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# Monetary Policy Spillover Effects of the Fed and the ECB:

## Evidence from Turkiye

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# Monetary Policy Spillover Effects of the Fed and the ECB: Evidence from Turkiye

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**Abstract**

This paper examines the spillover effects of the U.S. Federal Reserve (Fed) and the European Central Bank (ECB) monetary policies on Turkiye. We examine the distinct impacts of three dimensions of monetary policy: interest rate changes, forward guidance, and quantitative easing (QE), on key financial and macroeconomic variables in Turkiye, using a high-frequency identification approach to capture policy shocks, and applying a Bayesian VAR model to address short sample size issues. Our findings reveal that while interest rate changes primarily affect financial variables, forward guidance and QE shocks appear to have a greater effect on output and inflation. Furthermore, U.S. policies seem to exert a stronger effect on financial variables in Turkiye. The results offer valuable insights into the different dimensions of monetary policy, highlighting the importance of closely monitoring the policy shifts of advanced economies to mitigate potential risks to financial stability and economic growth for policymakers in the emerging markets.

**Keywords**: Forward guidance, Fed, ECB, Bayesian VAR, Turkiye

**Jel Codes:**

## 1. Introduction

After the 2008-2009 Global Financial Crisis, major central banks implemented unconventional monetary policies characterized by large-scale asset purchases and forward guidance. The literature has documented that these policies have significant effects on financial markets and macroeconomic variables (Georgiadis and Jarocinski, 2023; Dedola et al., 2017; Miranda-Agrippino and Rey, 2020).

However, it is crucial to distinguish between the effects of different aspects of the Federal Reserve's (Fed) monetary policy, such as interest rate changes, forward guidance (FG), and quantitative easing (QE). A recent strand of the literature seeks to distinguish the effects of various dimensions of unconventional monetary policy (Swanson, 2021; Jarociński & Karadi, 2020), but much of the literature still tends to focus on just one policy dimension at a time. While interest rate changes typically have immediate effects on financial markets, forward guidance usually impacts the medium term through expectations, and quantitative easing has more lasting effects, particularly on financial markets and liquidity.

This distinction becomes particularly important when examining spillover effects to emerging markets, as these economies are often highly sensitive to external financial shocks, especially from advanced economies like the U.S. and the Euro Area. Understanding how these dimensions work separately and together helps to better assess the nature of spillovers, as well as the specific vulnerabilities of emerging markets to policy shifts in advanced economies. This analysis is critical for predicting and managing the potential risks to financial stability, inflation, and growth in emerging markets, which are often more susceptible to external shocks due to their reliance on global capital flows and trade.

While the impacts of these policies have been explored for the US economy (Lakdawala, 2019; Swanson, 2021; Miranda-Agrippino and Ricco, 2023; Swanson, 2024), the literature on the international transmission of these policies is rather scarce. Most of the existing studies examined the effect of either quantitative easing (Tillmann, 2016; Bhattarai et al., 2021; Chari et al., 2021) or forward guidance (Dahlhaus and Vasishtha, 2020) without differentiating between different aspects of unconventional monetary policy. Recently, Georgiadis and Jarocinski (2023) estimated global spillovers from different Fed policy measures on the rest of the world and a group of emerging markets and concluded that forward guidance and LSAPs have a greater effect than conventional monetary policy. Miranda-Agrippino and Nenova (2022) compares the international spillover effects of unconventional monetary policies implemented by the U.S. Federal Reserve (Fed) and the European Central Bank (ECB), and finds that while the effects are similar, the spillovers from the Fed's policies are generally stronger than those from the ECB, particularly with regard to real economic impacts.

This paper examines the spillover effects of the Fed's and ECB's monetary policies on Turkiye, a major emerging market. Our central research questions are: (1) How do the different dimensions of monetary policy—interest rate changes, forward guidance, and quantitative easing—affect key financial and macroeconomic variables in Turkiye? and (2) Do spillover effects from the Fed's policies differ significantly from those of the ECB, particularly in the context of Turkiye's strong economic ties to the Euro Area? In addressing these questions, we analyze the impacts of these policy shocks on Turkiye's treasury bond yields, exchange rates, inflation, and output. This analysis is particularly relevant for Turkiye, an emerging market that is highly integrated into the global economy through trade, finance, and capital flows. The Turkish economy has experienced significant fluctuations in response to external shocks, especially those originating from advanced economies like the U.S. and the Euro Area. Turkiye's financial markets are sensitive to changes in global liquidity and investor sentiment, which are heavily influenced by unconventional monetary policies in major economies. Additionally, Turkiye's reliance on foreign capital for funding its current account deficit and its integration with European and U.S. financial markets make it particularly vulnerable to spillover effects from U.S. and ECB policies. By examining the specific effects of these policy dimensions on Turkiye's economic indicators such as exchange rates, inflation, and output, this study aims to provide valuable insights for policymakers in Turkiye. Understanding the transmission channels of these policies is essential for managing financial stability, mitigating external shocks, and designing appropriate monetary and fiscal responses to safeguard Turkiye's economic growth and inflation targets.

The paper contributes to the literature in several ways. First, we extend the existing research by differentiating the effects of various dimensions of monetary policy, whereas much of the previous literature has focused on either conventional or unconventional policy as a whole or on a single policy instrument. Specifically, we aim to explore whether shocks to target rate, forward guidance and quantitative easing have different effects in terms of magnitude and persistence. For this purpose, we employ a state-of-the-art high-frequency identification for conventional monetary policy shocks proposed by Miranda-Agrippino and Nenova (2022). The methodology used in this paper involves analyzing monetary policy surprises in the Euro Area (EA) and the United States (US) by examining high-frequency price revisions around monetary policy announcements, building on Kuttner (2001) and Gurkaynak et al. (2005). Miranda-Agrippino and Ricco (2021) distinguish between genuine monetary policy shocks and non-monetary news, known as the central bank information effect. To isolate monetary policy shocks, they adopt a reduced-form approach

based on the contemporaneous comovement between stock prices and bond yields, following Jarociński and Karadi (2020). This methodology is extended to encompass unconventional monetary policies, using principal component analysis to extract three key factors: the Target/Policy Rate Factor, the Path/Forward Guidance Factor, and the QE/Asset Purchases Factor.

Secondly, we analyze the effects of both the Fed's and ECB's monetary policy to identify whether the spillover effects of the Fed's policy are greater than that of ECB. The literature mostly focuses on the transmission of US monetary policy shocks to global economy. However, other major central banks can also generate spillover effects especially for the countries that are geographically or financially closer. The literature documents that ECB monetary policy shocks have also an impact on emerging markets although this effect seems to be weaker than that of US monetary policy (Ca' Zorzi et al., 2023; Miranda-Agrippino & Nenova, 2022). Undertaking this analysis is especially important for Turkiye which has close economic and financial relations with European countries. Almost half of Turkiye's trade takes place with European Union countries. Therefore, ECB's decisions are also expected to have a significant effect on the Turkish economy.

Our final contribution is methodological. To examine the effects of monetary policy shocks on Turkiye, we employ a Bayesian VAR model which allows us to mitigate the short sample size problem. To the best of our knowledge, this will be the first study examining the effects of various dimensions of unconventional monetary policy on an emerging market economy using the Bayesian VAR model,

Our results reveal that financial variables respond more strongly to changes in interest rates, while forward guidance and QE shocks appear to have a greater effect on output and inflation. Moreover, U.S. policies seem to exert a stronger effect on financial variables in Turkiye.

The outline of the study is as follows: The paper begins with an introduction section, followed by a review of the related literature. Section 4 presents methodology, data, and the empirical results. Finally, in section 5 we conclude with a discussion of policy implications.

## 2. Data

Our dataset cover monthly data between 2006 and 2019, dictated by data availability. Our analysis consists of different dimensions of monetary policy, equity prices, exchange rate, industrial

production, GDP and inflation. Data on financial and macroeconomic variables are obtained from the electronic data delivery system of the Central Bank of the Republic of Turkiye (CBRT).

Our key variable is various types of monetary policy including change in interest rate, forward guidance and quantitative easing. Capturing different dimensions of monetary policy is not a straightforward task and over time different methods have been proposed. Monetary policy surprises are identified from high frequency monetary policy surprises around policy announcements (Kuttner, 2001). However, Gürkaynak et al. (2005) suggested that monetary policy surprises should be seperated in terms of target shocks and path shocks. While target shocks captures conventional policy actions, path shocks include information regarding central bank communication regarding future interest rate changes. However, after the implementation of quantitative easing policies after 2008 crisis, a literature has emerged arguing that monetary policy shocks should be decomposed into changes in federal funds rate, forward guidance and large-scale asset purchases. However, the composition of these effects should also distinguish between pure monetary policy shocks and central bank information effect. Pure monetary shocks such as a change in interest rate or asset purchases directly affects the economic environment by affecting the cost of capital and liquidity. Central bank information effect arises when monetary policy announcements reveal new information about the economic outlook or central bank's future actions. By affecting expectations about future economic conditions, they lead investors to change their beliefs about the trajectory of the economy. For example, when Fed signals a dovish outlook, markets may interpret it as a sign of weak economic conditions and may lead to lower asset prices even if no immediate changes in policy are made. Thus, while a pure monetary shock is identified as a positive co-movement shock associated with an increase in interest rate and stock prices, an information shock is associated with higher interest rates and lower stock prices (Bauer et. al., 2022). Failure to seperate these shocks could lead to misleading interprations regarding the transmision channels of monetary policy. Therefore, the recent literature deals with this issue and try to seperate pure monetary shocks and central bank information effects while also decomposing into different monetary policy instruments. Swanson (2022) separately identifies and estimates the effects of changes in the federal funds rate, forward guidance, and large-scale asset purchases on the U.S. economy using high-frequency changes in short, medium, and long-term interest rates around FOMC announcements, post-FOMC press conferences, FOMC meeting minutes releases, and speeches and testimony by the Federal Reserve Chair and Vice Chair. He also tackles with the issue of central bank information effect. Building on this literature, Miranda-Agrippino and Nenova

(2022) adopted this methodology and deconstructed monetary policy surprises. The methodology used in this paper involves analyzing monetary policy surprises in the Euro Area (EA) and the United States (US) by examining high-frequency price revisions around monetary policy announcements. Miranda-Agrippino and Nenova (2021) distinguish between genuine monetary policy shocks and non-monetary news, known as the central bank information effect. To isolate monetary policy shocks, they adopt a reduced-form approach based on the contemporaneous comovement between stock prices and bond yields, following Jarociński and Karadi (2020). This methodology is extended to encompass unconventional monetary policies, using principal component analysis to extract three key factors: the Target/Policy Rate Factor, the Path/Forward Guidance Factor, and the QE/Asset Purchases Factor. In this study, we will seperately analyze the effects of these three dimensions.

## 3. Empirical Analysis and Findings

In this study, a Bayesian VAR[1] approach will be employed. Although vector autoregression (VAR) models, based on the the interdependencies between lagged values of all variables in a given model have been widely employed to analyze the effects of monetary policy, they are also subject to over paremetrization problem due to the small sample size and inclusion of many endogenous variables (Koop and Korobilis 2010), which can be tackled with a Bayesian approach by including conjugate priors in the model structure. It is documented that a Bayesian approach yields models with reduced parameter uncertainty (Koop 2013). As the choice of priors is a important in a Bayesian approach, we use Minnesota prior which has become a benchmark in analysis of monetary policy. The Minnesota prior introduced by Litterman (1980) imposes the hypothesis that individual variables all follow random walk processes.

Bayesian VAR models are estimated with six lags over the sample 2006-01:2018-12 with Minnesota priors. For robustness, four lags is also used and the results did not change.

In this section, we evaluate the effect of different policy instruments on main financial and macro variables. We start with analyzing the responses to U.S. monetary policy instruments. Figure 1 diplays the response of variables to a one standard deviation shock in U.S. target shock in four panels. Panel 1 shows that one standard deviation shock initially has a positive immediate effect on 10 year treasury bond rates but this effect is not sustained over time as it becomes insignificant after three months. This effect is in line with expectations. The nominal exchange rate reacts to the shock

[1] We use the BVAR package in *R* introduced by Kuschnig and Vashold (2021)

by rising slightly (0.002%) and it begins to decrease after two months. Following a small rise in the fifth month, it begins to decline and gradually converges to zero. Panel 3 shows the response of industrial production to a one standard deviation shock and shows that output declines slightly after two months and this effect becomes insignificant later. The last panel shows the response of inflation rate to a shock in U.S. target rate. It is seen that the response of inflation to a shock is not significant.

Figure 2 diplays the response of key variables to a one standard deviation in U.S. path shock across four panels. Panel 1 illustrates that one standard deviation shock initially has a positive effect on 10 year treasury bond rates, with bond rates increasing approximately 0.2 per cent. Although this response becomes insignificant after the the third moth, it responds positively during the fifth and eight periods. This is consistent with the finding that forward guidance influences long term rates by signaling future monetary policy (Swanson, 2021). However, after the third month this effect becomes insignificant although it exhibits some positive responses again in the fifth period. This temporary rebound may be explained by the market reassessment of new information (Jarocinski and Karadi, 2020). The nominal exchange rate reacts to the same shock by rising immediately by %0.005 but begins to decrease therefter and gradually converges to zero. Panel 3 focuses on the response of industrial production and shows that output shows an increase initially but decreases in the third and fourth periods. This finding is related with the finding that forward guidance affects economy in the short to medium terms reflecting the lags between monetary policy signals and real economic effects (Miranda-Agrippino & Rey, 2020). The last panel shows the response of inflation rate to a one standard deviation shock in U.S. forward guidance. While it is initially insignificant, it displays a moderate increase around period six. This delayed response is consistent with the idea that forward guidance impacts inflation more gradually. The results from Figure 2 indicate that as opposed to the shocks in target rate, the responses to forward guidance shocks tend to be more persistent over time.

Finally, Figure 3 presents the response of variables to a one standard deviation shock in quantitative easing policies. Panel 1 shows that one standard deviation shock leads to a negative effect on 10 year treasury bond rates at the fourth month, while this effect becomes insignificant later. The nominal exchange rate reacts immediately to the shock by depreciating. However, this effect is not sustained. This temporary response of exchange rate is similar to the finding obtained by Dahlhaus and Vasishta, 2020). Panel 3 shows the response of industrial production to a one standard deviation

shock and shows that output declines substantially after two months and this effect becomes significant almost until the sixth period. This is in line with the findings of Georgiadis and Jarocinski (2023) who found that LSAP shocks generate real activity spillovers. The last panel shows the response of inflation rate to a shock in U.S. QE policy. It is seen that inflation rate decreases substantially after the second period reflecting the effect of monetary tightening on demand.

We next turn to analyzing the responses to ECB's monetary policy shocks. Figure 4 diplays the response of variables to a one standard deviation shock in ECB's target rate. Panel 1 shows that bond yield responds negatively to a one standard deviation shock. It continues to decrease until the third period and reaches to its pre-shock level around period three. In Panel 2, it is seen that the response of nominal exchange rate is insignificant. This reaction is surprising because exchange rates generally reacts to interest rate changes. However, Turkiye's economic relations with multiple regions, central bank intervention in foreign exchange market to stabilize Turkish Lira, and risk perception can reduce the transmission of monetary policy shocks to exchange rates. Furthermore, Turkiye's limited financial market integration and risk perception can also dampen the impact of external shocks on the exchange rate. This result is in line with that of Miranda-Agrippino & Nenova (2022) and Dahlhaus & Vasishtha (2020) who found that exchange rate is more responsive to U.S. monetary policy and global risk sentiment than to ECB decisions. Panel 3 presents the response of industrial production to the ECB target shock. The results show that output declines significantly after two months similar to the U.S. target shock. However, when compared with US target shock, this effect is slightly higher in terms of the magnitude. As liquidity tightens due to higher interest rates, access to credit becomes more difficult, particularly for firms in emerging markets, which can reduce investment and consumption (Georgiadis & Jarocinski, 2023). The last panel shows the response of inflation rate to a shock in U.S. target rate. We see that inflation reacts negatively to a shock. This response is consistent with conventional economic theory, which suggests that central bank tightening reduces inflationary pressures by curbing demand through higher interest rates, thus reducing consumption and investment (Miranda-Agrippino & Rey, 2020). Additionally, tighter monetary conditions can lead to lower import prices, which can also help reduce inflation in economies with significant foreign trade, such as Turkiye.

Figure 5 diplays the response of variables to a one standard deviation ECB path shock. Panel 1 shows that the immediate response of 10-year-bond yields is negative, but after the fifth period it

becomes positive as markets begin to adjust to the long term expectations. Exchange rate reacts negatively for a short period of time but this effect becomes insignificant. This finding aligns with Dahlhaus and Vasishtha (2020), who noted that exchange rates often exhibit short-lived reactions to central bank announcements and policy guidance, especially in emerging markets. In Panel 3, the response of industrial production is shown. Industrial production has a weak positive effect only in the fourth period. Lastly, it is seen in Panel 4 that the effect of inflation to a path shock is not significant except for a brief negative response in period three.

The last figure presents the response of key variables to a one standard deviation shock in ECB QE policy in four panels. Panel 1 shows that one standard deviation shock has a negative effect on 10 year treasury bond rates. It is seen that exchange rate's response is not significant. While QE policies by the ECB aim to inject liquidity into the financial system, they primarily influence bond yields and liquidity in the Eurozone. Therefore, QE may not have as immediate or noticeable an effect on Turkiye's exchange rate. In Turkiye, QE may have less direct impact on the exchange rate because the Turkish market is less integrated with the Eurozone financial system. Panel 3 shows that industrial production has a weak negative response in the fifth month. The last panel shows the response of inflation rate to a shock in ECB QE. Inflation respons negatively alhough weakly to an ECB QE shock.

Overall, the comparison of the findings for the FED and ECB reveals that Fed's policies tend to have a stronger and more persistent impact on Turkish financial markets. Furthermore, while both central banks generate negative spillover effects on industrial production and inflation, the magnitude of these effects are smaller in the case of ECB shocks.

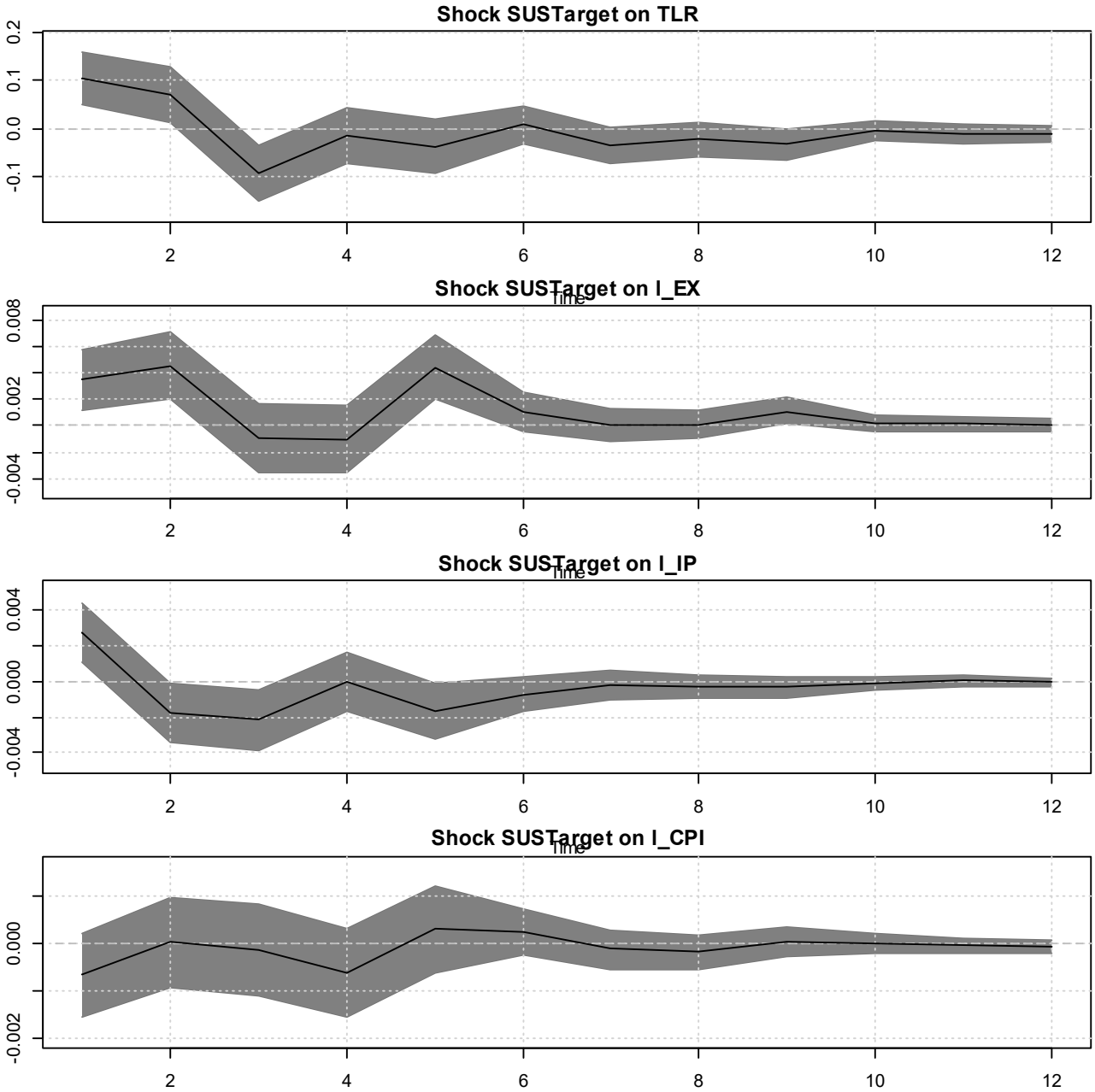


**Figure 1:** Impulse responses of 10 Year bond rates, exchange rate, industrial production, and inflation to a target shock.

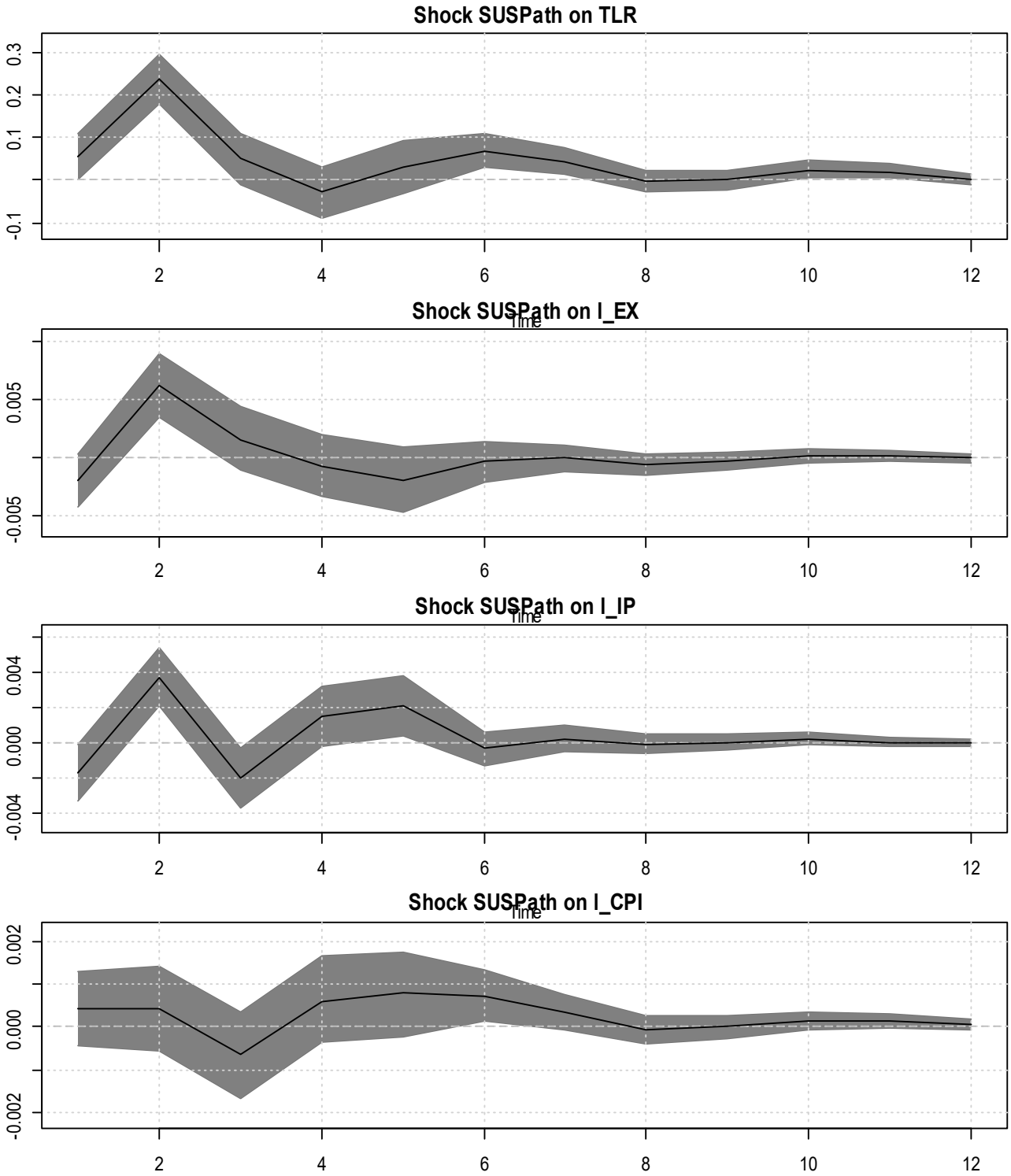


**Figure 2:** The effects of U.S. path shocks

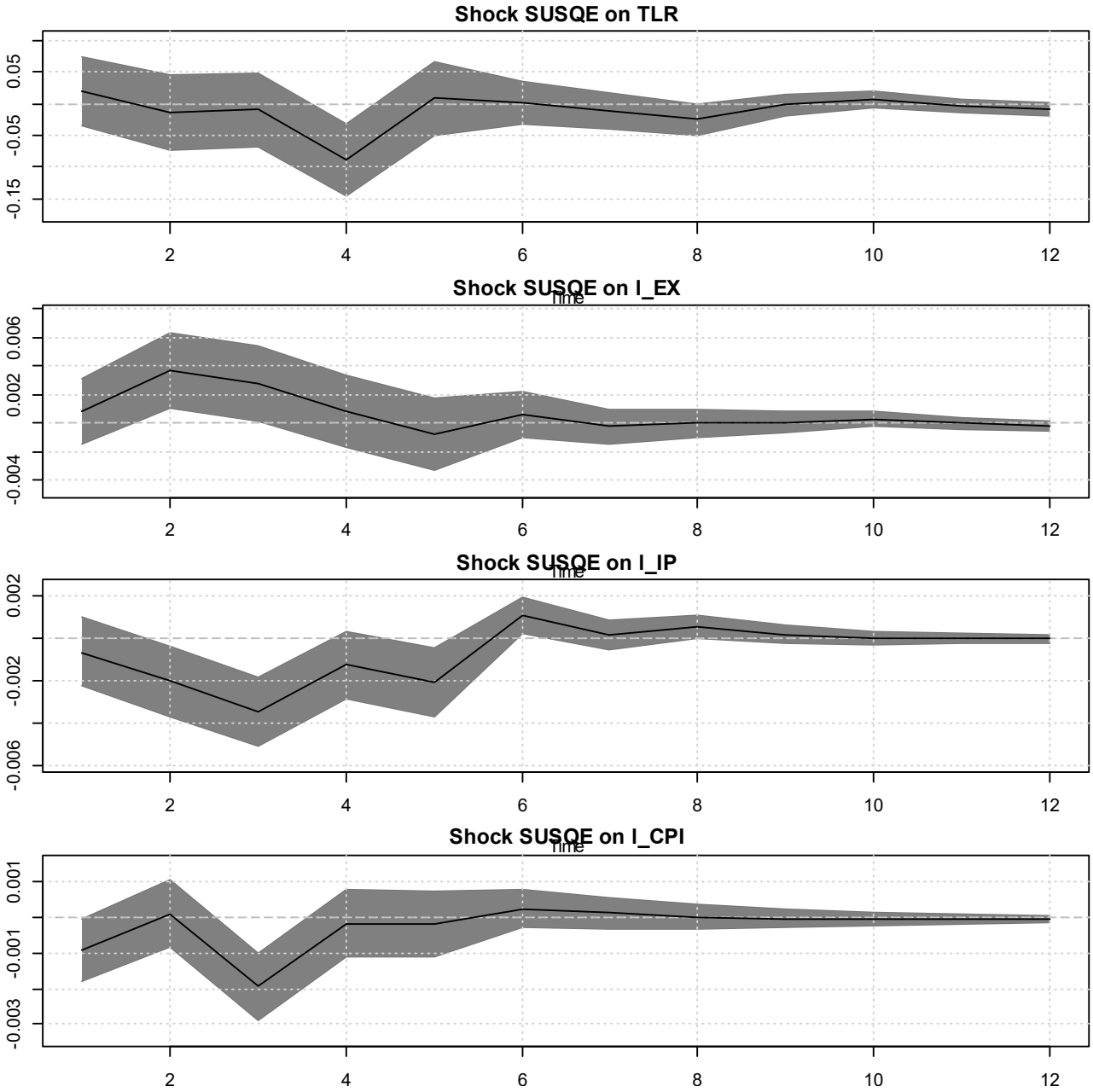


**Figure 3:** The effects of U.S. QE shocks

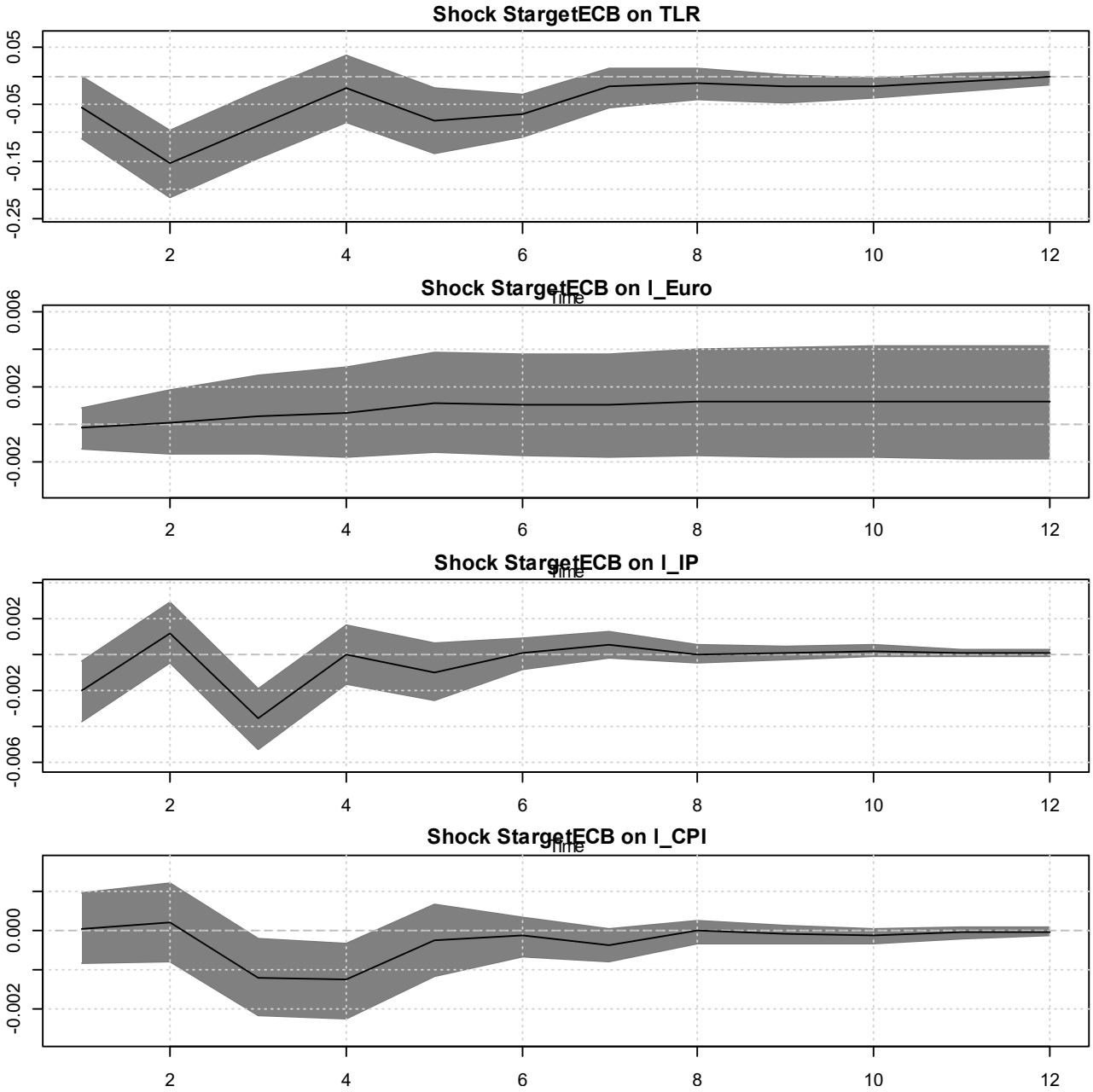


**Figure 4:** The effects of ECB target shocks

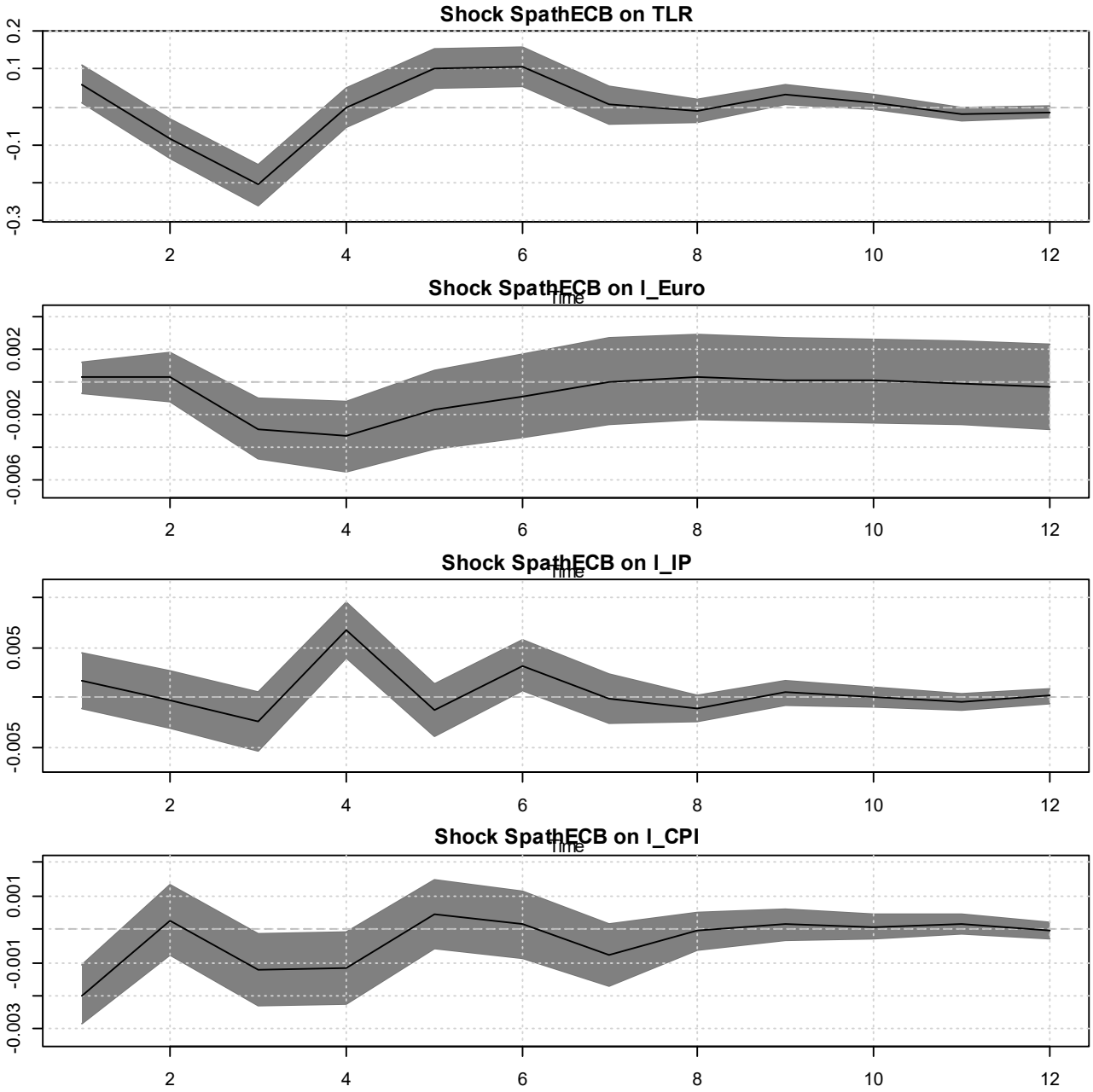


**Figure 5:** The effects of ECB path shocks

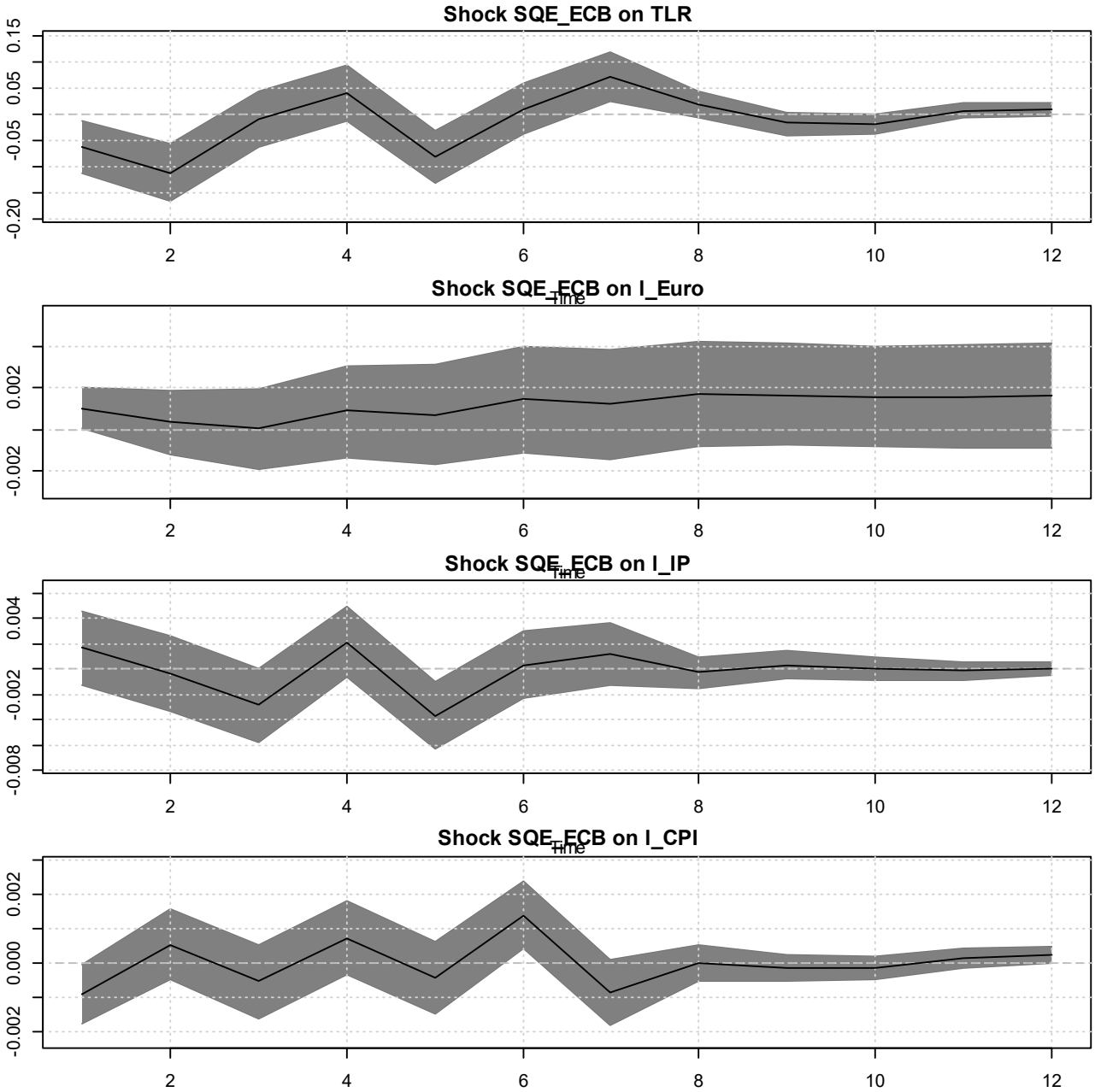


**Figure 6:** The effects of ECB QE shocks

## 4. Conclusion

This study provides an analysis of the international transmission of monetary policies from both the U.S. Federal Reserve and the European Central Bank to Turkiye. By differentiating between various policy instruments such as interest rate changes, forward guidance, and quantitative easing, we highlight the varying magnitudes and persistence of their effects on key financial and macroeconomic variables in Turkiye. Our findings based on a Bayesian VAR approach suggest that while both the Fed and the ECB's policies significantly influence Turkiye's economy, the effects of U.S. monetary policy are generally larger and more long-lasting. This underscores the critical role of forward guidance and quantitative easing in shaping economic outcomes in emerging markets. The study also contributes to the broader literature on the global spillover effects of unconventional monetary policy, emphasizing the need for emerging market economies to carefully monitor the policy shifts of advanced economies to mitigate potential risks to financial stability and economic growth. These insights can aid in better forecasting and managing the impact of external shocks on emerging market economies.

The results of this study carry significant policy implications for Turkiye, a key emerging market economy that is highly sensitive to global financial and monetary conditions. Our findings suggest that U.S. monetary policy shocks, especially those related to QE policies, significantly influence the Turkish lira, often leading to depreciation. This is due to shifts in global risk sentiment, as capital flows to emerging markets like Türkiye tend to decrease when the Fed signals tighter monetary conditions. Türkiye, with its high level of external debt and reliance on foreign currency, is especially vulnerable to exchange rate volatility. For policymakers in Turkiye, this means that central bank actions need to closely monitor global monetary developments. In periods when major central banks like the Fed adjust their policies, the Central Bank of the Republic of Turkiye (CBRT) may need to adopt preemptive measures to stabilize the lira. These measures could include adjusting domestic interest rates, deploying foreign exchange reserves, or enhancing communication strategies to manage market expectations and reduce volatility. Additionally, Turkiye could benefit from diversifying its trade and financial relationships to mitigate the direct impact of these external shocks.

The study also reveals that unconventional monetary policies, especially forward guidance and QE, have a notable impact on inflation rates in Turkiye, although the effect is not always immediate. The combination of capital inflows and exchange rate depreciation, driven by U.S. or ECB policy

shifts, can lead to increased inflationary pressures, particularly through higher import prices. This is a concern for Turkiye, where inflation has historically been volatile and is often exacerbated by exchange rate fluctuations.

In response, Turkiye's policymakers should consider strengthening their inflation targeting framework. Given the spillover effects from U.S. and ECB monetary policies, it may be necessary for the CBRT to adjust its inflation forecasts more frequently and adopt a more flexible approach to monetary policy. This could involve using macroprudential tools to address potential inflationary pressures from external shocks, such as capital inflows that may overheat certain sectors of the economy. Additionally, the Turkish government could invest in structural reforms to boost domestic production capacity, thus reducing reliance on imports and insulating the economy from external price shocks.

Additionally, it is crucial for the CBRT to stay informed about the global monetary policy stance, including the timing and scope of interest rate hikes, QE programs, and forward guidance from both the Fed and ECB. This information could guide Turkish monetary policy decisions, allowing for smoother adjustments to external shocks.

In summary, the policy implications of this study underscore the need for Turkiye to adopt a proactive, flexible approach to monetary and fiscal policy in the face of external shocks, especially those arising from U.S. and ECB unconventional monetary policies. By focusing on exchange rate stability, inflation management, financial resilience, and long-term growth, Turkiye can better navigate the challenges posed by global monetary conditions and safeguard its economic stability.

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