STOCKHOLM SCHOOL OF ECONOMICS
Department of Economics
5350 Master's Thesis in Economics
Spring 2026

Monetary Policy Shocks and Exchange Rate Dynamics in Sweden

Evidence from a Proxy-SVAR with High-Frequency Identification

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Abstract: This thesis examines whether contractionary monetary policy shocks in Sweden generate exchange rate dynamics consistent with Dornbusch (1976) overshooting hypothesis. Using a Proxy Structural Vector Auto-Regression with High-frequency external instruments, the study identifies unexpected monetary policy shocks from intraday financial market reactions around announcements from the Riksbank. It further distinguishes between pure monetary policy shocks and central bank information effects by analyzing the co-movement between short-term interest rate surprises and stock market responses. The results show that a contractionary monetary policy shock leads to an immediate appreciation of the Swedish krona, followed by a gradual reversal over time, consistent with the overshooting hypothesis. This pattern is robust across several specifications and is also visible in bilateral exchange rates. By contrast, the evidence for central bank information effects is weak and stands in stark contrast to previous findings for the Eurozone and the United States.

Keywords: Exchange Rate Overshooting, Monetary Policy Shocks, Central Bank Information shocks, High-Frequency Identification, Riksbank Announcements, Small Open Economy

JEL: E52, E58, F31, G14

Supervisor: Rickard Sandberg
Date submitted: May 13, 2026
Date examined: May 27, 2026
Discussants: Hugo Hennel & Lukas Jung
Examiner: Álvaro Janez Garcia

Declaration of AI Technologies

During the work of this study, the authors used ChatGPT to improve the language and readability of this thesis. ChatGPT and Claude were also used to assist in the coding.

One possible drawback of using Claude and ChatGPT is that it can reduce our own understanding of how the code actually works. To avoid this, we made an effort to understand the output it generated instead of using it without reflection. We checked whether the results were reasonable based on economic intuition and compared them to findings in similar studies. This helped us to make sure that the code worked as intended. Using these tools made the coding process easier and helped us produce better code than we would likely have managed based only on our earlier programming experience without AI.

All entire output was then reviewed and edited as necessary and the authors assume full responsibility for the final content of the study.

Acknowledgements

First and foremost, we extend our heartfelt gratitude to our supervisor, Rickard Sandberg, who guided us throughout the process and helped us sharpen our arguments.

We are also deeply grateful to our fellow M.Sc. Economics students Pontus Larsson, Jakob Oberhammer, Vincent Holstensson, Linus Abrahamsson, Dhruv Yadav and Pedro Silva for their support during the semester and for engaging in fruitful discussions at the mid-term seminar.

Finally, we acknowledge the valuable support provided by the Riksbank's Monetary Policy Department, the SSE Library staff and the LSEG Help Desk during the data collection process.

Per aspera ad astra.

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1. Introduction

Exchange rates are often described as one of the most forward-looking prices in the economy, reacting within minutes to news about inflation, growth and monetary policy. However, despite decades of research, one prominent macroeconomic prediction remains empirically disputed: does a contractionary monetary policy shock trigger an immediate appreciation of the exchange rate that overshoots its long-run level, as proposed in Dornbusch (1976) overshooting hypothesis? On the one hand, some literature finds strong evidence for the overshooting hypothesis, with a clear immediate appreciation of the exchange rate (Bjørnland, 2009; Rüth, 2020; Almerud et al., 2024; Soosalu, 2024; Braig et al., 2024). On the other hand, although the theory is straightforward, sticky goods prices imply that the exchange rate must jump on impact to clear asset markets, some research points in the opposite direction by documenting recurring "puzzles", such as "delayed overshooting", which contradict the Dornbusch hypothesis (Scholl and Uhlig, 2008; Gürkaynak et al., 2021; Lindé, 2003; Müller et al., 2024; Kim et al., 2017). An explanation, emphasized in the literature, is that these puzzles largely reflect identification problems rather than flaws in the underlying theory (Bjørnland, 2009; Rüth, 2020; Braig et al., 2024).

Monetary policy shocks rarely contain only information about the unexpected policy change, they may also communicate the central bank's view on the economic outlook and inflation prospects, which can generate information effects (Jarociński and Karadi, 2020; Gürkaynak et al., 2021; Breitenlechner et al., 2021; Gürkaynak et al., 2005). If markets interpret a policy announcement as new information on future fundamentals rather than a "pure" contractionary policy shock, the responses in real activity and prices may appear theoretically inconsistent, even if the underlying mechanism in the Dornbusch (1976) model remains relevant.

Against this background, several contributions have revisited the overshooting hypothesis using improved identification strategies and open-economy frameworks, showing that dynamics, like overshooting, can re-emerge when monetary policy shocks are identified with greater credibility and when the interaction between monetary policy and the exchange rate is modeled more carefully (Bjørnland, 2009; Rüth, 2020; Soosalu, 2024; Braig et al., 2024).

This debate is particularly relevant for small open economies with floating exchange rates, where external prices and financial conditions interact tightly with domestic stabilization policy (Bjørnland, 2009; Kim and Lim, 2018; Soosalu, 2024). For this reason, Sweden offers an interesting setting to test the hypothesis. The Swedish krona has exhibited pronounced volatility over the last decades, while monetary policy has undergone sharp regime shifts. The Swedish economy has gone from inflation targeting and credibility building in the late 1990s, through unconventional policy and negative rates, to the rapid

tightening cycle following the post-pandemic inflation surge.

The purpose of this thesis is to empirically evaluate whether unexpected changes in Swedish monetary policy generate an exchange rate dynamic consistent with Dornbusch (1976), and to analyze the potential role of information revealed by the central bank. The thesis builds on the framework of Rüth (2020) and Jarociński and Karadi (2020), but implements it in a Swedish and small open economy framework.

To address the fact that monetary policy announcements may communicate more than pure policy stance, we follow Jarociński and Karadi (2020) and Jarociński (2022) to decompose the shock into two components, one that aims to capture a "pure" monetary policy shock and one that aims to capture the informational component of central bank communication. This distinction could matter since the exchange rate and the broader economy may react not only to the unexpected policy stance, but also to new information about the economic outlook revealed at the same time. By isolating the different possible components of the surprise, we can assess whether the dynamics of output, prices and the exchange rate differ depending on the nature of the underlying shock (Jarociński and Karadi, 2020; Breitenlechner et al., 2021; Gürkaynak et al., 2021).

A further consideration concerns the composition of the event database. Because the Riksbank holds fewer monetary policy meetings than most comparable central banks, the database provided by Almerud et al. (2024) augments the standard announcement window by including price movements around the release of executive board minutes, thus increasing the number of observations available for identification. Since this practice is not adopted in the corresponding literature for other countries (Cesa-Bianchi et al., 2020; Jarociński and Karadi, 2020; Soosalu, 2024), we explicitly evaluate whether the inclusion of minutes-release observations materially affects the results. This could be of clear interest, since if minutes only increase the number of observations and do not bias results, it could enable similar research on economies with fewer years of central bank independence.

Against this background, the thesis is structured around the following research questions:

1. *Does a contractionary monetary policy shock from the Riksbank cause an immediate appreciation of the Swedish krona that overshoots and subsequently reverses, consistent with Dornbusch's overshooting hypothesis?*

2. *What differences emerge in exchange rate movements and macroeconomic dynamics when comparing the impact of decomposed monetary policy and central bank information shocks?*

3. *To what extent do the results vary depending on the inclusion of minutes in the high-frequency intraday data?*

Empirically, we implement an Instrument Variable Vector Auto-Regression framework, also known as Proxy Structural Vector Auto-Regression (Proxy-SVAR), where we identify monetary policy shocks through high-frequency intraday data as external instruments, a method pioneered by Gertler and Karadi (2015). This strategy is based on measuring the immediate reactions of the markets in narrow time windows around the Riksbank's policy announcements to isolate exogenous shocks from general economic information. By focusing on this restricted interval, the risk that other macroeconomic news contaminates the measurement of the monetary policy surprise is minimized.

A central part of the methodology is that we, in line with Jarociński (2022), decompose these high-frequency surprises, by rotational decomposition, into two components. One "pure" monetary policy shock and an informational shock stemming from central bank communication. This decomposition is enabled by analyzing the co-movement between policy rate surprises in three-month Overnight Index Swap rates and stock market (OMXSPI) reactions. A "pure" tightening (loosening) of monetary policy is expected to raise (lower) interest rates and lower (increase) stock prices, whereas an information shock, in which the central bank signals a stronger-than-expected economy, is assumed to cause interest rates and stock prices to move in the same direction.

To estimate these effects in a small open economy, the Proxy-SVAR framework is applied to a monthly data-set of domestic macroeconomic variables. To account for Sweden being a small open economy influenced by economic and financial development abroad, we control for a set of foreign macroeconomic variables.

This study contributes to the literature in two main ways. First, we provide updated evidence that the overshooting hypothesis of Dornbusch (1976) holds for Sweden, showing that the exchange rate exhibits a clear appreciation following a contractionary monetary policy shock, followed by a gradual return to baseline. Second, we are the first to explicitly test the presence of information shocks in Swedish monetary policy announcements, finding no suggestive evidence that the nature of the underlying shock matters for the dynamics impacting the price-level, output and the exchange rate.

The thesis proceeds as follows. First, Section 2 reviews the theoretical framework and the related literature. Then, Section 3 describes the data used in the analysis and Section 4 outlines the empirical methodology. The results are then presented in Section 5 and discussed in Section 6 before the thesis concludes with a final summary and concluding remarks in Section 7.

2. Theory & Literature Review

This section reviews the theoretical framework on which the thesis is based. It discusses the empirical literature written on the effects of monetary policy shocks on exchange rates, with a particular focus on the overshooting hypothesis and on high-frequency identification strategies. We begin by outlining the overshooting mechanism, focusing on how monetary policy shocks transmit to macroeconomic variables and exchange rate dynamics. We then review studies that use high-frequency data to identify monetary policy shocks and estimate their effects on the exchange rate. Finally, we discuss the monetary policy frameworks in Sweden and the euro area. The section concludes by examining the role of central bank transparency in this thesis.

2.1 The Overshooting Hypothesis

The overshooting hypothesis, by Dornbusch (1976), was developed to explain why exchange rates can exhibit large and temporary reactions to monetary policy shocks. The model is based on a small open economy with perfect capital mobility, where domestic and foreign assets are viewed as perfect substitutes given an appropriate premium for expected exchange rate movements. A fundamental driver behind this phenomenon is the different adjustment speeds between different markets. Although the exchange rate and the interest rate on the asset market adjust immediately, the prices on the goods markets are sticky and respond only gradually.

Dornbusch (1976) assumes that actors have rational expectations, in the form of perfect foresight. This means that expectations about the future path of the exchange rates are consistent with the actual structure of the model and will therefore not lead to systematic forecast errors. Another important assumption to motivate why overshooting appears as a necessity is that the output is fixed at its full-employment level in the short run, i.e. in a steady state. Since output cannot adjust immediately to accommodate a change in the money supply, the initial adjustment must occur entirely through financial variables.

According to the model, a contractionary monetary policy shock leads to an immediate decrease of the real money supply, which, in turn, will increase the domestic interest rate to achieve equilibrium on the money market. For uncovered interest parity (UIP) to hold, the higher domestic interest rate must be offset by an expected future depreciation. For the market to maintain such an expectation, the exchange rate must appreciate immediately and by enough to exceed its long-run equilibrium level. Thus, the exchange rate overshoots. Over time, as prices gradually adjust and real money balances are restored, the exchange rate depreciates toward its long-run equilibrium (Dornbusch, 1976).

The empirical literature on the overshooting hypothesis has been characterized over the past decades by a tension between theoretical elegance and empirical puzzles. Some

studies have failed to find empirical support for the hypothesis, leading to puzzles such as "delayed overshooting", where the exchange rate reaches its maximum appreciation only after several years (Lindé, 2003; Scholl and Uhlig, 2008; Müller et al., 2024). In line with this, Kim and Lim (2018) find that, using sign restrictions, the appreciation in Sweden and other small open economies occurs with a delay, especially during the inflation-targeting period. Sims (1992) highlighted a fundamental difficulty in identifying monetary policy shocks in VAR models. The presence of the "price puzzle", where inflation increases after an increase in the policy rate, suggests that such models often fail to account for the endogenous response of the central bank to private information on future inflation.

Building on this broader identification problem, Bjørnland (2009) argues that these puzzles are often a by-product of limited identification rather than a failure of the underlying theory. Bjørnland (2009) was among the first to show that once the contemporaneous interaction between the interest rate and the exchange rate is allowed, through long-run restrictions, the evidence provides clear support for Dornbusch (1976) overshooting predictions.

A central development in the literature concerns the use of high-frequency data to address the identification problem. Rüth (2020) examines the overshooting hypothesis in the United States by applying a Proxy-SVAR method. In this model, unexpected interest rate movements around policy announcement serve as an external instrument to isolate monetary policy shocks. He concluded that the overshooting hypothesis remains intact in the United States, with the exchange rate response peaking within two months of the shock. The results of Rüth (2020) show that when shocks are isolated more effectively, previously reported delays disappear. Applying the same method and theoretical framework as in Rüth (2020), we will evaluate whether the overshooting hypothesis also holds for Sweden.

Additionally, Braig et al. (2024) advance this argument by using a controlled experimental design in which an open-economy DSGE model serves to evaluate alternative identification strategies. In a setting where overshooting is known to be true by definition, they find that a Proxy-SVAR is the most reliable approach to recovering the exchange rate's immediate response to a monetary policy shock. They also reinforce the interpretation in Bjørnland (2009) and Rüth (2020) by showing that many of the previously documented "puzzles" and anomalies are more likely symptoms of misidentification in conventional empirical models than evidence against the underlying theory. This supports our methodological choice of relying on a Proxy-SVAR with external instruments.

2.2 Central Bank Information Effects

Meanwhile, central bank communication has received renewed attention in the literature. Gürkaynak et al. (2021) and Breitenlechner et al. (2021) emphasize the presence of in-

formation effects, in which the market's reaction to a policy decision depends not only on the interest rate change itself, but also on what the decision is perceived to signal about the central bank's private assessment of the economic outlook. If a rate increase is interpreted as conveying optimism about future growth rather than as a straightforward tightening, exchange rates and macroeconomic variables may respond in ways that appear inconsistent with standard theory, unless the two types of news are separated. We address this concern by applying the decomposition developed by Jarociński (2022), described in detail in Section 4.3.

A related strand of the literature establishes that high-frequency surprises can systematically capture more than pure monetary policy shocks. Jarociński and Karadi (2020) and Jarociński (2022) show that policy announcements frequently coincide with information shocks, through which the central bank simultaneously communicates its view of macroeconomic conditions. This mechanism is plausible given the evidence that central banks hold an informational advantage over the public (Romer and Romer, 2000). Both studies exploit the co-movement between interest rate surprises and stock market returns to disentangle monetary policy shocks from information shocks, before estimating the resulting dynamics in a VAR framework. Removing the information component produces impulse responses more consistent with standard theory, with the effect particularly pronounced for the United States and more muted for the euro area. Evidence of information effects in the euro area is further corroborated by Kerssenfischer (2019) who similarly identifies an information component, using stock market co-movement.

2.3 High-Frequency Identification

A key challenge in modeling a small open economy is accounting for the contemporaneous relationship between interest rates and the exchange rate, which a standard Cholesky Decomposition fails to model. If this relationship is not properly identified, it becomes difficult to isolate exogenous monetary policy shocks from the broader flow of information in the economy, complicating the interpretation of movements in policy rates and macroeconomic variables as genuine monetary policy shocks.

To address the problem of contemporaneous restrictions, recent literature has moved towards high-frequency identification (HFI), a method pioneered by Gertler and Karadi (2015). The idea behind HFI is to use an external instrument framework (Proxy-SVAR), proposed by Stock and Watson (2012) and Mertens and Ravn (2013), to measure market pricing in a narrow window around a monetary policy announcement. Within this restricted time frame, it is reasonable to assume that price movements primarily reflect the effects of the central bank's announcement. This approach aims to isolate the unexpected component in monetary policy, making it possible to trace its causal effect on asset prices (Gertler and Karadi, 2015).

In a Swedish context, Almerud et al. (2024), show that intraday data can serve to identify causal effects in a small open economy. By constructing a new event-study database with high-frequency (HF) market reactions to the Riksbank's announcements, they develop a static factor model, based on the foundations of Gürkaynak et al. (2005). Using this approach, they find that an unexpected tightening leads to an immediate and persistent appreciation of the Swedish krona, along with gradual declines in real activity and prices, providing empirical support for the theory of Dornbusch (1976).

Soosalu (2024), similarly, studies the Canadian economy and finds that HF intraday surprises produce stronger and faster effects on output and prices compared to daily-based data approaches, suggesting that daily measures may contain noise from information unrelated to monetary policy that can obscure causal effects.

A closely related contribution is Cesa-Bianchi et al. (2020), who study the transmission of monetary policy in the United Kingdom using a Proxy-SVAR identified with high-frequency surprises. They find that a contractionary monetary policy shock leads to a persistent appreciation of the pound sterling, with the exchange rate response lasting well beyond the initial impact, alongside falls in output and inflation. The United Kingdom shares key structural features with Sweden, including a flexible exchange rate, an inflation-targeting central bank and a high degree of financial openness, making their findings a natural benchmark for the results presented here.

2.4 Monetary Policy Frameworks & Transparency

Over the past decades, the Riksbank has undergone major changes. In 1992, Sweden abandoned the fixed exchange rate in favor of a floating exchange rate. Since 1995, the Riksbank has followed an inflation targeting framework, where the inflation target is set at 2% annually. Inflation is measured as the annual percentage change in the Consumer Price Index with a Fixed Interest Rate (CPIF). Since 2017, the Riksbank has conducted inflation targeting with a variation band of 1-3% around the target of 2 % for CPIF inflation (Sveriges Riksbank, 2026a). The Swedish policy rate (formerly the repo-rate) is the Riksbank's primary instrument for achieving its inflation target. The rate is set by the Riksbank's Executive Board at regular monetary policy meetings[1] and by steering the overnight market rate, it influences interest rates at longer maturities throughout the economy.

Similarly to the Riksbank, the European Central Bank (ECB) bases its framework of price stability on a quantitative definition. The ECB aims to have a 2% inflation over the medium term, where inflation is measured by the Harmonized Index of Consumer Prices (HICP). The 2% target of the ECB is symmetric, which means that negative and positive deviations from the target are equally undesirable. Compared to the Swedish

[1]For a complete timeline of the monetary policy announcement process, see Appendix A.8.

policy rate, the key instrument for achieving the inflation target set by the ECB is the Deposit Facility Rate (European Central Bank, 2021).

The Riksbank is often recognized as one of the most transparent central banks in the world (Dincer and Eichengreen, 2014). An important explanation for this is the regulatory framework set in the *Sveriges Riksbank Act* (SFS 2022:1568). Under this act, the Riksbank is required to regularly report its monetary policy decisions. It must also communicate its strategy, its assessment of future inflation developments, the key factors underlying its decisions, and how it evaluates the prospects of achieving the inflation target.

Furthermore, Jarociński and Karadi (2020) argue that central bank transparency is best understood as the ability to convey its internal assessment of the economic outlook to financial markets, thereby generating information shocks. In this context, they show that nearly half (approximately 47%) of ECB policy announcements are associated with a positive co-movement between stock prices and interest rates, compared to roughly one-third in the United States. The authors attribute this difference to the ECB's more transparent communication strategy, characterized by the immediate release of macroeconomic forecasts and regular press conferences. Relative to the ECB, Dincer and Eichengreen (2014) find that the Riksbank exhibits an even higher degree of transparency.

Given the high degree of transparency of the Riksbank, one might expect concerns about central bank information masking underlying dynamics to be less pronounced in the Swedish setting. As argued by Almerud et al. (2024), this should enable a cleaner identification of monetary policy transmission. Furthermore, Almerud et al. (2024) argue that, due to the small size of the Swedish economy and its high degree of capital mobility, the Riksbank is unlikely to systematically influence stock market movements, as a substantial share of asset flows originates from foreign investors.

Despite this, we empirically test whether information shocks, identified by stock-market co-movement, may nevertheless be present in Sweden. Even in a small open economy, investors allocating capital to Swedish assets face a trade-off between equities and other asset classes, suggesting that monetary policy may still affect stock market dynamics. Moreover, as emphasized by Gürkaynak et al. (2021) and Breitenlechner et al. (2021), information effects embedded in central bank announcements can obscure the underlying transmission dynamics even in transparent institutional settings.

Consequently, we follow Jarociński and Karadi (2020) and decompose the announcement shocks into a pure monetary policy component and an information component. This will serve as an empirical test of whether such effects are present in the Swedish context. Simultaneously, it will test whether the procedure, outlined by Jarociński and Karadi (2020), can credibly identify such an effect in a Swedish setting. This procedure is described in further detail in the methodology section.

3. Data

This section describes the data used in the empirical analysis. The choice of variables and overall model structure follow Rüth (2020), Jarociński and Karadi (2020) and Cesa-Bianchi et al. (2020), adapted to a Swedish small open economy context. This entails a more parsimonious specification, reflecting the shorter sample period, as well as the inclusion of exogenous variables to account for foreign influences.

The full sample of monthly macroeconomic data spans from January 2000 to November 2025. Endogenous variables include a short-term interest rate (measured by the three-month government bill)[2], the price level, industrial production and the exchange rate index. Exogenous control variables include the corresponding interest rate, industrial production and price index for the euro area (EA).

Building on the methodology of Gertler and Karadi (2015) and in line with the related literature (Almerud et al., 2024; Rüth, 2020; Soosalu, 2024; Cesa-Bianchi et al., 2020; Gürkaynak et al., 2021), we identify monetary policy shocks using HF surprises measured in narrow windows around policy announcements and employ these surprises as external instruments. To this end, we use the Riksbank's HF monetary policy surprise series, which spans from August 2004 to November 2025.

3.1 High-frequency Data of Monetary Policy Shocks

We use the Database for Event Studies of Swedish Monetary Policy, provided by Sveriges Riksbank and compiled by Almerud et al. (2024), to identify HF monetary policy shocks. The database was developed to enable empirical analysis of the reactions of financial markets to the Riksbank's communication and policy rate decisions.

The HF data consist of changes in financial derivative prices measured within narrow windows around monetary policy events, including policy rate decisions and minutes (see below for definition). To instrument changes in the interest rate, we use the 3 month STINA-swap, a SEK Overnight Index Swap (OIS), to capture shifts in market expectations concerning the policy rate. The database also includes changes in the OMX Stockholm All-Share index (OMXSPI), during the announcement-window.

The identification of monetary policy shocks is based on an event-study methodology in which price changes are measured within a narrow time-window around the announcement, specifically during the 10 minutes preceding and the 20 minutes following the release, as illustrated in Figure 3.1. The short interval allows the resulting price movements to be interpreted as reflecting new information about monetary policy while minimizing

[2]Government bonds with a maturity of two and ten years are used as alternative policy indicators for the results presented in Appendix A.6.

the influence of other contemporaneous macroeconomic news or financial shocks[3].

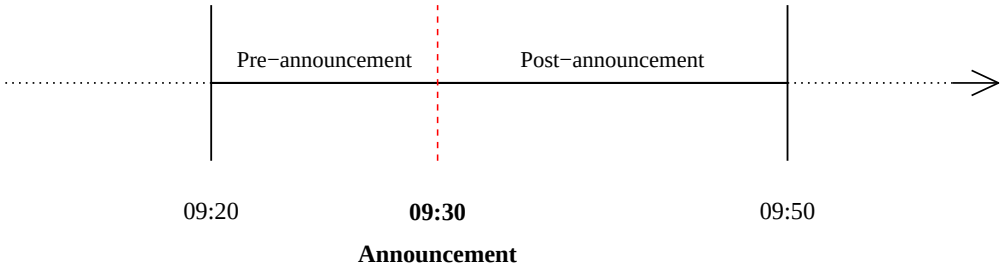


Figure 3.1: Measurement window for HF monetary policy shock

The pre-announcement interval covers the ten minutes leading up to the policy communication, from 09:20 to 09:30, while the post-announcement interval extends from 09:30 to 09:50. The monetary policy shock is defined as the change in the median quoted price between the post-announcement and pre-announcement periods.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024).

Since the database is structured at the event level, each observation is linked to a specific policy announcement and, therefore, contains detailed information on its timing, type and associated market reactions. This HF structure makes the data suitable for the construction of external measures of unexpected monetary policy changes. In line with previous literature (Almerud et al., 2024; Gertler and Karadi, 2015; Rüth, 2020; Soosalu, 2024; Cesa-Bianchi et al., 2020), the resulting monetary policy surprises are used as an external instrument to identify monetary policy shocks in our VAR analysis.

Following Almerud et al. (2024), we exclude four dates from the full sample of 289 observations. That is, 2008-10-08, 2008-10-15, 2020-09-15 and 2021-03-10. These announcements were removed since they were either part of coordinated actions between different central banks to ease pressure from the Global Financial Crisis, or related to liquidity support during the pandemic and were thus in a strict sense not aimed at conveying a standard monetary policy. In Table 3.1 we provide a breakdown of the different types of events provided in the data set.

The *Minutes* refer to the reports published by the Riksbank five working days after each policy announcement[4]. In the minutes, the Riksbank documents the discussion underlying the policy decision and presents the arguments advanced by the individual board members. One could therefore argue that the minutes do not necessarily provide any new information about the policy rate and should therefore not have such an impact on the market. Moreover, the existing literature on the overshooting hypothesis based on HF intraday data typically identifies monetary policy shocks using narrow windows around the

[3]Due to limited liquidity at times on the Swedish market, some windows were expanded to allow for more price observations. (Almerud et al., 2024).

[4]As of 2024, the Riksbank increased the number of monetary policy meetings from five to eight per year. At the same time, the minutes began to be published five working days after each meeting, rather than ten days later as before (Sveriges Riksbank, 2023).

policy announcement and occasionally the accompanying press conference, but not from protocols or minutes published several days later (Gertler and Karadi, 2015; Jarociński and Karadi, 2020; Soosalu, 2024; Rüth, 2020). We will therefore exclude minutes from parts of the estimation to see how the results vary depending on their inclusion.

Communication event	Number of events
Regular Announcement	131
Minutes	134
Extraordinary Announcement	22
Extraordinary Announcement & Minutes	2

Table 3.1: Types of Riksbank announcements

The table classifies the different types of monetary policy communication events included in the dataset. The table presents all of the 289 announcements, including the announcements we exclude in the analysis.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024).

In line with Rüth (2020), Bjørnland (2009) and Cesa-Bianchi et al. (2020) we use the yield of three-month government bills as our policy indicator in the VAR. In addition, we will also make use of the two-year government bond yield and the ten-year government bond yield as policy indicators to examine whether the results differ when using longer maturities. To identify monetary policy shocks, we use HF surprises in the three-month SEK OIS rate as an external instrument. This approach follows Rüth (2020), who argues that the three-month instrument is particularly suitable because it captures both the immediate rate adjustment and the market's short-term policy expectations, while being less sensitive to purely technical "timing surprises" than contracts of shorter maturity. The use of three-month OIS surprises as an external instrument is also supported by Jarociński and Karadi (2020), who employ closely related short-maturity OIS contracts for the US and the EA to quantify announcement-window interest rate surprises.

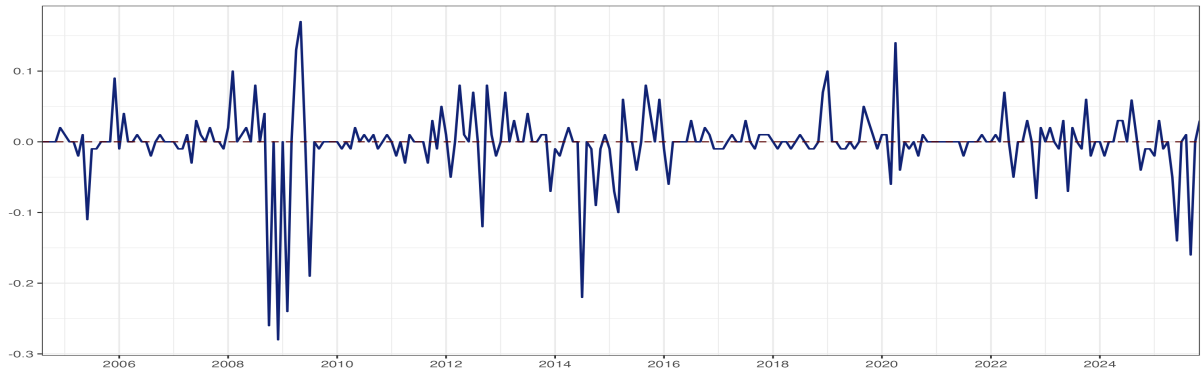


Figure 3.2: Timeseries over monetary policy shocks

The figure shows movements in three-month overnight index swap (OIS) rates within the 30-minute window around Riksbank announcements.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024).

Figure 3.2 visualizes the three-month OIS movements around the Riksbank's monetary policy announcements. Most observations are close to zero, indicating that policy announcements are mostly expected, while occasional sharp spikes reflect meetings where the decision or communication meaningfully surprised markets. These time-variation patterns motivate the use of the three-month OIS surprise as an instrument for the policy indicator in the VAR.

As noted above, the HF data span August 2004 to November 2025, a shorter period than the main VAR sample. Since the instrument enters externally, it need not cover the same time span, following the approach of Rüth (2020), Jarociński and Karadi (2020), Soosalu (2024), and Cesa-Bianchi et al. (2020). The longer VAR sample improves the precision of the reduced-form estimates by allowing the model to better capture the underlying macroeconomic dynamics, while the external instrument ensures that shock identification remains sharp regardless of sample length (Gertler and Karadi, 2015; Jarociński and Karadi, 2020; Rüth, 2020).

3.2 Macroeconomic Variables

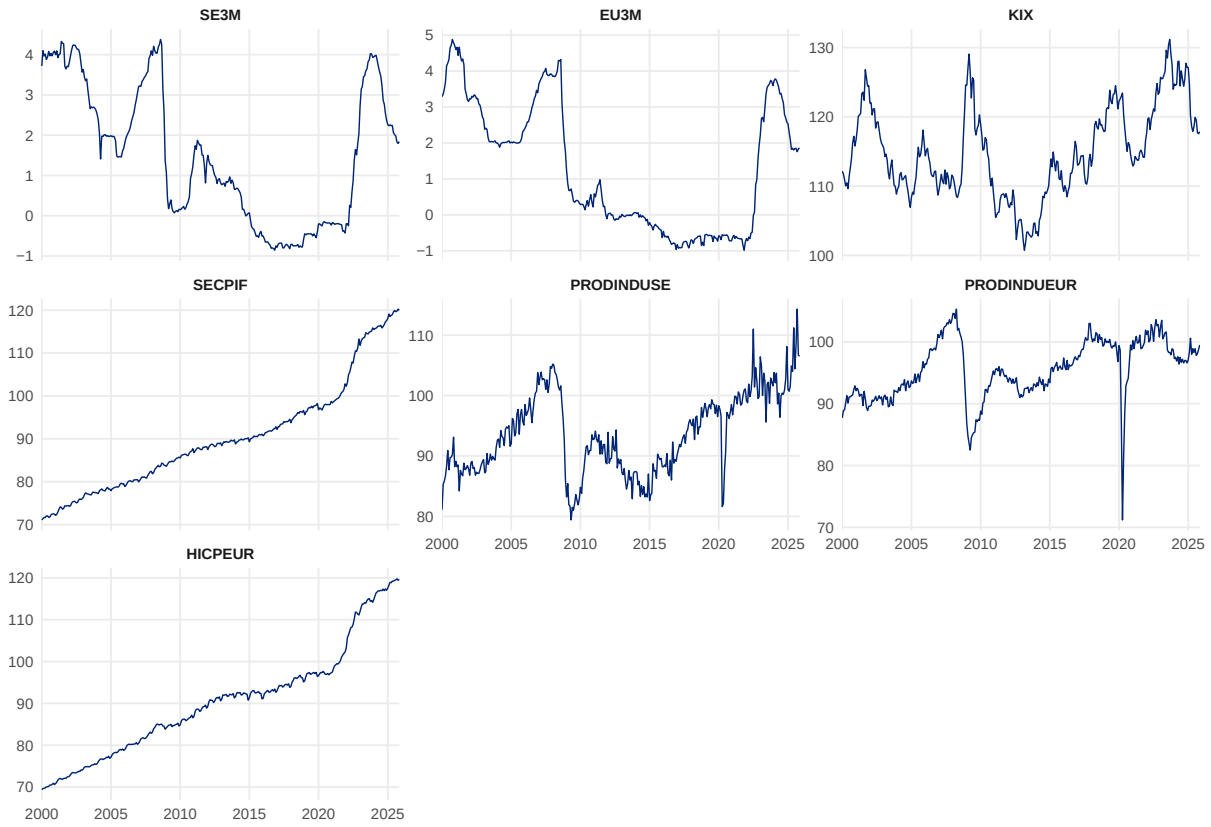


Figure 3.3: Time Series Data Included Directly in the VAR

The figure provides an overview of the variables included in the baseline VAR, covering the period from January 2000 to November 2025. Interest rates (SE3M & EU3M) are measured in percent, while all other variables enter in logarithms. 2021=100 for all indexes.

Source: Eurostat (2026), LSEG (2026) and Sveriges Riksbank (2026).

3.2.1 Endogenous Variables

The endogenous variables are chosen to directly capture the key channels of the monetary policy transmission mechanism in a small open economy. In line with previous literature (Almerud et al., 2024; Bjørnland, 2009; Rüth, 2020; Soosalu, 2024), we estimate the common dynamics between the short-term interest rate, the exchange rate, prices and real activity. We will also substitute the short-term interest rate with bond yields with longer maturities to see if the impact of forward guidance matters for the overshooting hypothesis.

In contrast to Almerud et al. (2024) and Rüth (2020) we do not include a measure of financial conditions given that it is not an outcome of interest and risks decreasing the precision of estimates due to the inclusion of further endogenous variables in the VAR. Moreover, Almerud et al. (2024) show that the exclusion of a measure of financial conditions does not, in any meaningful way, alter the impulse responses of the macroeconomic variables or the exchange rate included in the model.

The yield of the three-month government bill *(SEM3)* functions as the policy indicator through which the identified monetary policy shock operates[5]. The exchange rate is central to this thesis, which is why we include *KIX*, the "krona index"[6]. KIX is a geometric chain index of SEK exchange rates against other currencies. Its weights are based on the total flows of processed goods and raw materials between Sweden and its 31 largest trading partners. The weighting scheme accounts for the effects of export, import, as well as third-country effects. The EA carries the largest weight at roughly 50%, followed by the United States at 10% and China at 9% (Sveriges Riksbank, 2026b).

The price level *(SECPIF)* and industrial production *(PRODINDUSE)* represent the ultimate target variables of monetary policy: inflation and output. The choice of price level measurement is based on how the Riksbank measures inflation (Sveriges Riksbank, 2026a). These variables allow us to assess whether the identified shock generates a pattern consistent with standard theory, which is, immediate reactions in financial variables and more gradual effects on production and prices. Together, the endogenous variables make it possible to analyze whether the exchange rate movements occur consistent with the macroeconomic transmission mechanism.

3.2.2 Exogenous Variables

In line with previous literature on small open economies, we control for external factors that affect the domestic economy (see, for instance, Almerud et al., 2024; Kim and Lim, 2018; Soosalu, 2024; Cesa-Bianchi et al., 2020). In a Swedish context, this requires controlling for external macroeconomic conditions. Since the EA accounts for roughly 50%

[5]See Appendix A.1 for time series over alternative policy indicators with longer maturity.
[6]See Appendix A.2 for alternative bilateral SEK exchange rates.

of Sweden's external trade, we include only EA variables. The exogenous variables are therefore intended to control for external drivers that are particularly relevant for Sweden as a small open economy closely integrated with the EA.

Industrial production in the EA *(PRODINDUEUR)* captures external demand that affects the Swedish economy, while the EA price level *(HICPEUR)* reflects external inflationary pressures passed through trade and import channels. The choice of price level measurement is based on how the ECB measures inflation (European Central Bank, 2021). The yield-benchmark from three-month EA government bills *(EU3M)* will in this context capture interest rate movements in the EA.

By treating these variables as exogenous, we remove a substantial part of the international variation that could otherwise be mistaken for the effects of Swedish monetary policy. Finally, following Almerud et al. (2024) and Bisgaard Larsen and Jessen Weissert (2024) we introduce a dummy for the pandemic in March, April and May 2020 to account for the exogenous impact of the pandemic on the Swedish economy.

A complete overview of the macroeconomic variables included in the model, as well as the external instrument, is provided in Table 3.2.

Variable	**Source**	**Transformation**
Endogenous Variables		
3-month Swedish government bill (SE3M)	LSEG	Level
Price level (SECPIF)	Statistics Sweden	Log level * 100
Industrial production (PRODINDUSE)	Eurostat	Log level * 100
Krona index (KIX)	Sveriges Riksbank	Log level * 100
Exogenous Variables		
3-month euro area government bill, benchmark (EU3M)	LSEG	Level
Industrial production, euro area (PRODINDUEUR)	Eurostat	Log level * 100
Price index, euro area (HICPEUR)	Eurostat	Log level *100
External Instrument		
High-frequency monetary policy surprises	Sveriges Riksbank	High-frequency change

Table 3.2: Data and Sources

All variables are monthly from January 2000 to November 2025 except the policy surprise, ranging from August 2004 to November 2025.

3.3 Delimitations

The sample in this study is mainly restricted due to data availability. The analysis is based on monthly data and the sample period begins in 2000 and extends through the end of 2025. Observations prior to 2000 are excluded, partly due to limited access to comparable data and partly because the euro was not yet fully established as a common currency with a functioning monetary policy framework. Since our model includes EA variables as exogenous controls, it is methodologically justified to restrict the sample to the period following the introduction of the euro, as the monetary policy regime in the EA can be regarded as more stable and comparable over time.

In addition, practical considerations impose limitations on the choice of control variables. It is not feasible to explicitly control all Sweden's trading partners. Thus, we restrict the analysis to the EA, motivated by the fact that the EA represents the largest parts of the Swedish trade (roughly 50%). The second-largest trading partner is the United States, which accounts for only 10%, followed closely by China at 9% Sveriges Riksbank (2026b). This implies that no other partner comes close to the EA in terms of trade share and is therefore expected to have a limited influence on the results relative to the EA. Together, this restriction allows us to capture the most relevant external demand and price developments impacting Sweden, while keeping the complexity of the model manageable.

4. Methodology

This section outlines the empirical methodology used to identify and estimate the effects of monetary policy shocks in Sweden. Building on the theoretical framework and data described in the previous sections, we employ a Proxy-SVAR with HF external instruments to isolate unexpected monetary policy shocks from broader macroeconomic developments. We first present the baseline VAR framework and explain how the external instrument is used for identification. We then discuss the conditions required for instrument validity. Finally, we describe the decomposition of announcement surprises into pure monetary policy shocks and central bank information shocks, as well as the simpler sign-based approach used as a robustness check.

4.1 Proxy-SVAR

To estimate the impact of monetary policy shocks on the Swedish krona exchange rate, we employ a vector autoregression (VAR) framework, first proposed by Sims (1980). We identify monetary policy shocks using an external instrument (proxy) strategy in which the HF monetary policy surprises instrument for the structural shock, in line with Gertler and Karadi (2015) and the Proxy-SVAR methodology developed by Stock and Watson (2012) and Mertens and Ravn (2013). This approach has been widely applied in the literature on monetary policy and exchange rates (Soosalu, 2024; Rüth, 2020), where we implement it for Sweden using HF surprises from the Riksbank constructed by Almerud et al. (2024). We estimate a structural VAR with four endogenous variables, three exogenous controls and p lags, listed in Table 3.2.

Let $Y_t \in R^{4\times 1}$ denote the vector of endogenous variables[7] and $X_t \in R^{3\times 1}$ the vector of exogenous variables[8]. The structural representation is:

$$A_0 Y_t = \sum_{j=1}^{p} C_j Y_{t-j} + DX_t + \varepsilon_t, \tag{1}$$

where $A_0 \in R^{4\times 4}$ is the contemporaneous coefficient matrix, $C_j \in R^{4\times 4}$ captures the dynamic impact of a shock over time to the system, $D \in R^{4\times 3}$ captures the impact of foreign variables on the domestic ones in the system and $\varepsilon_t \in R^{4\times 1}$ is the vector of unobserved structural shocks, assumed to be zero-mean white noise processes. One component, $\varepsilon_t^p \in \varepsilon_t$, denotes the structural monetary policy shock of interest.

Multiplying by A_0^{-1} yields the reduced-form VAR

$$Y_t = \sum_{j=1}^{p} B_j Y_{t-j} + GX_t + u_t, \tag{2}$$

[7] $Y_t \equiv [KIX, SE3M, SECPIF, PRODINDSE]$
[8] $X_t \equiv [EU3M, HICPEUR, PRODINDUEUR]$

where $B_j = A_0^{-1}C_j$, $G = A_0^{-1}D$, and

$$u_t = S\varepsilon_t, \tag{3}$$

with $S = A_0^{-1}$. The reduced-form variance covariance matrix is

$$E[u_t u_t'] = SS' = \Sigma_u. \tag{4}$$

Let s denote the column of S corresponding to ε_t^p. Impulse responses to a monetary policy shock are governed by

$$Y_t = \sum_{j=1}^{p} B_j Y_{t-j} + GX_t + s\varepsilon_t^p. \tag{5}$$

Thus, identification of the monetary transmission mechanism reduces to recovering the impact column s.

To achieve this, we employ external instruments. Let Z_t denote a vector of HF monetary policy surprises and let ε_t^q be structural shocks to other variables other than the one of interest. Validity requires:

$$E[Z_t\varepsilon_t^p] \neq 0, \qquad E[Z_t\varepsilon_t^q] = 0 \quad \text{for } q \neq p. \tag{6}$$

Let the reduced-form residual in (2) be partitioned as

$$u_t = \begin{pmatrix} u_t^p \\ u_t^q \end{pmatrix}, \tag{7}$$

where u_t^p is the residual of the policy inidicator (interest rate) equation and u_t^q collects the remaining residuals. Using (3), we can write

$$u_t^p = s_p\varepsilon_t^p + \sum_{q\neq p} s_q\varepsilon_t^q, \tag{8}$$

$$u_t^q = s_{qp}\varepsilon_t^p + \sum_{q\neq p} s_{q'}\varepsilon_t^q. \tag{9}$$

In the first stage, we project u_t^p on the instrument Z_t to obtain the fitted value $\hat{u}_t^p$.

$$u_t^p = \gamma Z_t + \omega_t \tag{10}$$

Under condition (6), $\hat{u}_t^p$ isolates the component of u_t^p driven by the structural monetary shock ε_t^p and is orthogonal to the remaining structural shocks.

In the second stage, we regress u_t^q on $\hat{u}_t^p$:

$$u_t^q = \psi\hat{u}_t^p + \xi_t \tag{11}$$

Since $\hat{u}_t^p$ is orthogonal to ξ_t, by assumption, the two-stage least squares estimator ψ consistently identifies the ratio s_{qp}/s_p. Hence, the external instrument approach identifies the impact vector s up to the scaling factor s_p. An estimate of s_p is then recovered by exploiting the restriction in (4) $\Sigma_u = SS'$, which together with the estimated ratios s_{qp}/s_p pins down s_p up to sign. The sign is normalized by convention, such that a positive structural shock ε_t^p corresponds to an unexpected increase in the policy rate. Given estimates of s_p, the elements s_q and the reduced-form coefficients B_j, equation (5) delivers the impulse responses to a structural monetary policy shock.

4.1.1 Selection of lag length

The selection of lag length p follows both theoretical considerations and empirical guidance from the literature. Studies examining U.S. data, such as Rüth (2020) Jarociński and Karadi (2020) and Gertler and Karadi (2015), uniformly adopt twelve lags. Although this choice is facilitated by their considerably longer sample periods beginning in the late 1980s. For Swedish data comparable to ours, Almerud et al. (2024) selects nine lags for a slightly shorter sample period than our. At the other end of the spectrum, Soosalu (2024) and Cesa-Bianchi et al. (2020) employ two lags in structurally similar Proxy-SVAR frameworks applied to Canadian and UK data, respectively, over sample periods of comparable length to ours.

Turning to data-driven criteria for our model, the Bayesian Information Criterion (BIC) favors a parsimonious specification of two lags, reflecting its heavier penalty for model complexity (Lütkepohl, 2005), while the Akaike Information Criterion suggests 6 lags. The divergence between the two is unsurprising given our moderate sample size, where the BIC's stronger penalty mechanically favors shorter lag structures.

Balancing parsimony against the need to adequately capture the propagation dynamics of monetary policy shocks, which are known to operate over extended horizons, we set p to 6. This choice lies within the data-driven bounds, avoids the risk of underfitting inherent in shorter lag specification, and remains conservative relative to the U.S. benchmarks given our shorter sample. Robustness to alternative lag lengths as low as p=2, and as high as p=7 is documented in Appendix A.4 and A.5.

4.1.2 Estimation of the model

We include the data in levels, following Sims (1992) allowing for co-integration relations between the variables without explicitly modeling it. This also ensures comparability with other studies that have modeled the data identically (see, for instance: Almerud et al., 2024; Cesa-Bianchi et al., 2020; Rüth, 2020; Bisgaard Larsen and Jessen Weissert, 2024).

Given the reduced-form VAR in equation (2) and the identified impact vector s, impulse

response functions (IRFs) track the dynamic response of Y_t to a unit monetary policy shock ε_t^p. The IRFs are computed recursively as:

$$\mathrm{IR}_0 = s, \tag{12}$$

$$\mathrm{IR}_t = \sum_{j=1}^{\min(t,p)} B_j \, \mathrm{IR}_{t-j}, \quad t = 1, \ldots, h, \tag{13}$$

where h denotes the horizon of interest. At $t = 0$, the impulse response equals the impact vector s, capturing the contemporaneous effect of the shock on all variables in Y_t. For $t \geq 1$, the response is propagated forward through the estimated reduced-form coefficient matrices B_j, accumulating the dynamic effects of the shock across the system.

Following Mertens and Ravn (2013) and Gonçalves and Kilian (2004), the wild bootstrap procedure was chosen for the computation of confidence intervals as it is robust to heteroskedasticity, which is relevant given the time-varying variance of high-frequency instruments. Pointwise confidence bands at the horizon t are then obtained as empirical quantiles across draws and are recentered around the point estimate IR_t to correct for bootstrap bias.

4.2 Instrument Validity

The validity of the external instrument hinges on the orthogonality and relevance conditions stated in equation (6):

$$E[Z_t \varepsilon_t^p] \neq 0, \qquad E[Z_t \varepsilon_t^q] = 0 \quad \text{for } q \neq p.$$

The first condition ensures relevance, namely that the instrument is sufficiently correlated with the structural monetary policy shock. Empirically, this is assessed through the first-stage regression (10) and the corresponding F-statistics, following the approach of Gertler and Karadi (2015) and Rüth (2020). In line with the rule-of-thumb set forth by Stock and Yogo (2002), we employ a F-statistic greater than ten as the threshold to satisfy the relevance criterion of the instrument.

The second condition requires the instrument to be orthogonal to all non-monetary policy structural shocks. The economic justification for this exclusion restriction follows the reasoning in Gertler and Karadi (2015), Jarociński and Karadi (2020) and Almerud et al. (2024), in a Swedish context. HF monetary policy surprises are measured within a narrow window around policy announcements. Under the maintained assumption that no other macroeconomic or financial shocks systematically occur within this narrow window and are simultaneously correlated with the policy surprise, the resulting measure isolates exogenous variation in monetary policy.

More formally, because the instrument is constructed from asset price movements in a tight announcement window, it reflects unexpected changes in policy conditional on

the information set available prior to the announcement. Any endogenous response of policy to contemporaneous macroeconomic developments is already priced in before the announcement and therefore does not contaminate the surprise component. As a result, the instrument is assumed to capture unanticipated policy innovations that are orthogonal to other structural disturbances in the VAR.

A relevant concern in a small open economy setting would be that the announcements made by the Riksbank systematically coincide with those made by other major central banks, thus violating the exogeneity assumption. However, as Almerud et al. (2024) shows, the EA rates remain largely unaffected during the Swedish announcement windows. If this were not the case, then major shifts in European rates would coincide with changes in Swedish rates

This argument parallels the identification logic in Gertler and Karadi (2015), where high-frequency futures rate surprises are used to purge monetary policy innovations of endogenous responses to economic conditions. Rüth (2020) adopts the same strategy in a similar VAR environment, highlighting that the short announcement window is crucial to satisfy the orthogonality condition.

Another potential concern, emphasized by Almerud et al. (2024), is that the measured Riksbank policy surprises may not satisfy the orthogonality condition if they partly capture markets' responses to macroeconomic information released alongside policy decisions, rather than purely unanticipated monetary policy actions. This concern is more broadly documented by Bauer and Swanson (2023), who show that high-frequency monetary policy surprises are systematically correlated with pre-release macroeconomic data across a range of central banks, potentially compromising instrument orthogonality. However, Almerud et al. (2024) finds that purging the Swedish surprise series of its correlation with real-time macro-financial variables does not materially alter the estimated macroeconomic effects of the Riksbank's monetary policy. This suggests that such informational contamination is quantitatively negligible and does not invalidate the surprise series as an instrument. We therefore proceed with the raw OIS-based surprise measure as a starting point, taking Almerud et al. (2024)'s finding as evidence that our instrument plausibly satisfies the orthogonality condition. Additionally, concerns stemming from Bauer and Swanson (2023) can be further mitigated by decomposing the raw surprises into an informational component and a pure monetary policy component. We follow the approach of Jarociński and Karadi (2020) to achieve this decomposition.

Taken together, the institutional features of monetary policy announcements and the high-frequency construction of the instrument provide economic and econometric support for the validity conditions in equation (6). Although these assumptions are ultimately untestable, they are grounded in both market microstructure considerations and established practice in the literature on high-frequency monetary policy (see, for instance: Gürkaynak et al., 2021; Soosalu, 2024; Jarociński and Karadi, 2020; Almerud et al., 2024).

4.3 Shock Decomposition

4.3.1 Identification Strategy

Our identification strategy builds on the insight of Jarociński and Karadi (2020) that central bank announcements can transmit two distinct structural shocks, separable by their co-movement patterns in financial markets. Specifically, we distinguish between a *monetary policy shock*, characterized by opposite-signed movements in interest rates and stock prices, and a *central bank information shock*, characterized by same-signed movements.

The economic interpretation follows directly from standard monetary theory. A contractionary monetary policy shock should raise interest rates while simultaneously reducing stock prices through two channels: a higher discount rate lowers the present value of expected future dividends, and a deteriorating economic outlook reduces expected dividend streams themselves (Bernanke and Kuttner, 2005). By contrast, a positive co-movement pattern, where both interest rates and stock prices rise, should not reflect pure monetary policy news. Rather, it suggests that the central bank has signaled favorable information about economic fundamentals, such as stronger growth prospects, that raises both the natural rate of interest and expected corporate earnings, ultimately leading to higher output and prices. We therefore follow Jarociński and Karadi (2020) in interpreting negative co-movement as a *monetary policy shock* and positive co-movement as a *central bank information shock*.

Two key assumptions justify this identification in the context of high-frequency surprises around Riksbank announcements:

1. **External Instrument Validity:** High-frequency surprises in three-month OIS rates and OMXSPI returns, measured in narrow windows around Riksbank announcements, are driven exclusively by the two announcement shocks and not by other macroeconomic disturbances. This assumption is credible given that the tight event window makes it unlikely that unrelated shocks systematically coincide with central bank announcements and relates to the discussion on instrument valaidity above.

2. **Sign-Based Separation:** The two structural shocks are distinguishable by their characteristic co-movement patterns, with the monetary policy shock generating opposite-signed movements and the information shock generating same-signed movements in interest rates and stock prices.

4.3.2 Rotational Decomposition

Although our economic reasoning closely follows Jarociński and Karadi (2020), our implementation differs methodologically. Jarociński and Karadi (2020) combine HFI with sign restrictions in a structural VAR framework, where announcement surprises enter as observed variables whose structural loadings are restricted. In contrast, we adopt an *external instrument* approach, meaning that we first decompose the HF surprises themselves into orthogonal monetary policy and information shocks outside the VAR, then use these identified shocks as external instruments in a Proxy-SVAR-framework.

To isolate distinct monetary policy (MP-shock) and central bank information shocks (CBI-shock), based on surprises in short-term interest rates and equity prices around the Riksbank announcements, we employ a rotation-based identification strategy similar to that of Jarociński (2022) that exploits the differential correlation structure of the two types of shocks. However, in contrast to Jarociński (2022) we perform the decomposition on the event-level data prior to summing it up to monthly series, allowing for cleaner separation of the different shocks.

A clear advantage of the rotational decomposition over simpler sorting approaches, such as the "Poor Man's Proxy" discussed in Section 4.3.4, is that every announcement is allowed to contain both a monetary policy and an information component. Rather than discarding observations that do not fit a predetermined co-movement pattern, the decomposition retains the full sample by assigning each surprise a combination of the two shocks according to its co-movement signature.

4.3.3 Data and Reduced-Form Surprises

The analysis uses two observed financial market surprises measured in tight windows around the Riksbank's policy announcements: changes in the three month OIS rate (i_t) and returns on the OMXSPI equity index (s_t). Under these assumptions, the surprises in the OIS-rate reflect a mixture of two underlying structural shocks: a pure monetary policy shock (ε_t^{mp}) and a central bank information shock (ε_t^{cbi}) about economic fundamentals.

We begin by constructing the $n \times 2$ matrix of observed surprises:

$$\mathbf{M} = \begin{bmatrix} i_1 & s_1 \\ i_2 & s_2 \\ \vdots & \vdots \\ i_n & s_n \end{bmatrix} \tag{14}$$

where n is the number of policy announcements with non-missing observations for both series. We perform a QR decomposition:

$$\mathbf{M} = \mathbf{QR} \tag{15}$$

where $\mathbf{Q}$ is an $n \times 2$ orthonormal matrix ($\mathbf{Q}^\top \mathbf{Q} = \mathbf{I}_2$) and $\mathbf{R}$ is a 2×2 upper-triangular matrix:

$$\mathbf{R} = \begin{bmatrix} R_{11} & R_{12} \\ 0 & R_{22} \end{bmatrix} \tag{16}$$

This decomposition provides an initial orthogonalization, but does not yet impose economic identification restrictions. The key identifying assumption is that monetary policy shocks and information shocks exhibit systematically different co-movement patterns. A contractionary monetary policy shock is assumed to raise interest rates while depressing equity prices (opposite signs), whereas a positive central bank information shock signaling stronger fundamentals is assumed to raise both (same signs).

To exploit this pattern, we construct a modified interest rate series:

$$i_t^{\text{mod}} = \begin{cases} 0 & \text{if } \text{sign}(i_t) = \text{sign}(s_t) \text{ and both non-zero} \\ i_t & \text{otherwise} \end{cases} \tag{17}$$

By zeroing out same-signed observations, i_t^{mod} isolates variation primarily attributable to pure monetary policy shocks. We then compute the variance ratio:

$$\lambda = \frac{\text{Var}(i^{\text{mod}})}{\text{Var}(i)} \tag{18}$$

This ratio captures the proportion of interest rate surprise variance stemming from policy shocks as opposed to information shocks. The rotation angle that achieves orthogonality between the identified shocks is[9]:

$$\alpha = \arccos\left(\sqrt{\lambda}\right) \tag{19}$$

Using this angle, we construct the 2×2 rotation matrix:

$$\mathbf{P} = \begin{bmatrix} \cos(\alpha) & \sin(\alpha) \\ -\sin(\alpha) & \cos(\alpha) \end{bmatrix} \tag{20}$$

This matrix rotates the initial orthogonal basis from the QR decomposition to align with the economically meaningful shock directions.

[9]The rotation angle $\alpha = \arccos\left(\sqrt{\lambda}\right)$ is derived from the requirement that the two identified shocks must be uncorrelated. After the QR decomposition, we have an orthonormal basis $\mathbf{Q}$. When we apply the rotation matrix $\mathbf{P}$, we obtain rotated orthonormal vectors. The modified series i^{mod} isolates interest rate movements when i and s have opposite signs (or one is zero).

Under the assumption that same-signed movements are driven primarily by information shocks while opposite-signed movements are driven primarily by monetary policy shocks, the monetary policy shock places weight $\cos^2(\alpha)$ on the interest rate dimension after rotation. Since i^{mod} captures the variance attributable to monetary policy shocks, we have $\text{Var}(i^{\text{mod}}) \approx \cos^2(\alpha) \cdot \text{Var}(i)$. Therefore, $\lambda = \text{Var}(i^{\text{mod}})/\text{Var}(i) = \cos^2(\alpha)$. Solving for α yields $\cos(\alpha) = \sqrt{\lambda}$, and thus $\alpha = \arccos\left(\sqrt{\lambda}\right)$. When $\lambda \approx 1$, almost all interest rate variance comes from opposite-signed (monetary policy) movements, so $\alpha \approx 0$ (minimal rotation needed).

To ensure the identified shocks have interpretable magnitudes and preserve the scale of the original surprises, we apply a diagonal scaling matrix:

$$\mathbf{D} = \begin{bmatrix} R_{11}\cos(\alpha) & 0 \\ 0 & R_{11}\sin(\alpha) \end{bmatrix} \tag{21}$$

where the diagonal elements scale each shock by the corresponding element from $\mathbf{R}$ weighted by the rotation angle components.

The final identified shocks are obtained through the composite transformation:

$$\mathbf{Z} = \mathbf{QPD} \tag{22}$$

where $\mathbf{Z}$ is an $n \times 2$ matrix whose columns contain the identified Monetary Policy (MP) shock (ε^{mp}) and Central Bank Information (CBI) shock (ε^{cbi}):

$$\mathbf{Z} = \begin{bmatrix} \varepsilon_1^{mp} & \varepsilon_1^{cbi} \\ \varepsilon_2^{mp} & \varepsilon_2^{cbi} \\ \vdots & \vdots \\ \varepsilon_n^{mp} & \varepsilon_n^{cbi} \end{bmatrix} \tag{23}$$

By construction, these shocks are orthogonal ($\text{Cov}(\varepsilon^{mp}, \varepsilon^{cbi}) = 0$), sum up to the original change in the OIS-rate ($\varepsilon_n^{mp} + \varepsilon_n^{cbi} = i_n$) and satisfy the identifying restriction that the monetary policy shock loads on episodes where interest rates and equity prices move in opposite directions, while the information shock captures co-movements with the same sign. The constructed series are visualized in Figure 4.1.

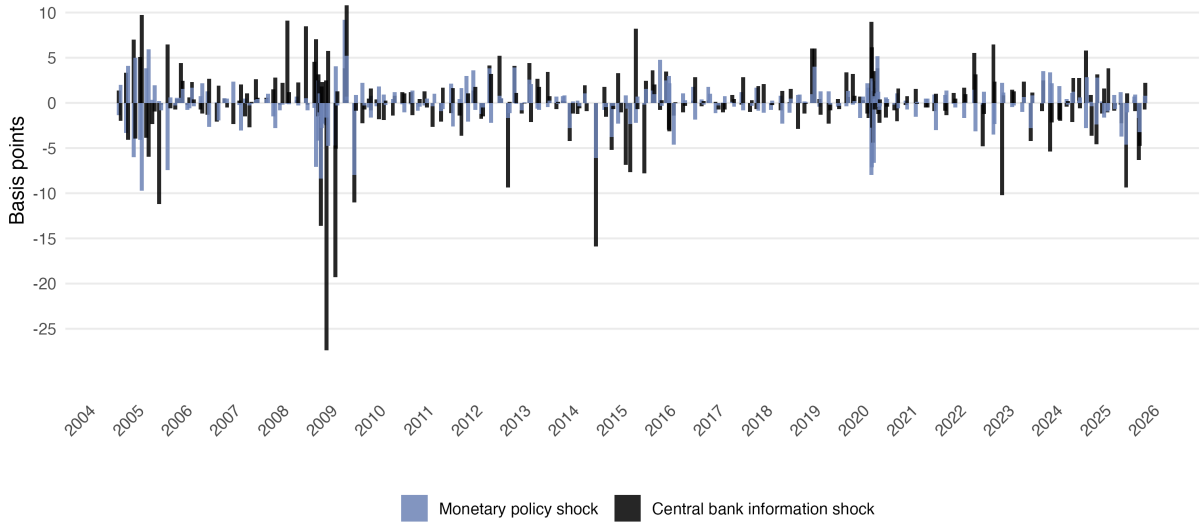


Figure 4.1: Monetary policy and information shocks over time

The figure plots high-frequency surprises around the Riksbank´s policy announcements, decomposed into a monetary policy shock and a central bank information shock. The series are expressed in basis points.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024). Author's computations

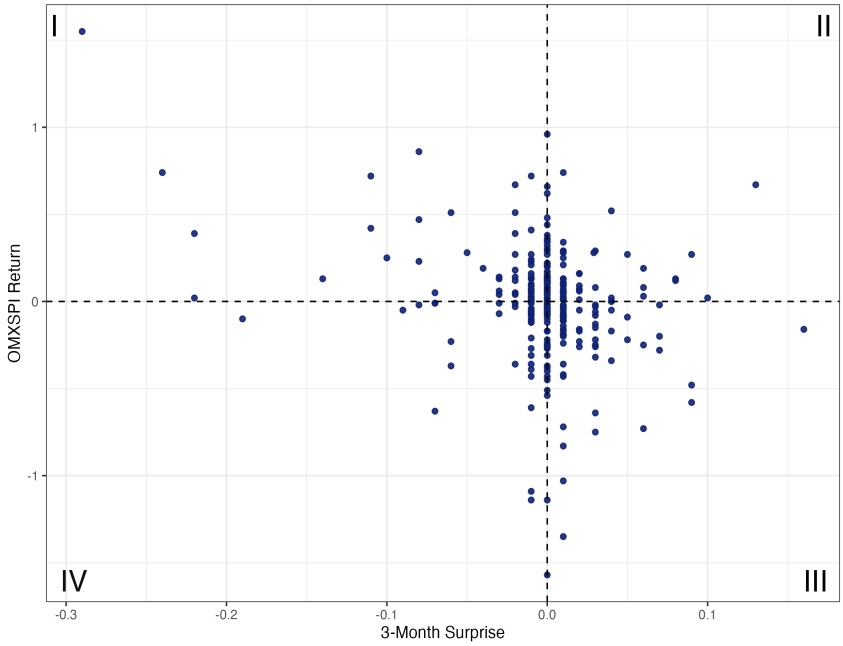


Figure 4.2: High-frequency shocks in Sweden

The figure present the raw shocks for the three month SEK OIS and OMXSPI series between August 2004 and November 2025.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024).

Figure 4.2 summarizes the raw high-frequency shocks by relating the three month OIS surprise on the horizontal axis to the contemporaneous OMXSPI return on the vertical axis, where each dot corresponds to one policy announcement. Points in quadrants I and III indicate negative co-movement, where equity returns move opposite to the interest-rate surprise. Points in quadrants II and IV indicate positive co-movement, where equities and rates move in the same direction. The dense clustering around the origin suggests that most announcement surprises are small, while a few outliers capture episodes with unusually large market reactions.

4.3.4 Poor Man's Sign Restriction

In line with Jarociński and Karadi (2020) and Amberg et al. (2022), we also implement a simpler decomposition approach, the so-called *Poor Man's sign restriction*, as a robustness check. This method directly classifies each announcement month t as either dominated by a monetary policy shock or a central bank information shock based on the observed co-movement pattern of the high-frequency surprises.

The classification rule is straightforward:

$$\varepsilon_t^p = \begin{cases} \varepsilon^{mp} & \text{if } \text{sign}(i_t) \neq \text{sign}(s_t) \\ \varepsilon^{cbi} & \text{if } \text{sign}(i_t) = \text{sign}(s_t) \end{cases} \tag{24}$$

where i_t denotes the summed three month OIS surprise and s_t the summed OMXSPI

return in the announcement windows of month t.

The economic intuition mirrors our main identification strategy, that is, a contractionary monetary policy shock raises interest rates while depressing stock prices (opposite signs), whereas a positive central bank information shock about economic fundamentals raises both (same signs).

Unlike the rotational approach, which decomposes each announcement into *both* shock components with varying weights, the Poor Man's method assumes that one shock type dominates each month. Formally, we construct two instrument series:

$$\mathrm{MP}_t^{\mathrm{PM}} = \begin{cases} i_t & \text{if } \mathrm{sign}(i_t) \neq \mathrm{sign}(s_t) \\ 0 & \text{otherwise} \end{cases} \tag{25}$$

$$\mathrm{CBI}_t^{\mathrm{PM}} = \begin{cases} i_t & \text{if } \mathrm{sign}(i_t) = \mathrm{sign}(s_t) \\ 0 & \text{otherwise} \end{cases} \tag{26}$$

These binary-classified instruments are then used as external instruments in the Proxy-SVAR framework. While this approach sacrifices the continuous decomposition of the rotational method, it provides a transparent alternative that serves as a useful robustness check and has been shown to generate results close to those obtained by rotational decomposition (Jarociński and Karadi, 2020). Table 4.1 presents the number of Non-zero MP and CBI shocks in our dataset.

Category	Months	Non-zero Obs.	Share (%)
All surprise months	197	147	74.6
MP		90	61.2
CBI		57	38.8

Table 4.1: Months Containing Monetary Policy Surprises

The table summarizes the number of non-zero observations for MP and CBI shocks in the sample period.

Source: Database for event studies of Swedish monetary policy compiled by Almerud et al. (2024).

5. Results

5.1 Impulse Responses Excluding Minutes

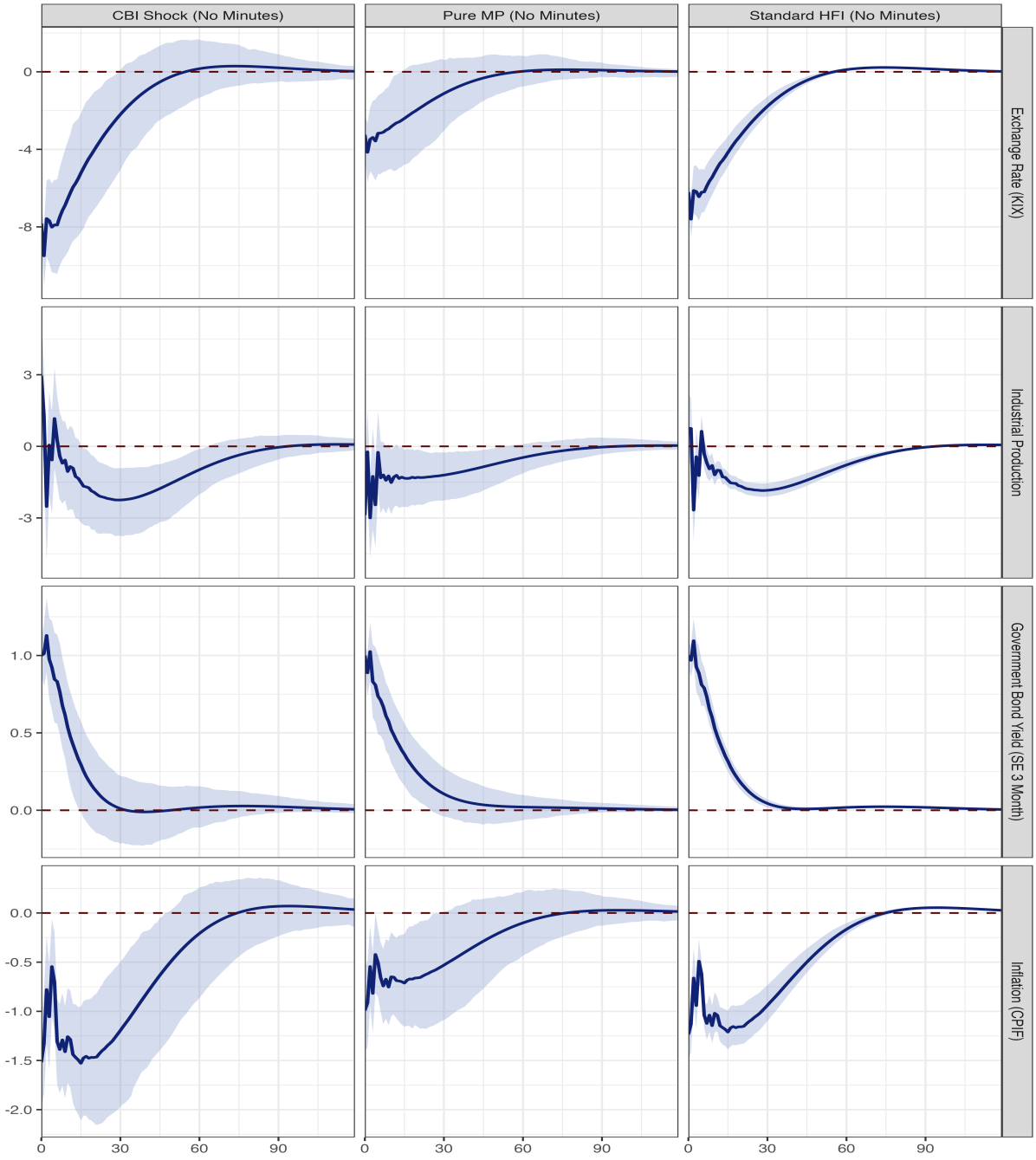


Figure 5.1: Impulse response functions across identification strategies

The three-month government bill yield functions as the policy indicator.
The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.
90% CI; 1,000 bootstraps, Lags p = 6.

Figure 5.1 presents impulse response functions (IRFs) to a contractionary monetary policy shock, estimated using a sample that excludes minutes from the high-frequency identification window. The IRFs are shown for three identification strategies: the *Central Bank Information (CBI) shock*, the *Pure Monetary Policy (MP) shock*, and the *Standard HFI shock*, the latter being the, unsorted high-frequency surprise that makes no distinction between monetary policy news and central bank information, which is simply the change in OIS rates. All responses are normalized to a 100-basis-point policy shock and displayed with 90% confidence intervals.

Across all three identification strategies, the exchange rate (KIX) appreciates immediately following the shock. The appreciation is strongest at impact under the CBI specification, where the exchange rate initially falls by roughly 8%. Under the MP and Standard HFI specifications, the appreciation is somewhat smaller, around 4 to 6% on impact. In all cases, the exchange rate gradually adjusts over time and returns toward baseline after approximately 50 to 60 months. The overall dynamic pattern is similar across specifications, although the results vary in statistical significance. For the CBI specification, the response remains statistically significant for roughly 30 months. Under the MP specification, significance is limited to approximately the first 15 months, whereas in the Standard HFI specification, the response remains significant for up to 60 months.

Industrial production declines following the contractionary shock. Under all specifications, the response is initially volatile during the first few months before settling into a negative response. The industrial production slowly recovers and converges back toward baseline toward the end of the horizon. The results following an MP-shock are weakly statistically significant over the horizon, however, the results for Standard HFI are significant from approximately 15 months and remain significant up until 80 months following the shock.

The response of the three-month Swedish government bill yield is normalized to 100 basis points on impact in all three specifications. Following this initial normalization, the yield gradually declines over time. In the CBI specification, the decline is somewhat faster and the response reaches the baseline 15 months. In the MP specification, the yield also falls from its initial level and approaches zero after 30 months. The Standard HFI specification displays a very similar pattern, with the response declining relatively quickly, converging back to baseline after 30 months. Overall, the dynamic response of the three-month yield is highly similar across the three identification strategies.

Inflation, measured by CPIF, displays relatively comparable dynamics across the identification strategies. Under the CBI specification, inflation decreases the most on impact, reverting to baseline after 60 months. The Standard HFI specification exhibits a similar pattern, although with a somewhat smaller magnitude. Under the MP specification, inflation falls less on impact, reaching a minimum of around -0.75% in the first months before gradually recovering and moving back toward baseline over the remaining horizon.

Table 5.1 reports the first-stage F-statistics for the external instruments used in the Proxy-SVAR estimates in Figure 5.1. All instruments exceed the conventional threshold of 10, suggesting that they are sufficiently strong for identification.

	CBI	Pure MP	Standard HFI
F-statistic	16.67	16.76	26.49

Table 5.1: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 5.1.

5.2 Impulse Responses Including Minutes

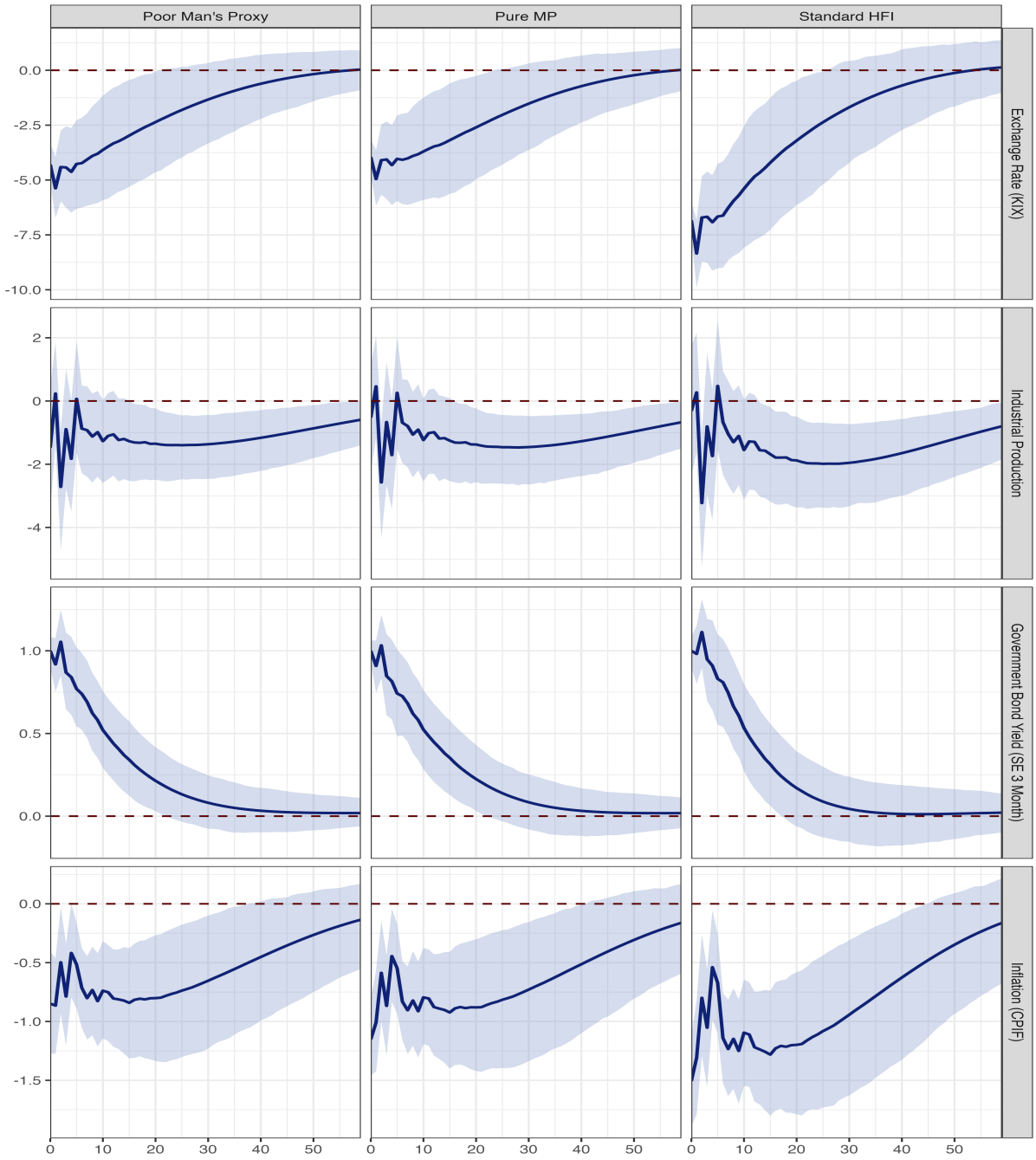


Figure 5.2: Impulse response functions across identification strategies

The three-month government bill yield functions as the policy indicator.

The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1,000 bootstraps, Lags p = 6.

Figure 5.2 presents IRFs after a contractionary monetary policy shock in Sweden. The IRFs are visualized for three alternative identification strategies: Poor Man's Proxy, Pure MP and the Standard HFI. The CBI shocks (the decomposed one and Poor Man's Proxy) were not included due to instrument irrelevance (F-stat lower than 10). The responses are normalized to a 100-basis point shock and shown with 90% confidence intervals.

Across all identification strategies, the exchange rate appreciates immediately following the shock. The appreciation is highest at impact under the Standard HFI identification, where the exchange rate falls by roughly 7% and hits its minimum at around 8.5% after one month. For the Poor Man's Proxy and Pure MP specifications, the initial response is smaller but still clearly negative, ranging approximately 4% and 3.75%, respectively. In all cases, the exchange rate gradually returns toward baseline and hits its pre-shock level after around 50 months. Across all three specifications, the responses are statistically significant at the 10% level for approximately the first 20 months. In the Standard HFI specification, significance persists somewhat longer, extending to roughly 25 months.

Industrial production declines after the shock under all identification strategies. Following a brief period of volatility during the first few months, approximately the first eight months, the response remains negative for most of the horizon. The decline gradually deepens and reaches its lowest point after about 20 to 30 months before slowly moving back toward baseline. The fall in industrial production also appears to be somewhat larger under the Standard HFI specification than under the Poor Man's Proxy and Pure MP specifications. However, the results only become statistically significant after roughly 15 months in all strategies.

The three-month Swedish government bond yield is scaled to 100 basis points at impact. During the first month, moderate volatility is observed in the Poor Man's Proxy and Pure MP specifications, with the yield initially declining before increasing slightly. In the Standard HFI specification, only a small increase is observed during the first months. The response for all three specifications peaks at around three months and then gradually declines over time, approaching baseline after approximately 30 to 40 months. The response of the three-month Swedish government bond yield remains significant at the 10% level for up to 20 months in the Poor Man's Proxy and Pure MP specifications and for a slightly shorter period in the Standard HFI specification, roughly 15 months. Overall, the interest rate response displays a similar pattern across the three identification strategies.

Inflation decreases on impact following the monetary policy shock in all three specifications. After some short-run fluctuations during the first few months, inflation remains below baseline and continues to fall, reaching its lowest point after roughly 15 to 20 months. Thereafter, it gradually increases and moves back toward baseline over the remaining horizon. The results are statistically significant for up to 35 months for Poor Man's Proxy, 40 months for Pure MP and 45 months for Standard HFI. The overall dynamic pattern is similar across specifications, although both the initial decline and the

subsequent trough appear somewhat larger under the Standard HFI identification, where the initial fall is approximately 1.5 percent.

Table 5.2 reports the first-stage F-statistics for the external instruments used in the Proxy-SVAR estimations in Figure 5.2. All instruments exceed the conventional threshold of 10, suggesting that they are sufficiently strong for identification.

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	20.08	32.46	24.32

Table 5.2: First-stage diagnostics for external instruments.
The table presents the first-stage F-statistics for the external instruments in Figure 5.2.

6. Discussion

This section discusses the main findings of the thesis in relation to the research questions and the theoretical framework. The section also discusses how the results relate to the broader literature and how future research can build on the findings of this thesis. We first assess whether the estimated exchange rate responses in Sweden support the overshooting hypothesis by Dornbusch (1976). We then examine what the decomposition of announcement surprises implies for the role of central bank information effects. Next, we consider whether the inclusion of minutes changes the identification or interpretation in a meaningful way. Finally, we discuss the policy implications of our findings and outline the main limitations of the study along with suggestions for future research.

6.1 Review of Results

The first and strongest result of the thesis is that the Swedish krona appreciates immediately after a contractionary monetary policy shock and then gradually returns toward baseline over time. This pattern is visible across both specifications, different lag lengths and monetary policy indicators (see Appendix A.4-A.6), and is therefore the most robust finding of the analysis. Moreover, as shown in Appendix A.7, the findings are robust to substituting the aggregated KIX-index with different bilateral exchange rates. Together, these comparisons function as a set of internal robustness checks. The appreciation results remain visible across alternative lag lengths, policy indicators, exchange rate measures and identification choices, including the benchmark non-decomposed HFI specification. This reduces the likelihood that the main overshooting result is driven by a highly specific modeling choice.

Thus, the results provide clear support for the overshooting hypothesis in the Swedish context. Rather than observing a delayed appreciation, which has often been presented as an empirical puzzle in earlier VAR-based studies (Kim et al., 2017; Müller et al., 2024), the exchange rate reacts on impact, which is what standard open-economy monetary theory predicts when asset prices are forward-looking and goods prices adjust only gradually. This interpretation is also in line with the broader literature, suggesting that many exchange rate puzzles may reflect identification challenges rather than weaknesses in the underlying theory (Bjørnland, 2009; Rüth, 2020; Braig et al., 2024).

The immediate appreciation suggests that financial markets respond rapidly to unexpected changes in the expected policy stance of the Riksbank. The following reversal is equally important, since it indicates that the initial appreciation is not permanent, but instead reflects the intertemporal logic of overshooting. When domestic interest rates rise unexpectedly, the exchange rate must appreciate sufficiently on impact to be expected to depreciate thereafter, thereby aligning the higher domestic interest rate with the UIP. In this respect, the findings fit the core mechanism of Dornbusch (1976) well.

The second research question concerns whether decomposing the announcement into two different surprises alters the interpretation of the estimated monetary policy transmission. The conclusion is restrained. Although decomposition remains a relevant empirical exercise, the results do not provide convincing evidence that Swedish monetary policy announcements contain a distinct and economically meaningful CBI shock. Following this, we have two interpretations consistent with this finding. Either the structural CBI shock cannot be credibly isolated through the co-movement between OIS surprises and OMXSPI returns, or no such shock exists in the Swedish context. However, the results do not allow these to be distinguished, but both are plausible.

When minutes are excluded from the surprise series, both MP and CBI shocks achieve statistical relevance and yield statistically significant results. However, statistical significance alone is insufficient to establish whether the identified CBI component corresponds to a genuine information effect. The more demanding criterion is economic; if the decomposition were to successfully isolate a separate type of policy news, materially different macroeconomic responses relative to the impulse response obtained from using the standard HFI-instrument would be expected. This is not what the results show. Prices and industrial production respond broadly in the same way under the two decomposed specifications as under the standard identification. The decomposition appears to reorganize the surprise series statistically, without producing the distinct macroeconomic dynamics that would validate it as a meaningful structural separation.

This finding is also consistent with the institutional setting. The Riksbank is among the world's most transparent central banks, both by legal obligation and by the design of its monetary policy framework scoring highly on transparency, even relative to the ECB. In such a setting, markets are likely to have relatively accurate priors about the Riksbank's assessment of inflation, activity and risks before each announcement. The policy window therefore tends to capture the unexpected stance of policy itself rather than a bundle of policy news and unreleased central bank information. The absence of a clear information effect should therefore not necessarily be interpreted as a failure of the empirical strategy, but rather as a plausible and interpretable outcome.

A complementary market-structure argument reinforces this conclusion. As Almerud et al. (2024) notes, a substantial share of Swedish asset flows originates from foreign investors and the OMXSPI contains many large multinational firms whose valuations reflect global risk sentiment, international sectoral developments, exchange rate expectations and discount-rate effects alongside domestic monetary conditions. OMXSPI may therefore be too weakly tied to the Riksbank's informational advantage to serve as a reliable separator between policy shocks and information shocks. The central conclusion is not that information effects cannot exist in principle, but at-least that the co-movement with OMXSPI is not a sufficiently clean empirical tool for identifying them in this particular institutional and market setting.

The third research question concerns the role of minutes. Here too, the evidence points in a restrained direction. Excluding minutes does not materially alter the broader interpretation of the results. The main difference was mainly that it rendered the CBI-instruments irrelevant. However, the minimal differences in the results when excluding minute-based shocks are informative. The reasoning for this robustness check is twofold: first, to assess whether the results are sensitive to their inclusion, and second, to align the identification strategy more closely with the HF literature, which typically focuses on the immediate announcement window and, in some cases, the press conference, rather than on minutes published several days later. The minutes mainly document the discussion underlying the decision, which suggests that they may not convey a fresh policy surprise in the same way as the announcement itself. Since the main results remain broadly unchanged when minutes are excluded, the results do not support the view that minutes contain a distinct source of information that fundamentally changes the interpretation of Swedish monetary policy shocks.

This lack of difference further weakens the case for a Swedish information effect in the present framework. If the minutes had carried important additional information about the Riksbank's private assessment of the economy, more visible discrepancies would be expected in the estimated responses once minutes were removed from the HF series. However, the exchange rate dynamics remain consistent with the overshooting hypothesis and the responses of prices and industrial production remain broadly similar across specifications. The role of minutes therefore appears less central to the economic conclusions than initially expected. Their exclusion may still be preferable for reasons of international comparability and conceptual clarity, but not because doing so reveals a substantially different macroeconomic transmission pattern. Conversely, including minutes, or datapoints of similar nature, can also be seen as a bias-neutral remedy to increasing degrees of freedom for research on monetary jurisdictions with fewer years of central bank independence.

Furthermore, the responses of industrial production and prices should be interpreted with some care. As expected, they are estimated less precisely than the exchange rate response. Financial variables react immediately, whereas real activity and prices adjust more gradually and are only observed at a monthly frequency in the VAR. As a result, mapping from an intraday surprise to monthly macroeconomic variables is inherently noisier. This likely explains why the exchange rate results are the sharpest and most informative finding in the thesis, while the responses of inflation and industrial production are more useful for assessing broad consistency with theory than for drawing highly precise conclusions about short-run transmission.

Even if the responses in prices and real activity are broadly consistent with economic theory, the decrease in CPIF inflation observed on impact, across most specifications, warrants caution. This result conflicts with foundational monetary theory and may reflect a structural limitation of the Proxy-SVAR framework rather than a genuine economic

phenomenon. Unlike approaches that combine external instruments with a Cholesky ordering, where inflation is restricted to respond to interest rates only with a lag, the Proxy-SVAR imposes no contemporaneous restrictions. This leaves the model susceptible to theoretically inconsistent impact responses.

This shortcoming is not unique to this study. Bisgaard Larsen and Jessen Weissert (2024) and Cesa-Bianchi et al. (2020) similarly document a contemporaneous decline in prices when examining the Danish and British economies, respectively, and Cesa-Bianchi et al. (2020) additionally finds a contemporaneous hike in unemployment. Furthermore, Almerud et al. (2024) reports an impact increase in unemployment for Sweden, which is doubly difficult to reconcile: it contradicts standard theoretical predictions and sits uneasily with the institutional features of the Swedish labor market, where employment protection legislation limits the speed at which firms can adjust their workforce.

The fact that prices, real activity and the exchange rate do not respond in materially different ways under the decomposed and standard specifications is therefore especially telling. Even where the decomposition is technically available, it adds limited economic content in the Swedish setting. When the minutes were removed, however, the Poor Man's Proxy shocks became irrelevant. This is unsurprising, since it sharply reduces the number of observations.

In summary, three main findings emerge. First, the Swedish krona appreciates on impact and then gradually reverts following a contractionary monetary policy shock, consistent with Dornbusch-style overshooting. These exchange rate dynamics align well with Cesa-Bianchi et al. (2020) for the United Kingdom, Soosalu (2024) for Canada, and Almerud et al. (2024) for Sweden, while the accompanying contraction in output and prices is consistent with the broader empirical literature on monetary transmission. Second, the sign-based decomposition of Jarociński and Karadi (2020) does not provide convincing evidence that Riksbank announcements contain a distinct and economically meaningful central bank information shock, suggesting that the informational channel may be less prominent in a Sweden than in larger ones such as the EA. Third, the inclusion of minute-based shocks does not materially alter the results, lending robustness to the baseline identification strategy.

6.2 Policy Implications

The policy implications of these findings are closely linked to the role of exchange rates in Swedish monetary transmission. Since the krona responds rapidly and in the theoretically expected direction to monetary policy shocks, the exchange rate channel appears to be an important mechanism through which the Riksbank's policy affects the economy. For policymakers, this confirms the importance of observing exchange rate developments when assessing the likely effects of policy changes on imported inflation, competitiveness

and external demand. In a small open economy such as Sweden, these channels are an important component of monetary transmission.

A second implication concerns the communication channel since the results do not imply that communication is unimportant. In contrast, communication remains central to how markets understand policy. However, the findings suggest that in Sweden, communication may already be sufficiently transparent that the formal policy announcement reveals relatively little additional private information beyond the policy surprise itself. In that sense, transparency may simplify the identification rather than complicate it. Market reactions appear to reflect the unexpected stance of policy more directly, rather than a mixture of policy news and newly revealed information about future fundamentals.

More broadly, the findings suggest caution when interpreting positive co-movements between interest rates and stock prices as evidence of CBI shocks in small open economies. Such co-movements may arise for several reasons, and in the Swedish case they do not translate into materially different macroeconomic responses, as argued by Almerud et al. (2024). Researchers and policymakers should therefore be careful not to derive too much from this decomposition alone. In the present context, the safer conclusion is that OMXSPI co-movement is not a reliable empirical tool for identifying information shocks in Sweden.

6.3 Limitations and Future Research

Although the exchange rate responses are clearly estimated, the analysis is less precise regarding the transmission of the shock to inflation and real activity. A richer open-economy framework could, more explicitly, examine the channels through which the initial appreciation affects import prices, expectations and reallocation of expenditure over time. This would be a natural extension to this thesis, especially since the exchange rate response is the strongest empirical result and the one most directly linked to the paper's theoretical motivation.

A second limitation concerns instrument validity during periods of broader financial instability. Although the event-study database already excludes a small number of non-standard policy events, we do not systematically re-estimate the model after excluding broader episodes of market stress. If such periods disproportionately affect the HF surprise series, they could influence both the instrument validity and the estimation precision. Examining this in more detail would therefore be a useful robustness exercise for future research.

Third, the decomposition relies on strong assumptions about how stock prices should respond to different types of news. In practice, OMXSPI is influenced by a broad set of domestic and international factors that may not be directly related to the Riksbank's informational advantage. Future research could therefore examine whether other financial

variables, or alternative measures of market reactions, are better suited to identifying informational content in Swedish monetary policy announcements. One suggestion would be to explore whether bilateral exchange rates, forward-rate measures or written indicators from communication events provide a cleaner signal than the stock market in the Swedish case.

Fourth, the results of this thesis do not claim that informational effects are absent from Sweden altogether. Instead, we interpret the results as that we do not find convincing evidence for such effects using the co-movement between OIS surprises and OMXSPI, and that this co-movement does not appear to be a reliable identification tool in the Swedish setting. Future work could study other parts of the communication process, such as press conferences, forecasts or statement texts, to assess whether informational content is more visible through those channels. That would allow future research to separate the broader question of whether information effects exist from the more specific question of whether they can be identified through stock-market co-movement.

Finally, a cross-country comparison would be particularly valuable. If the usefulness of the sign-based decomposition depends on institutional transparency, market size and financial structure, as the framework of Jarociński and Karadi (2020) implicitly assumes, then Sweden offers an interesting contrast to larger economies such as the EA and the United States. Such a comparison could help clarify under what conditions stock-market co-movement is informative about CBI shocks, and under what conditions it breaks down. Along these lines, assessing the impact of central bank information shocks, identified through stock-market co-movement, across a wider array of small open economies would help determine whether the method's performance reflects central bank transparency or, rather, the capital market characteristics inherent to small open economies. This would also strengthen the broader contribution of the thesis, since the Swedish case may illustrate that a method performing well in one institutional setting does not necessarily transfer unchanged to another. A related avenue would be to reverse the direction of analysis entirely. Building on Jarociński and Karadi (2020) and Kerssenfischer (2019), and in a similar spirit to Bisgaard Larsen and Jessen Weissert (2024), one could examine how decomposed monetary policy shocks originating in the EA and the United States transmit to Sweden, treating external shocks as the primary object of interest rather than domestic ones.

Together, these limitations do not alter the central interpretation of the results. The central result remains that the Swedish evidence strongly supports exchange rate overshooting once monetary policy shocks are identified using HF external instruments. At the same time, the results show that the distinction between monetary policy shocks and information shocks is not equally informative in all settings. In Sweden, the most plausible interpretation is that the informational effects are limited, potentially due to the high degree of transparency from the Riksbank and that OMXSPI co-movement is therefore not a reliable tool for identifying them.

7. Conclusion

This thesis has examined whether contractionary monetary policy shocks in Sweden generate exchange rate dynamics consistent with the Dornbusch (1976) overshooting hypothesis and whether the interpretation of these dynamics deviates once the effects of central bank information and the role of minutes are taken into account. To do this, we have used a method based on a Proxy-SVAR framework with high-frequency external instruments derived from intraday financial market reactions around announcements from the Riksbank. The results has provided clear evidence that the Swedish krona appreciates immediately after a contractionary monetary policy shock, then gradually returns toward equilibrium over time. The pattern is robust across alternative specifications, lag lengths and exchange rate measures, thus providing strong support for the overshooting hypothesis in the Swedish context.

The decomposition of announcement surprises into pure monetary policy shocks and central bank information shocks does not significantly affect the broader interpretation of monetary policy transmission in Sweden. Although the decomposition is a relevant empirical exercise, the results do not provide convincing evidence that Swedish monetary policy announcements contain a distinct and economically meaningful informational shock that changes the responses of the exchange rate, prices or industrial production. In this sense, the Swedish case differs from findings for larger economies such as the United States and the euro area. A plausible interpretation for that is that the high degree of transparency of the Riksbank, combined with the structure of the Swedish financial market, limits the informational content that can be isolated through the co-movement of interest rate surprises and stock market returns. An alternative interpretation is that the identification strategy is valid, but that informational effects are in fact limited or absent in Sweden.

Furthermore, excluding the minutes leaves the main results largely unchanged. The exchange rate still shows appreciation on impact, followed by a gradual reversal towards baseline. The responses of inflation and industrial production also remain similar across the identification strategies. This suggests that the minutes do not contain a distinct source of information that fundamentally changes the interpretation of Swedish monetary policy shocks. Their exclusion may therefore be preferable mainly for reasons of international comparability and conceptual clarity, but could also possibly be included to increase the number of observations without biasing results.

Together, the findings of this thesis contributes to the literature in two main ways. First, they provide updated evidence that, when monetary policy shocks are credibly identified using high-frequency data, exchange rate overshooting remains a relevant empirical mechanism in a small open economy. Second, they show that the usefulness of decomposing monetary policy surprises into policy and information components may depend on institutional and market-specific conditions, which may not transfer straightforwardly across

countries. Although the exchange rate results are clear and robust, the responses of inflation and industrial production are estimated with less precision, partly because slowly adjusting monthly macroeconomic variables are linked to intraday identified shocks in a framework without contemporaneous restrictions.

To conclude, the central finding is that the Swedish evidence strongly supports Dornbusch-style overshooting once monetary policy shocks are identified using high-frequency external instruments. At the same time, the results suggest that central bank information effects are limited or absent in Sweden, or at least not convincingly captured by stock-market co-movement in the present framework. This makes Sweden an important case in the broader literature. It shows both that exchange rate puzzles can weaken when identification improves and that empirical tools developed for larger economies do not necessarily perform equally well in a small open economy setting.

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Appendix

A.1 Time Series of Alternative Policy Indicators

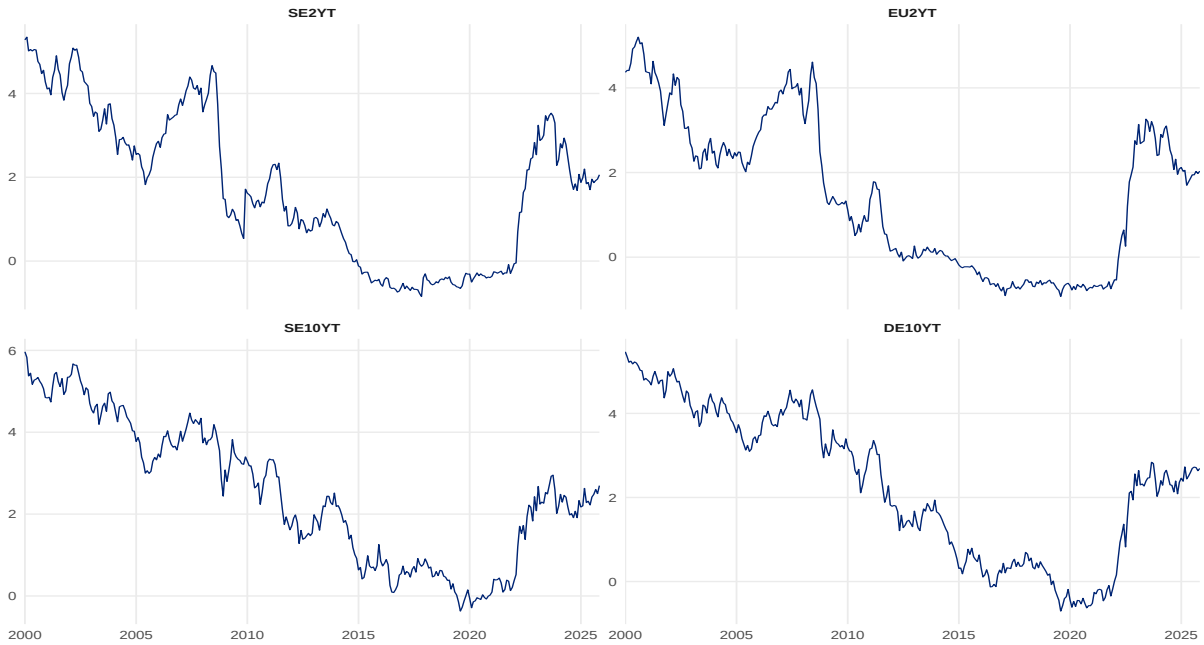


Figure 1: Time Series over Policy Indicators, both foreign and domestic
Source: LSEG (2026) and Sveriges Riksbank (2026).

A.2 Time Series of Bilateral Exchange Rates

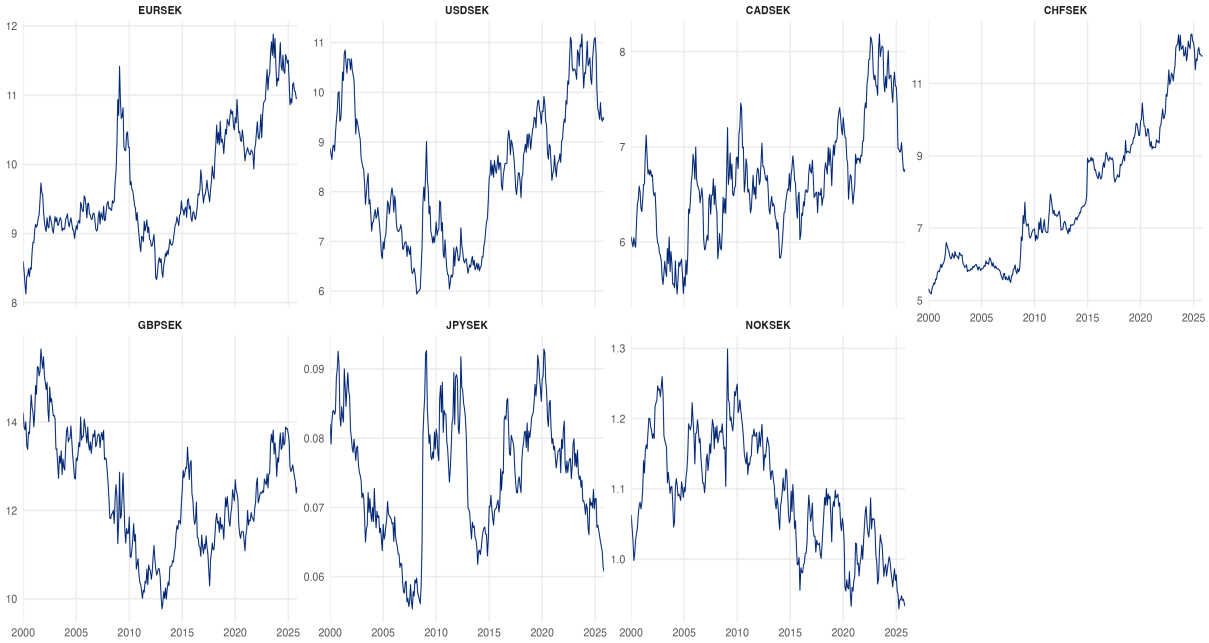


Figure 2: Time Series over Bilateral SEK Exchange Rates
Source: Sveriges Riksbank (2026).

A.3 Data and Sources for Alternative Variables

Variable	Source	Transformation
Policy Indicators		
2-year Swedish government bond (SE2YT)	Sveriges Riksbank	Level
10-year Swedish government bond (SE10YT)	LSEG	Level
2-year Euro Area government bond, benchmark (EU2YT)	LSEG	Level
10-year German government bond (DE10YT)*	LSEG	Level
Exchange Rates		
SEK per Euro (EUR/SEK)	Sveriges Riksbank	Log Level * 100
SEK per United States Dollar(USD/SEK)	Sveriges Riksbank	Log Level * 100
SEK per Canadian Dollar (CAD/SEK)	Sveriges Riksbank	Log Level * 100
SEK per Swiss Franc (CHF/SEK)	Sveriges Riksbank	Log Level * 100
SEK per Great Britain Pound (GBP/SEK)	Sveriges Riksbank	Log Level * 100
SEK per Japanese Yen (JPY/SEK)	Sveriges Riksbank	Log Level * 100
SEK per Norwegian Krona (NOK/SEK)	Sveriges Riksbank	Log Level * 100

Table 1: Data and Sources over Alternative Variables

All variables are monthly from January 2000 to November 2025.

*Due to data availability issues DE10YT was chose for the ten year maturity as no Euro Area benchmark was available.

A.4 Excluding Minutes, Different Lags

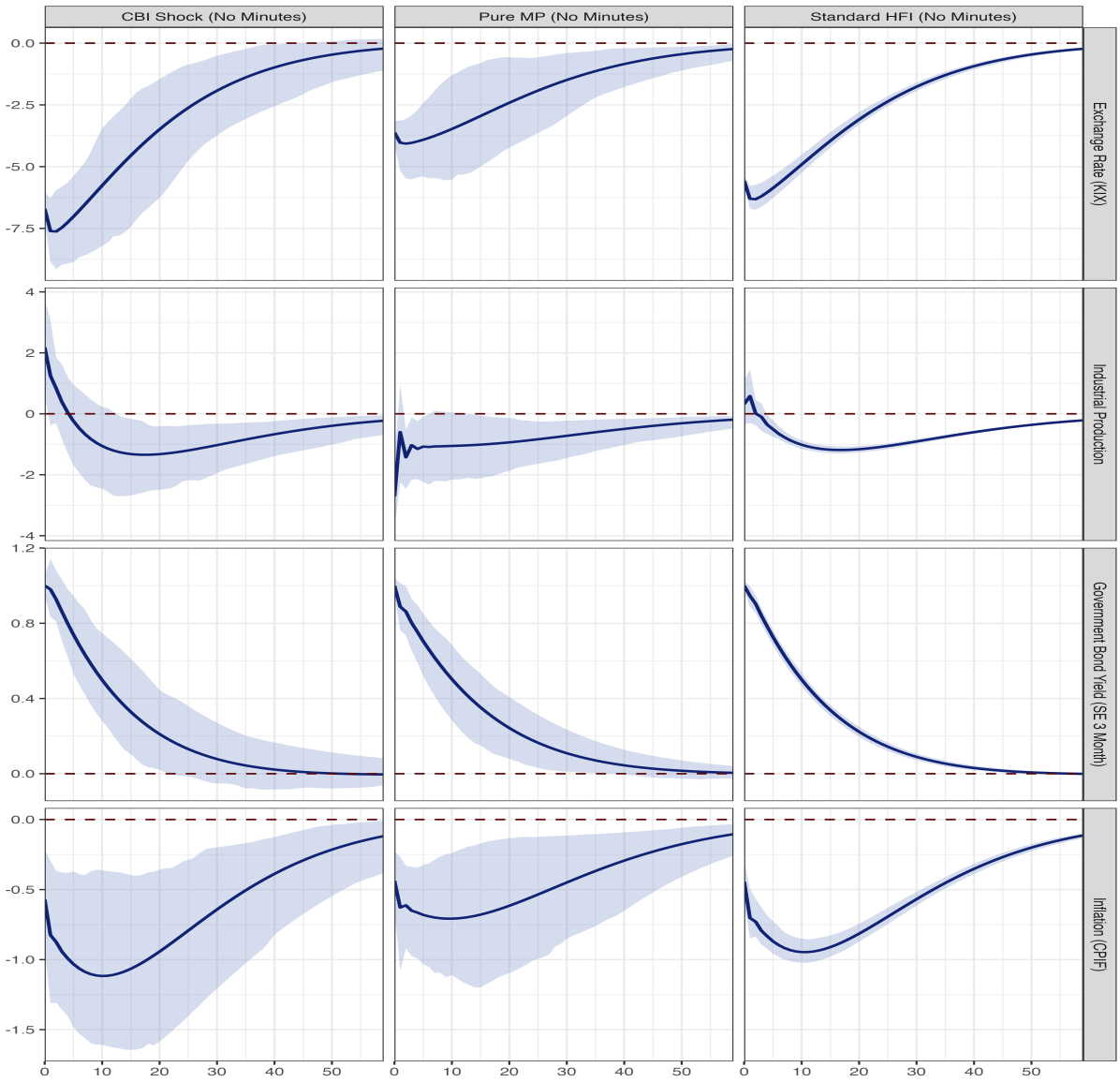


Figure 3: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock. 90% CI; 1000 bootstraps, Lags p = 2

	CBI	Pure MP	Standard HFI
F-statistic	18.96	22.86	31.94

Table 2: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 3.

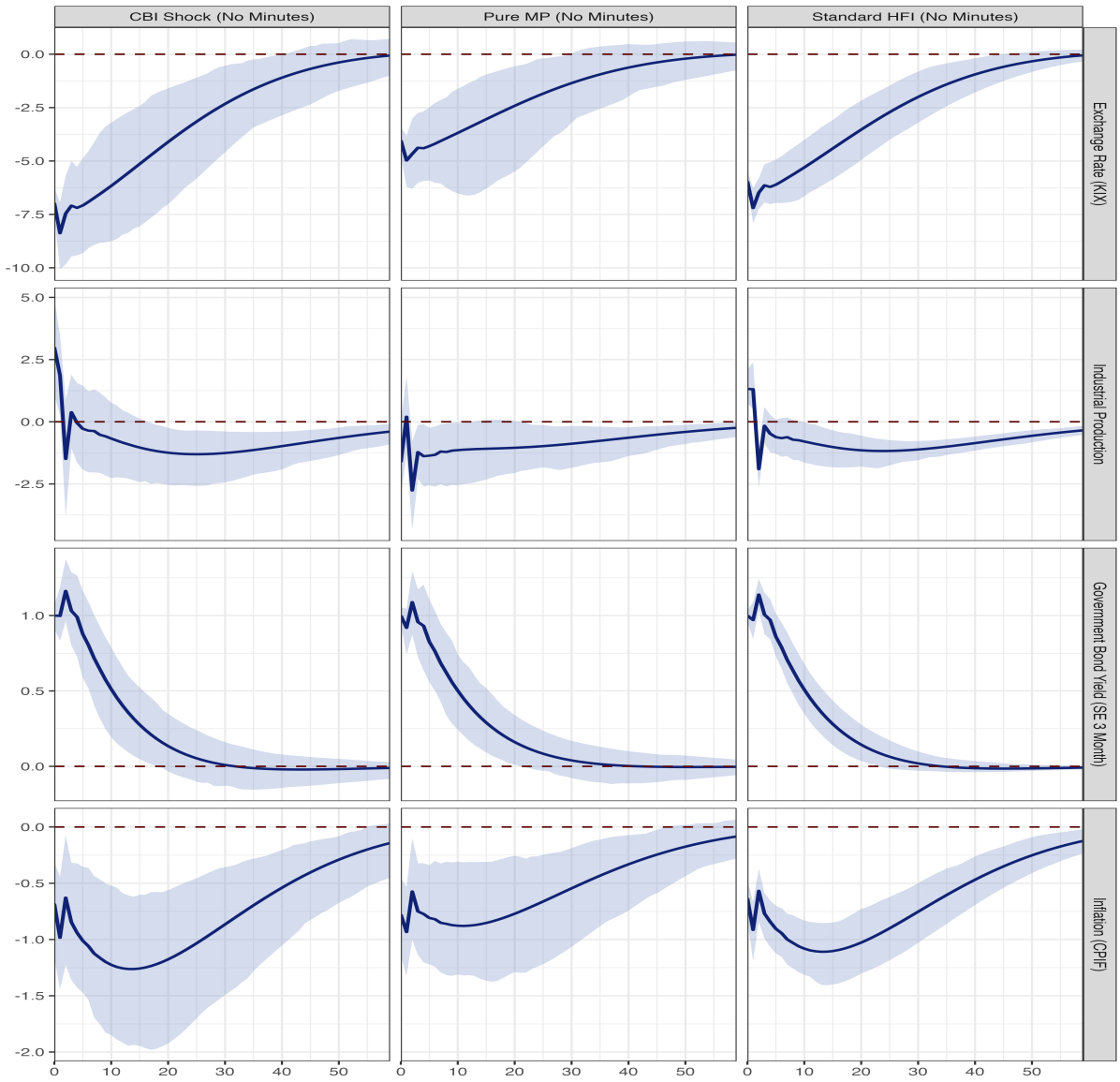


Figure 4: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1000 bootstraps, Lags p = 3

	CBI	Pure MP	Standard HFI
F-statistic	19.21	18.12	30.13

Table 3: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 4.

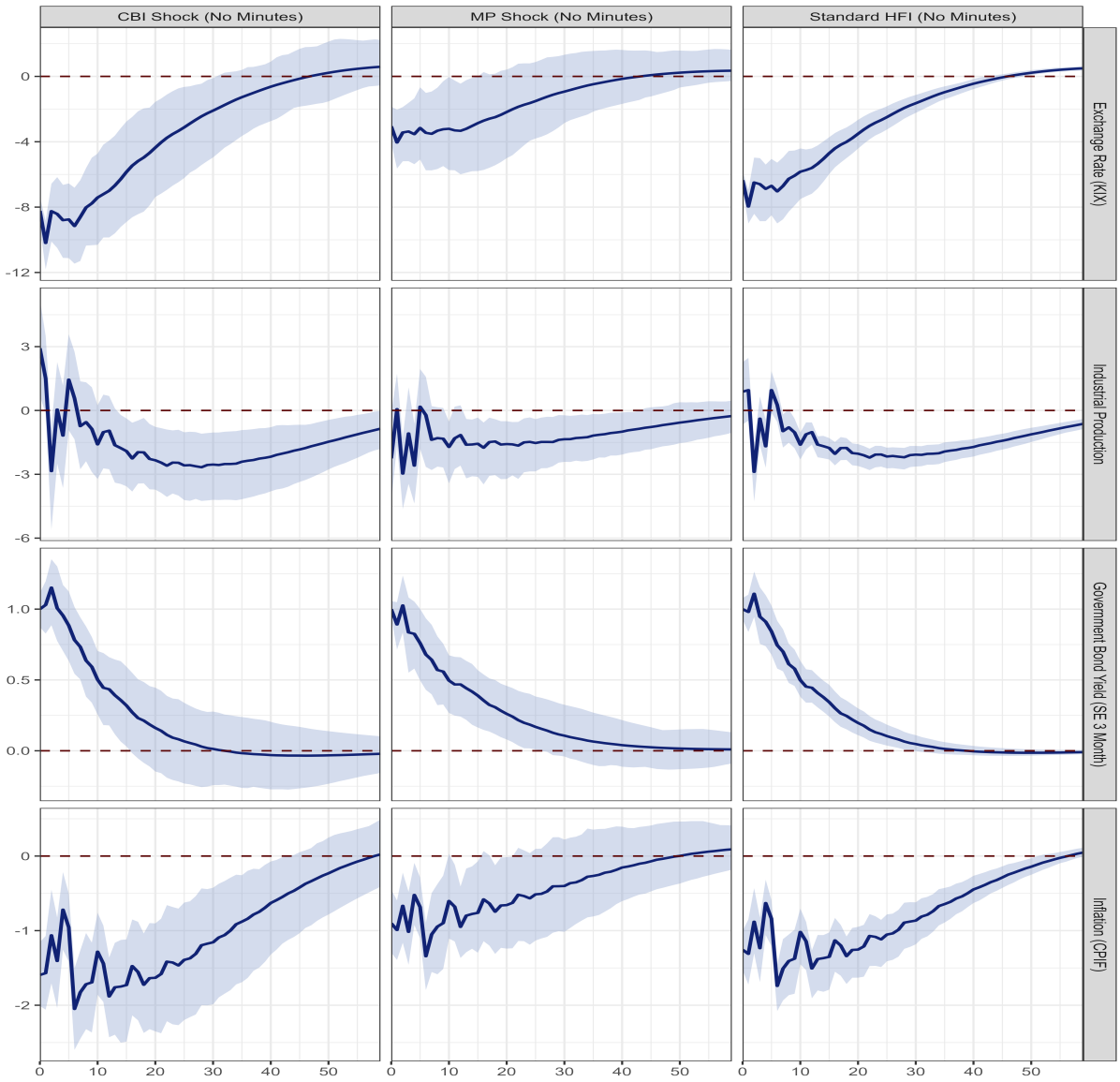


Figure 5: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1000 bootstraps, Lags p = 7

	CBI	Pure MP	Standard HFI
F-statistic	15.43	17.16	25.25

Table 4: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 5.

A.5 Including Minutes, Different Lags

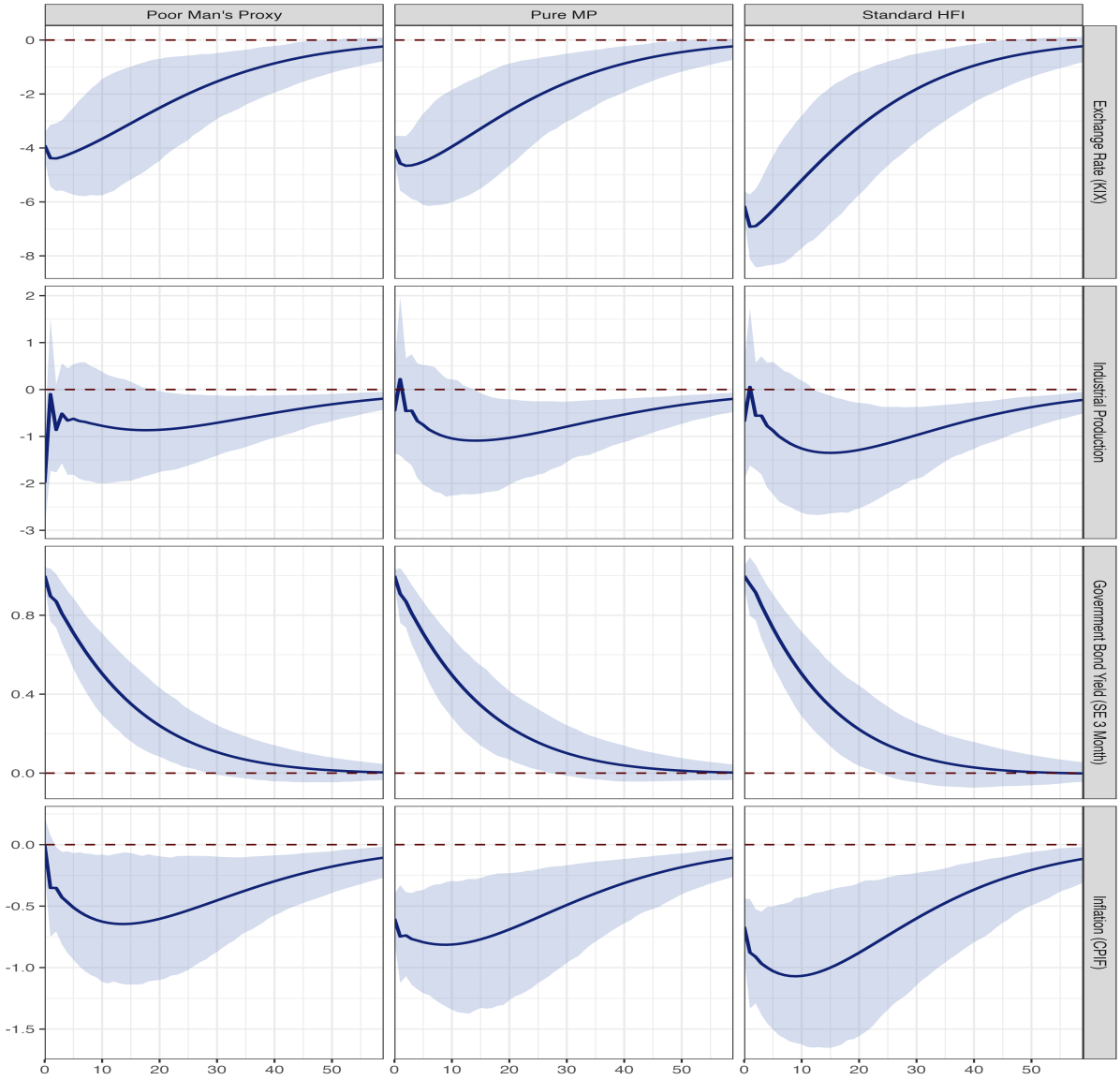


Figure 6: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1000 bootstraps, Lags p = 2

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	26.53	41.89	31.92

Table 5: First-stage diagnostics for external instruments

The table reports the first-stage F-statistics for the external instruments in Figure 6.

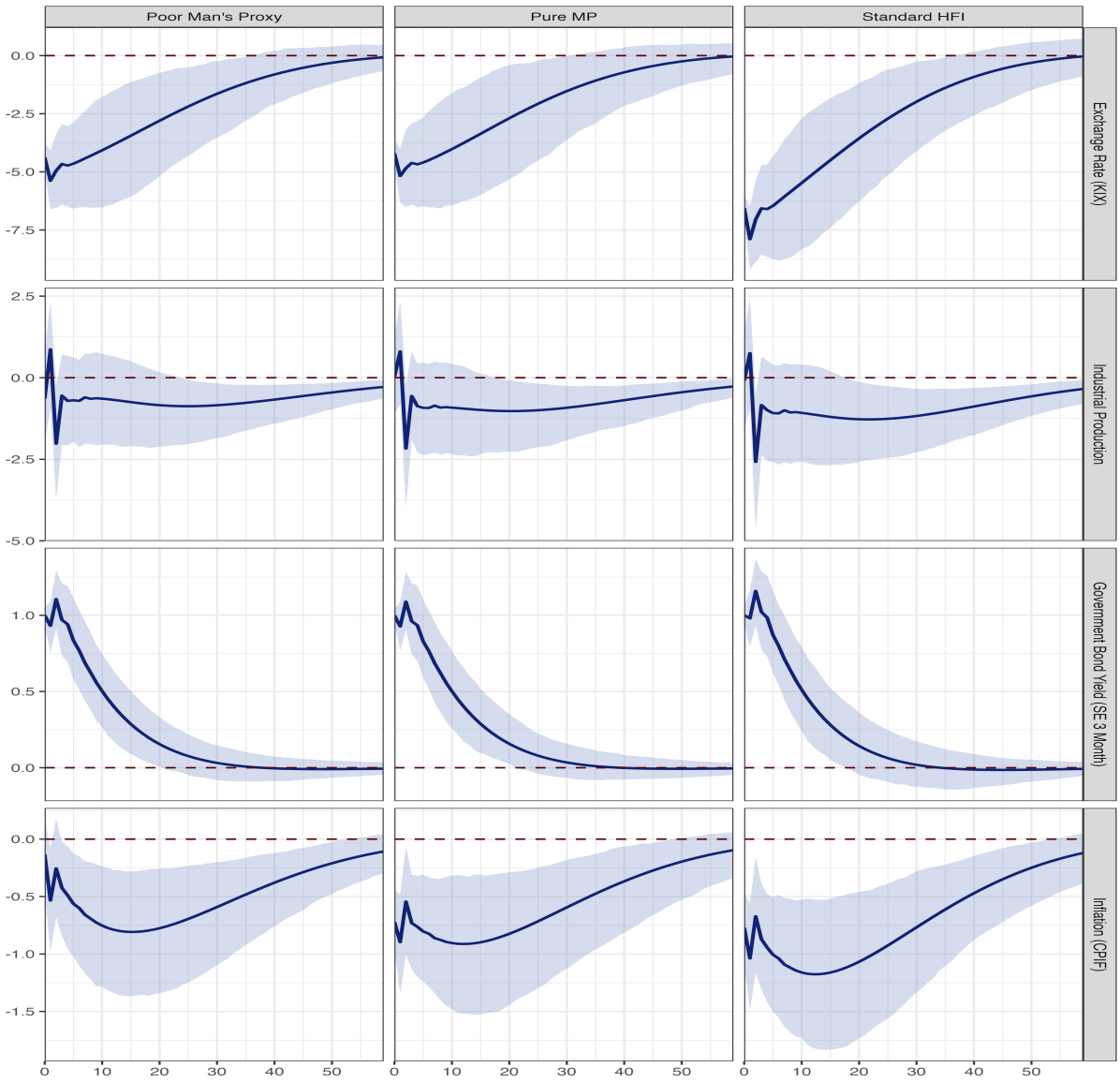


Figure 7: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1000 bootstraps, Lags p = 3

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	23.43	39.96	31.65

Table 6: First-stage diagnostics for external instruments

The table reports the first-stage F-statistics for the external instruments in Figure 7.

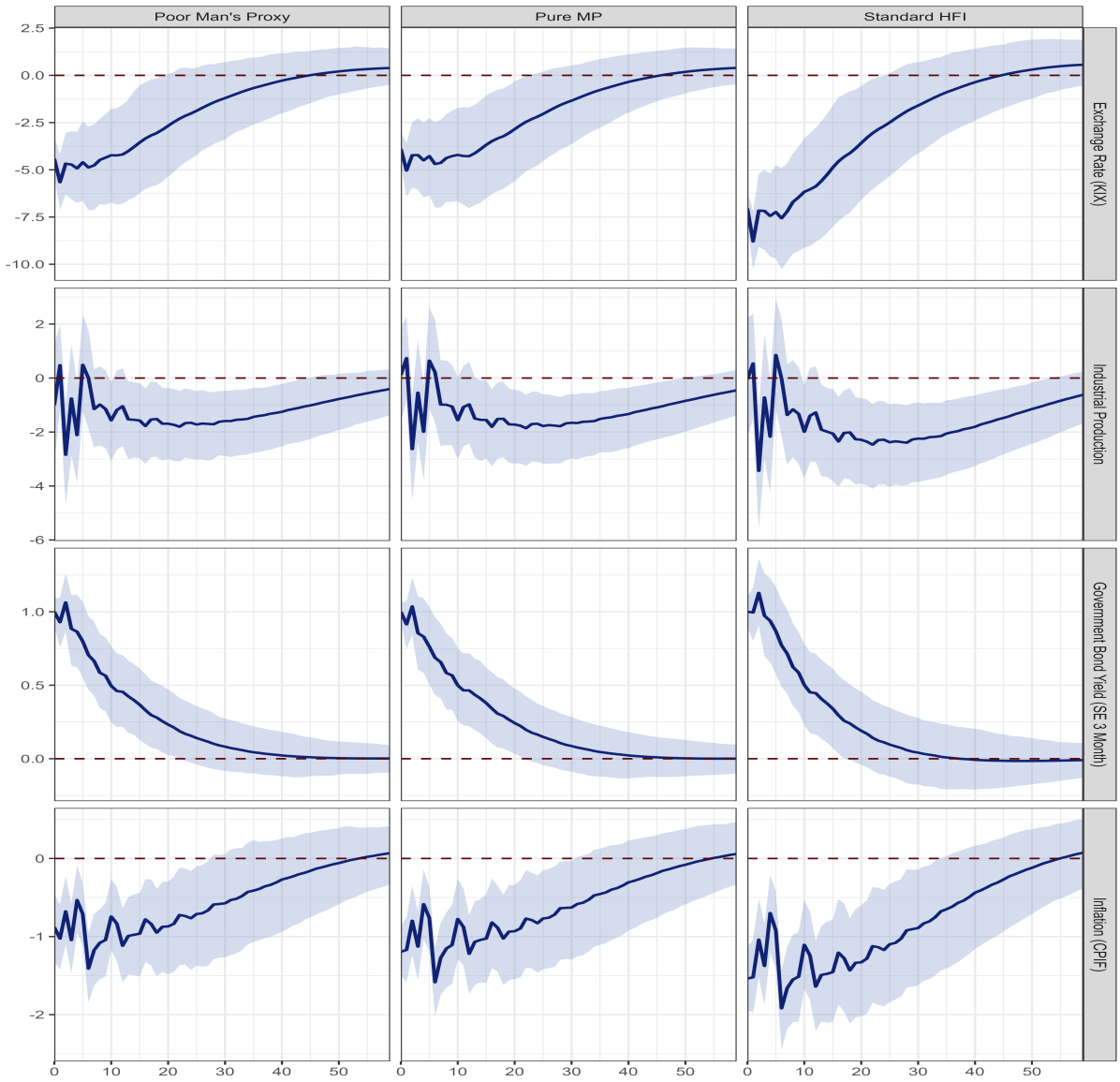


Figure 8: Impulse responses across identification strategies

The three-month government bill yield functions as the policy indicator. The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.

90% CI; 1000 bootstraps, Lags p = 7

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	15.43	17.16	25.25

Table 7: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 8.

A.6 Including Minutes, Different Policy Indicator

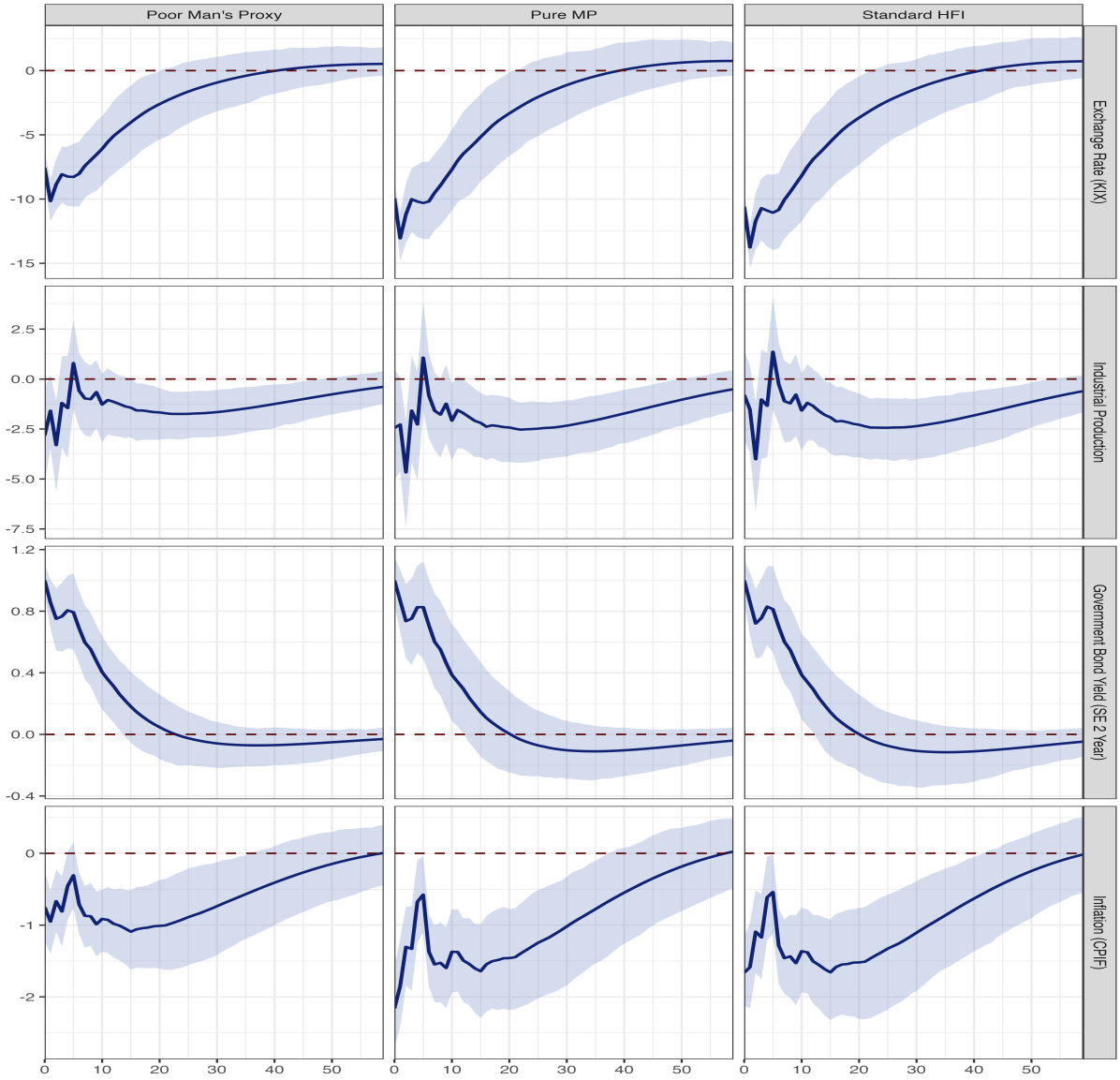


Figure 9: Impulse response functions across identification strategies

The two year government bond yield functions as the policy indicator.
The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.
90% CI; 1,000 bootstraps, Lags p = 6.

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	13.27	7.68	12.06

Table 8: First-stage diagnostics for external instruments.

The table presents the first-stage F-statistics for the external instruments in Figure 9.

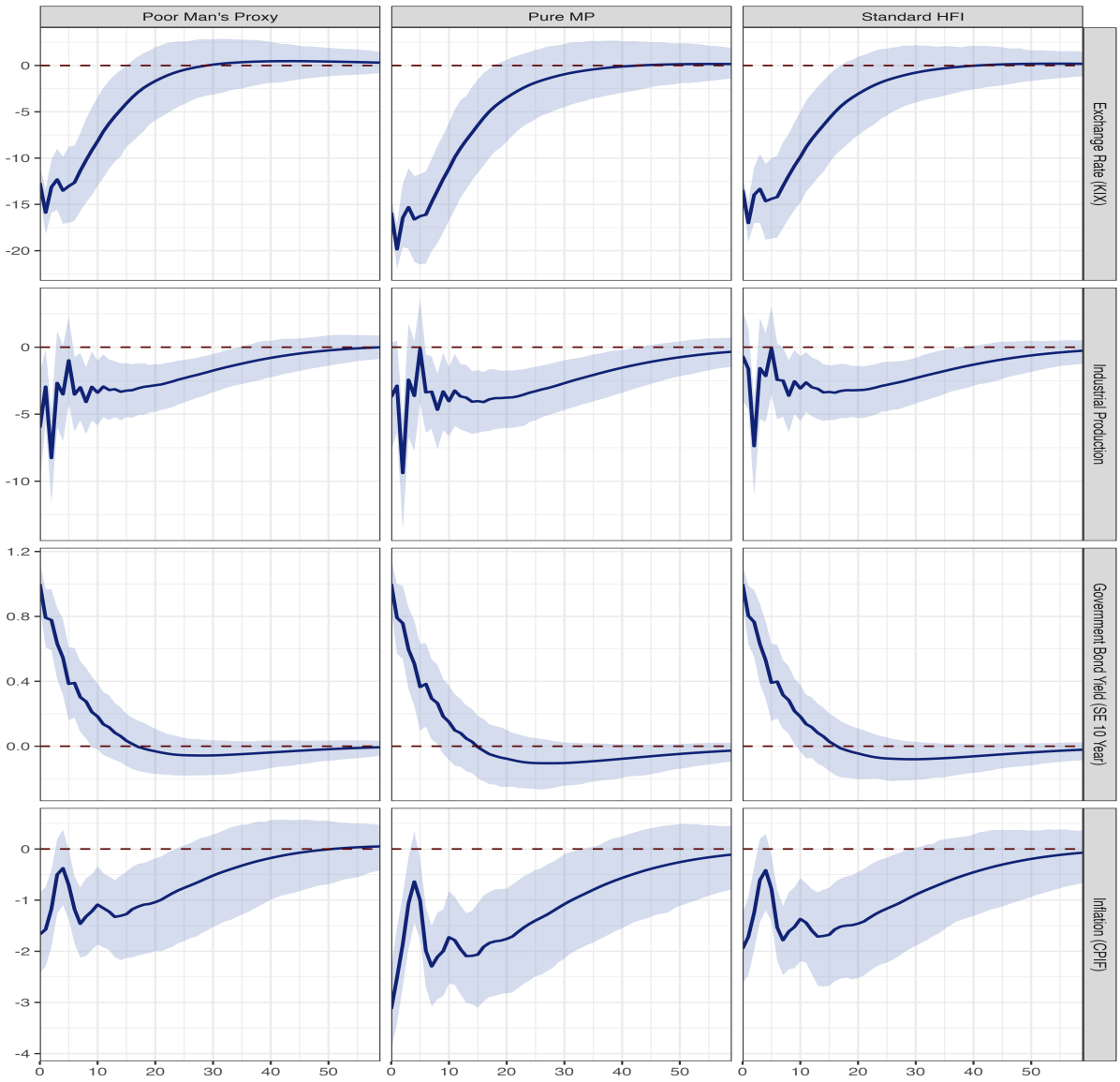


Figure 10: Impulse response functions across identification strategies

The ten year government bond yield functions as the policy indicator.
The shock is normalized to a 100-basis-point impact effect on the policy indicator. The time horizon is measured in months after the shock.
90% CI; 1,000 bootstraps, Lags p = 6.

	Poor Man's Proxy	Pure MP	Standard HFI
F-statistic	10.82	8.48	15.23

Table 9: First-stage diagnostics for external instruments

The table reports the first-stage F-statistics for the external instruments in Figure 10.

A.7 Impulse Responses for Bilateral Exchange Rates

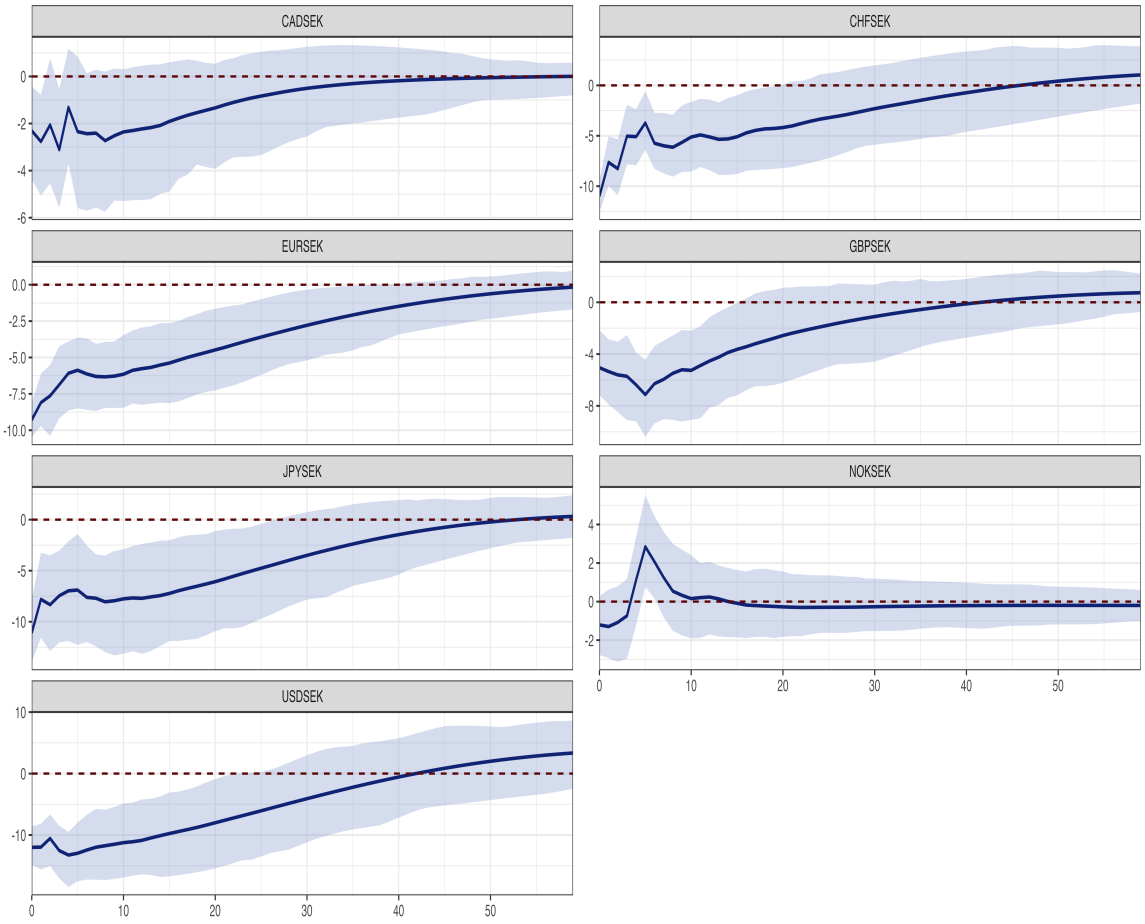


Figure 11: Impulse response functions for bilateral exchange rates

Impulse response for percentage change in number of SEK for one unit of foreign currency. 90% CI; 1,000 bootstraps, Lags p = 6.

A.8 The Riksbank's announcement process

Stage	Timing	Description
Monetary policy meeting	Day before announcement, 09:00 AM	The Executive Board decides on the monetary policy stance, including the policy rate and any complementary measures.
Monetary policy decision	Announcement day, 09:30 AM	The monetary policy decision is published, usually together with a Monetary Policy Report or a Monetary Policy Update.
Press conference	Announcement day, 11:00 AM	The decision is presented and explained at a press conference held by the Riksbank.
Minutes published	5 working days later, 09:30 AM	The minutes provide a detailed account of the Board's deliberations and the reasoning behind the decision.

Table 10: Timeline of the Riksbank's monetary policy decision process
Source: Sveriges Riksbank (2026).