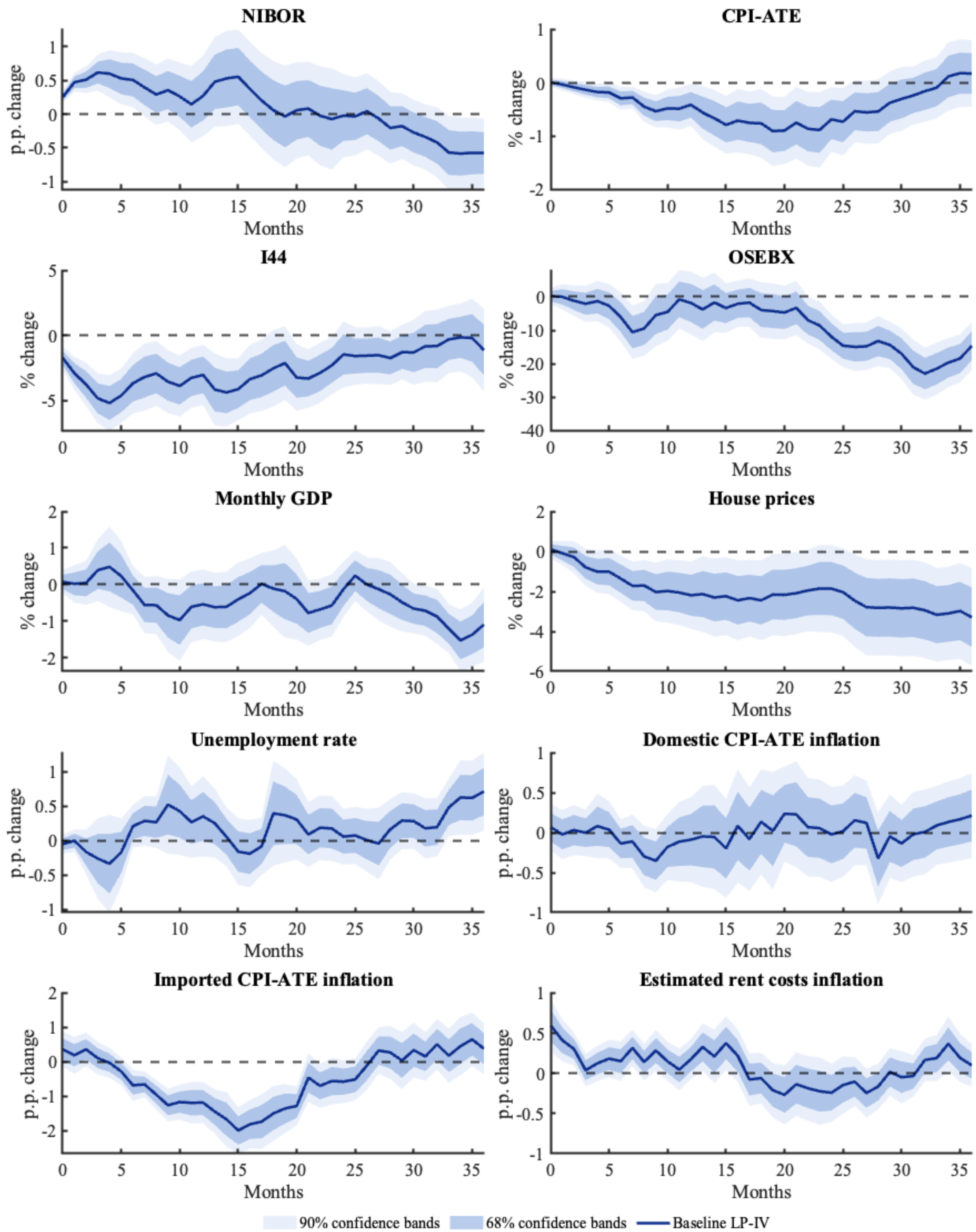
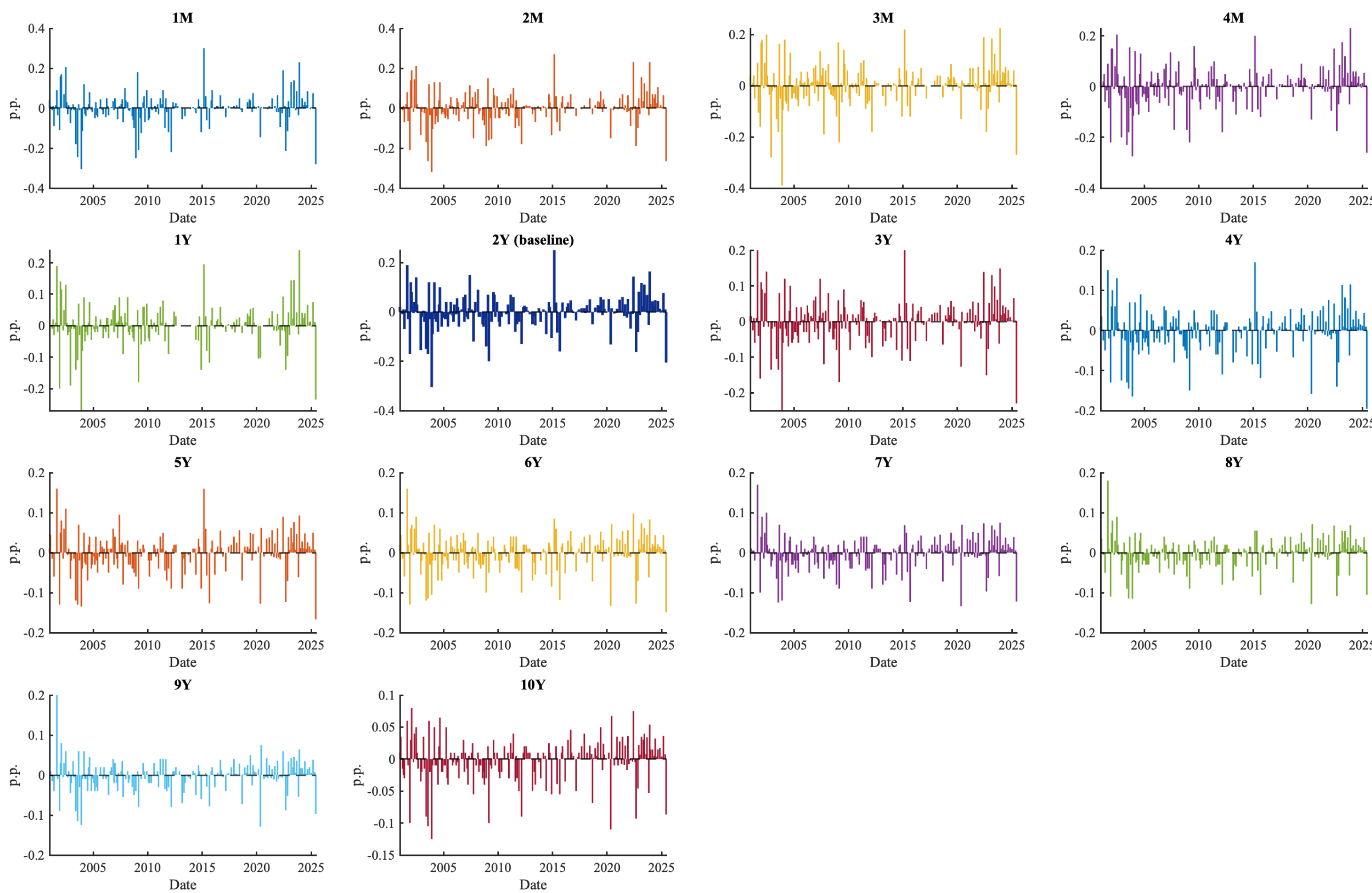


Figure A.8: Impulse responses to a contractionary monetary policy shock of 25 basis points using LP-IV approach and Romer and Romer (2004)-type instrument.



Note: Surprises are measured as the change in the market price from 10 minutes before to 20 minutes after each monetary policy announcement. The high-frequency surprises are converted to monthly frequency by summing all announcement-window changes within each month and setting the value to zero in months without policy announcements.

Figure A.9: Monetary policy surprises