Global Monetary Policy Surprises and Their Transmission to Emerging Market Economies: An External VAR Analysis

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Abstract

This paper analyzes how monetary policy surprises in the U.S. affect emerging market economies (EMs) by focusing on the transmission through the real exchange rate (RER) and country spreads (EMBI). To do so, I disentangle U.S. interest rate movements between both a pure monetary policy shock and an information shock; while the former is constructed based on high-frequency movements of interest rates around Federal Open Market Committee (FOMC) announcements, the latter builds from employment releases. I quantify the relative impacts using a structural VAR (SVAR) model with external instruments. The results suggest that a pure monetary policy shock produces a persistent appreciation of the RER in the U.S. coupled with an increase of the EMBI, which induces contractionary effects in the real sector of EMs. In contrast, an information shock does not necessarily produce such contractionary effects in EMs. These results contribute to the literature by identifying the specific drivers behind Fed announcements and its transmission channels to EMs.

Keywords: *External VAR; U.S. monetary policy shocks; foreign spillovers; emerging markets; information shock, pure monetary policy shocks*
JEL Classification: *F4; E5; C3*

1 Introduction

Increases in the interest rate controlled by U.S. monetary policy (the federal funds rate) have important spillover effects in emerging economies, with sizable consequences in the financial and real sectors (Fernández, Schmitt-Grohé, and Uribe (2017), Dahlhaus and Vasishtha (2020), Pinchetti and Szczepaniak (2021)). In this context, the question of which specific drivers causes the federal funds rate movement and which transmission mechanisms is responsible for global financial tightness becomes crucial for emerging markets (EMs).

Interestingly, prior research has typically focused on the effect of a "general shock" to the U.S. federal funds rate and its aggregate transmission to EMs; nonetheless, there could be several alternative variables explaining the same identified "general shock" to monetary policy, with different effects depending on the original driver. Many studies suggest that the impact of a monetary policy rate hike driven by a booming economy is different than if the increase in this rate is originated by an inflation shock (Hoek, Kamin, and Yoldas (2022), Nunes, Ozdagli, and Tang (2022)). Additionally, regarding the transmission mechanism to EMs, the literature has focused on specific channels, such as mutual fund investments, capital flows, economic activity, among others, and only considering the "general shock". Therefore, without considering the relevant channels and impact of the effective drivers behind the Federal Reserve (Fed) announcements. Understanding these transmission mechanisms acquires greater relevance for EMs since as documentend by Ilzetzki and Jin (2021), there has been a dramatic change pattern over time between the exchange rate and the risk aversion channel after aggressive U.S. rate hikes. They find that prior to the 1990s, the U.S. dollar appreciated in response to increases in the U.S. rate, with negative effects on the real and financial sectors, as predicted by textbook open economy models. However, in the past decades a shift has emerged. Specifically, increases in the U.S. interest rate depreciates the U.S. dollar but stimulates the global economy.

Research efforts to date to properly identify the impact of monetary policy shocks (in other words, "pure identification" of the drivers behind Fed announcements) have led to a renewed interest in proxy structural vector autoregressive (SVAR) models. These models make use of high-frequency movements of variables in response to these announcements to capture the specific driver behind the shock of interest (see Gertler and Karadi (2015), Jarociński and Karadi (2020))[1]. However, a Fed announcement could reveal both a "pure monetary policy shock" (related to surprises in the market due to the private information of the central bank) and an "information effect" (related to exogenous information about the state of the economy) with mixed effects on other macroeconomic variables. Thus, both components need to be considered in the international transmission of U.S. monetary policy shock.

This paper aims to analyze how monetary policy surprises in the U.S. affect emerging market economies – in particular, by separating the information to the pure monetary policy component behind the Fed announcement. To do so, I study how the market reacts in a daily window, after labor data releases (information shock) and FOMC announcements (monetary policy shock) using the three-month ahead monthly Fed Funds futures (FF4) as in Nunes et al. (2022). I postulate that the effects of an unexpected monetary policy tightening may have different effects on domestic and foreign economies depending on the underlying reason for the shock.

Using an external instrument VAR approach for the U.S. and including an external block with EMs variables, two main results emerge. First, a monetary policy surprise related to a pure monetary policy shock has contractionary and persistent effects for EMs. This result is in line with other studies that argue that after a pure shock there is an increase in global uncertainty, risk aversion, fears of recession, and capital outflows from riskier economies to safe economies, with negative spillovers to EMs. Second, an information shock has less adverse effects on foreign economies, implying that when there is a global financial tightening related to the "good reasons", the effect on the country spread and activity on EMs can be favorable[2].

These findings are consistent with an "outlook-at-risk" quantitative approach (O@R).

[1]In particular, Gertler and Karadi (2015), and Jarociński and Karadi (2020) analyze the high-frequency movements in the current month's Fed Funds futures (FF1) and the three month ahead monthly Fed Funds futures (FF4).

[2]A number of contributions demonstrate that an upward revision to the current state of the economy or a positive news about U.S. employment has positive effects on the economy (see e.g. Hoek et al. (2022), Engler, Piazza, and Sher (2023)).

Applied to monetary policy surprises, an O@R approach should reflect different risks if the economy is affected by pure monetary policy shocks or information shocks. To quantify these risks, I analyze the GDP forecast dispersion of different analysts around FOMC announcements (pure monetary policy shock) and employment releases (information shock). I obtain that when pure monetary policy shocks occur, downside risks on the economic outlook are more pronounced compared to when information shocks occur, reflecting greater uncertainty and volatility about future economic outcomes in the case of monetary policy shocks.

Although various authors have tried to quantify this phenomenon relating to different shocks on EMs, their methodologies present challenges when isolating the drivers, generating a great dispersion in their results. Unlike previous research, this paper use external instruments to capture the main drivers of the Fed announcement. By including these two components (pure monetary policy shock and information shock) behind the U.S. federal funds rate movement, it is possible to avoid contaminating the analysis with different types of drivers behind the interest rate movement. In addition, the transmission channels to the real and financial sector are studied. In particular, I solve some counter-intuitive results found in previous research, like the dynamic effect of the U.S. dollar and financial variables after aggressive U.S. interest rate hikes. My method exploits the intuition that global financial tightness could have different effects on EMs depending on the specific origin of the shock.

This paper is organized as follows. Section 2 highlights the importance of monetary policy surprises to EMs, and present historical spillovers from global financial tightening associated with aggressive increases in the federal funds rate. Section 3 discusses the methodology, construction of the external instruments, and the data. Section 4 reports the result of the impulses response, and Section 5 discusses the key findings.

2 Recent developments and lessons from the past

2.1 A general view and stylized facts

Monetary policy related Federal Reserve announcements are events of great importance for EMs. For example, a significant episode occurred during the "Taper Tantrum" in 2013, when Federal Reserve Chairman Ben Bernanke spoke about the possibility of the central bank reducing its bond purchases. This announcement had a strong negative effect on financial conditions in emerging markets economies, leading to significant movements in their exchange rates, spreads, and stock prices and consequently affecting the real and monetary sector. The event itself, as other announcements of the Fed, help to explain why the U.S. monetary policy communication and market surprises issues have become more prominent in recent literature contributions and policy discussions (see Rogers, Scotti, and Wright (2018), Cieslak and Schrimpf (2019) and Rholes and Petersen (2021)).

The literature has documented that spillovers from increases in the federal funds rate in EMs occur, in general, through two main and related channels: risk aversion and the exchange rate. The risk aversion channel considers that, given uncertainty, investors will take refuge in safe assets to the detriment of riskier assets, generating movements in capital flows and, therefore, increasing EMs' country spreads, which is also considered as a leading indicator of the economic cycle (Uribe and Yue (2006)). The exchange rate channel considers that an appreciation of the dollar, caused by the increase in interest rates in the U.S., would imply capital outflows from emerging economies, causing contractionary effects to the global economy. Although these channels feed back, local conditions or vulnerabilities could mitigate or accelerate the negative effects of tightening financial conditions (Iacoviello and Navarro (2019)).

In Figures 1 and 2 present data on historical spillovers to EMs'economies from global financial tightening associated with aggressive increases in the federal funds rate[3]. Two main stylized facts emerge with great importance to the U.S. and EMs. First, aggressive U.S. interest rate hikes did not produce a clear appreciation or depreciation of the dollar. This is consistent with the findings of Ilzetzki and Jin (2021), who found that there is no clear pattern of the U.S. dollar after Fed rate hikes. In fact, contrary to conventional wisdom and textbook open economy models, there are some episodes where U.S. interest rate increases produced a depreciation of the dollar with positive spillovers to foreign economies. This is evidenced by events in 1988, 1994, 1999, 2004, and 2016 where aggressive rate hikes did not produce either a clear appreciation or depreciation (Figure 1).

Another counterintuitive result following U.S. interest rate increases is related to the risk aversion channel, as presented in Figure 2. Looking at the 2004 and 2016 episodes, the global uncertainty (VIX) and the country spread (EMBI) of Brazil, Colombia, and Mexico show a downside pattern after the Fed's aggressive rate hikes during those periods, which appears counterintuitive since the country spread reflects uncertainty and risk of an economy. This risk measure, as is widely used in the literature, corresponds to the difference in the average yield of the sovereign securities of a country compared to the yield of the U.S. Treasury bond, encompassing both the public and private sectors of a country. Thus, intuition indicates that an aggressive federal funds rate increase leads to riskier foreign economies since, in addition to experiencing capital outflows, they face a higher rate differential as a result of the Fed increase.

This evidence suggests that another factor (or factors) influencing the real exchange channel and risk aversion channel may still need to be accounted for.

[3] Say, of the order of more than 50 base points which is an outlier on average U.S. monetary policy decisions.

Figure 1: Fed-tightening-cycle effect on interest rates and real exchange rate

Notes: Fed-tightening cycle is between 8 and 12 months after the announcement. Solid lines represent the difference of the variable of interest and the period that the Fed cycle tightening starts (t). Variables included: Fed funds rate, 2- and 10-year Treasury, and real exchange rate. Interest rates and real exchange rate are measured in b.p. and p.p., respectively.

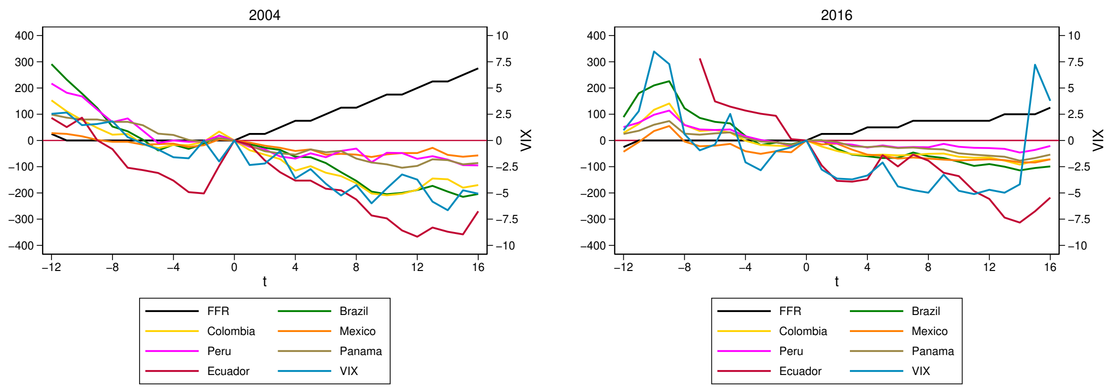

Figure 2: Fed-tightening-cycle effect on interest rates, VIX, and EMs spread

Notes: Fed-tightening cycle between 8 and 12 months after the announcement. Solid lines represent the difference of the variable of interest and the period that the Fed cycle tightening starts (t). Variables included: the Federal funds rate, VIX index, and EMBI. The Federal funds rate, EMBI, and VIX are measured in b.p. and p.p., respectively.

2.2 Recent evidence

Vector autoregressive models has been used regularly to investigates the international spillovers effects of U.S. monetary policy, which is a topic that has received increased attention in recent years. The seminal work on this subject is by Eichenbaum and Evans (1995), who analyzed the effect of conventional monetary policy on exchange rates.

Since the development of external macroeconomic instruments that capture the specific drivers of a shock, as in Stock and Watson (2012) and Mertens and Ravn (2013), the profession has begun to take advantage of these tools to capture the effects of conventional and unconventional policies. More recently, authors such as Dahlhaus and Vasishtha (2020), Ciminelli, Rogers, and Wu (2022), and Ca'Zorzi et al. (2020) combine high-frequency identification techniques around major macroeconomic events (like monetary policy meetings) to identify structural VAR models to capture the effects of conventional and unconventional policy shocks on domestic and foreign interest rates, as well as other economic and financial variables. In these models, the details that matter are not the monetary policy decisions specifically but the new information about what the Fed is going to do in the future.

Numerous authors, such as Fernández et al. (2017), highlight the importance of U.S. monetary policy for emerging economies, partly explaining the fluctuations in the growth cycle as well as the financial effects. The literature generally documents that global spillovers not only have asymmetric effects on EMs but also that their effects depend on the type of shock that causes the contractive cycle of monetary policy – and specifically on whether the event generates a surprise in the market. If the monetary policy rate announcement is immediately accompanied by a significant reaction in the market (for example, through movements in rate futures or expectations associated with the monetary path) it would cause more persistent effects on emerging economies. In line with this phenomenon, Nakamura and Steinsson (2018) document the tendency of analysts to change their growth projections higher in response to unforeseen increases in real yields, which are interpreted as proof of the information effect.

Regarding specific channels of monetary policy transmission to EMs, Ciminelli et al. (2022) analyze international mutual fund investments and the effects of monetary policy surprises. Using partially least squares, they obtain a pure monetary policy shock (that captures a sudden shift in the monetary policy that is orthogonal to change in the economic outlook) and an informational shock (that captures the changes in the FOMC's economic outlook) and find that an increase in the interest rate driven by a pure shock leads to large and persistent outflows from EMs. On the other hand, increases in monetary policy driven by positive information about the current state of the economy do not cause outflows from EMs.

Similarly, Iacoviello and Navarro (2019) study the impact of monetary policy on activity in advanced economies (AEs) and EMs and find that EMs experience larger declines than AEs after pure monetary policy shocks. Yet, a rise in the monetary policy rate could have less adverse effects if the underlying driver is related to an upward revision of the current state of the economy. Using a sign restriction identification, the results of Hoek et al. (2022), Pinchetti and Szczepaniak (2021), and Arteta, Kamin, Ruch, et al. (2022) suggest that tightness of financial conditions due to increases in the federal funds rate imply a significant depreciation of currencies in EMs, with large effects on CDs, bond yields, stock prices, and the real sector. Yet, they find that higher U.S. rates in response to expectations of stronger U.S. growth have less adverse spillovers to EMs.

However, until now, very few studies have used external instruments to quantify the specific drivers behind Fed announcements and their effects on foreign economies. Moreover, so far, very little research has explored the counterintuitive movements of the real exchange rate and country spreads after aggressive U.S. interest rate hikes mentioned in the previous subsection. To the best of my knowledge, the specific drivers behind central bank announcements – information shocks and pure monetary policy shocks – still need to be examined for the U.S. interest rate spillovers to EMs. I fill this gap by proposing a methodology that captures both components by exploiting the fact that central bank announcements and employment data are released on different days within a month. This approach is described in the next section.

3 Methodology and data

3.1 Empirical model

The econometric framework I implement is based on a VAR model with two external instruments to capture the shocks related to monetary policy surprises[4]. The assumption of external instruments in a VAR is a variant of the methodology developed by Stock and

[4]Pure monetary policy shock and information shock, which are described in more detail in section 3.2.

Watson (2012) and Mertens and Ravn (2013). My approach exploits the intuition about information from a variable that is external to the VAR but that is correlated with a particular shock of interest and uncorrelated with other shocks (the instrument). In this subsection, the procedure is described:

As in Gertler and Karadi (2015), consider Y_t a vector that contains economic and financial variables, A and C_j $\forall i \geq 1$ coefficient matrices and ϵ_t the shocks associated. Then, the structural form of the VAR model would be:

$$AY_t = \sum_{i=1}^{p} C_i Y_{t-i} + \epsilon_t \tag{1}$$

where I include an external block corresponding to the EMs variables. Then, if premultiplying by A^{-1} the reduce form is obtained:

$$Y_t = \sum_{i=1}^{p} B_i Y_{t-i} + u_t \tag{2}$$

where the residuals u_t contain both the information shock and pure monetary policy shock and are mean zero with covariance matrix Ω=E$[u_t u_t]$. Let's consider the column a of A^{-1}, which corresponds to the impact on each element of the structural policy shock ϵ_t^p (which also includes the monetary policy shock and the information shock). Since I am interested in the impulse response of the external instrument shocks, I need to estimate:

$$Y_t = \sum_{j=1}^{p} B_j Y_{t-j} + a_k^{-1} e_{k,t} \tag{3}$$

where the first column of a_k are the parameters of interest that quantify the impact of the monetary policy shock or the information shock (e_k).

In order to identify the parameters, as in Gertler and Karadi (2015), Mertens and Ravn (2013), and Lakdawala (2019), two key assumptions need to be satisfied: a relevance and an exclusion condition. Let Z_t be a vector of instrumental variables and ϵ_t^{iv} a vector of shocks that only include the monetary policy shock. To obtain a valid instrument set for shock-related instrumental variables, Z_t must be correlated with ϵ_t^{iv} (relevance condition) but orthogonal to any other structural shock (exclusion condition):

$$E(Z_t \epsilon_t^{iv}) = \lambda \tag{4}$$

$$E(Z_t \epsilon_t^{q}) = 0 \tag{5}$$

where ϵ_t^q is a column vector that includes any other shock except the monetary policy one. Then, as we exclude days when labor data releases are coincident with FOMC announcements to obtain the impulse response to the information shock, the procedure is the same as in the single shock case.

Other approaches used in the literature to identify this phenomenon include the use of sign restrictions on the effect on the variables caused by the shock (Pinchetti and Szczepaniak (2021), Hoek et al. (2022), Ciminelli et al. (2022)). However, there are two major disadvantages associated with this methodology when applied to this context and specific research question. First, a pure monetary policy (information) shock , which due to sign restrictions has negative (positive) effects on economic activity, may be due to a set of factors that generate the same phenomenon, including oil, foreign activity, or variables external to the model that are quantified in the shock. Second, depending on the vulnerabilities that an economy faces, an information shock that, by construction, has positive effects on the stock market would go against the literature associated with rate hikes leading to increases in the discounted interest rate for future dividends. Implying negative effects on the stock market even if this rate increase is for "good reasons". (Burger, Warnock, and Warnock (2017), Iacoviello and Navarro (2019)).

The econometric framework that I use is not based on the assumptions mentioned above. Rather, it assumes that the monetary policy shock does not occur beyond the FOMC announcement. As in Nunes et al. (2022) and Lakdawala (2019), this hypothesis allows for the use of changes in expected official rates measured close to the main macroeconomic event as an external tool for exogenous changes in the systematic component of monetary policy only. Then, a proxy SVAR approach allows for the isolating of the effect of FOMC information shocks from the effects of monetary shocks, both of which provide interest rate surprises around the FOMC announcement.

3.2 Identification method to extract monetary policy shocks

The first instrument used to extract pure monetary policy shocks is the change in the federal funds rate futures, three months out (FF4) in a one-day window around the FOMC announcement. As in Nunes et al. (2022), this instrument captures the change in the expected average banking system rate level over the third calendar month out from the day of the announcement – a horizon that typically also covers the following central bank meeting and thus captures near-term forward guidance (see Gertler and Karadi (2015) and Jarociński and Karadi (2020)).

The second instrument is the same banking interest rate change (FF4), but it is calculated around the unemployment rate releases (information shock). In order to separate the information to the monetary policy shock and avoid biased results, we exclude the days where the unemployment rate release coincides with central bank announcements. The idea behind these external instruments is that in a small window of time around FOMC announcements or labor data releases there are unlikely to be other events that significantly affect the market expectations of future interest rates (Lakdawala (2019)).

Equation 6 describes the construction of both instruments, where q_i corresponds to the pure monetary policy or information shock, "j" is the day, and "t" is the month.

$$iv_t^{q_i} = FF4_j - FF4_{j-1} \tag{6}$$

Figure 3 provides the time series of external instrument surprises, where clear episodes are observed when the FOMC announcement or unemployment rate releases shock market expectations. For example, in 2005 and 2008 episodes, our instruments fluctuated in the order of 20 basis points.

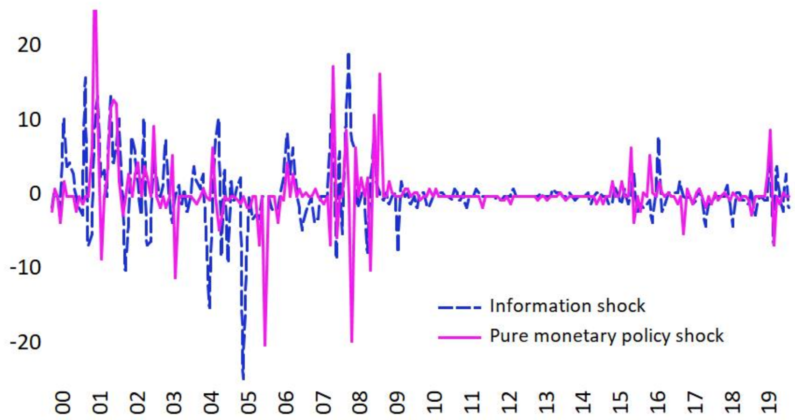

Figure 3: Historical instruments movements

Notes: The monetary policy and information shock are shown at monthly frequency (2000-2019) in basis points. The monetary policy shock corresponds to the change in the federal funds rate future, three months out (FF4) in a one-day window around the FOMC announcement. The information shock corresponds to the change in the federal funds rate futures, three month out (FF4) in a one-day window around unemployment rate releases

3.3 Data

The vector Y_t consider in my paper contain macroeconomic and financial variables for U.S. and EMs, between 2000 and 2019 at monthly frequency. The baseline model includes eight variables: for U.S., the fed fund rate (FFR), personal consumer expenditure (PCE), industrial production (IP), real exchange rate (RER), VIX, $S\&P$ 500 index, and for emerging market economies, the country spread (EMBI) and industrial production (EMsIP), both of are purchasing power parity weighted. We use a VAR model with two lags in natural logarithms of all variables except FFR and VIX. To maintain the assumption that monetary policy shocks do not enter into these labor-market-news-related interest rate surprises, we exclude the days where releases, FOMC meetings, and labor data coincide. The countries included in this research are Brazil, Colombia, Panama, Ecuador, Mexico, and Peru.

4 Results

In this section, I present the dynamic response to the federal funds rate shock for U.S. and EMs variables, which are divided in two topics. First, the aggregate results are presented estimating the domestic and foreign spillovers of monetary policy surprises, separating between the pure monetary policy and information shock. Second, I support my results by a robustness analysis that includes other interest rate surprises as instruments and a sign restriction identification to compare the main results.

4.1 Spillovers of U.S. monetary policy surprises to emerging market economies

Figures 4 and 5 show the impulse response over three years of personal consumer expenditure, real exchange rate, VIX, S&P500, country spread, and industrial production in EMs to a 10 b.p. pure Fed monetary policy shock and an information shock. I measure the dynamic response in the other variables in percentage points, and the dotted lines denote 68% confidence intervals that are based on robust standard errors following Mertens and Ravn (2013) and Nakamura and Steinsson (2018). Also, to check that the instruments are relevant, I present the first stage F-statistic, which indicates that if the value is lower than 10, we are in the presence of a weak instrument (Stock, Wright, and Yogo (2002)).

As shown in Figure 4, the effect of a 10 b.p. pure monetary policy shock on personal consumption expenditure (PCE) and industrial production (IP) on the U.S. is contractive and significant over five months. These contractive effects on the economy are well documented by the profession and are consistent with the tightness of the Federal Reserve[5].

The monetary policy surprise shock decreases U.S. PCE inflation and IP by 0.03 and 0.1 p.p., respectively, with persistent effects. In addition, of key interest (and related to the counterintuitive movements of real and financial variables mentioned in Section 2), the real exchange rate suffers an appreciation of 0.5 p.p., which is accompanied by a considerable increase in global uncertainty (VIX) in the order of 0.6 p.p.. Implying that the stock market (S&P500) is also hit by the surprise of the Fed, with a drop of 1 p.p. approximately. In other words, if the increase in the fed fund rate is given by a pure monetary shock, I observe a negative impact on economic activity. As economic activity falls, global uncertainty associated with fears of recession and investors taking refuge in the dollar increases, implying outflows from riskier countries to safer ones. Consequently, for EMs, this result indicates a large and important increase in the spread (1 p.p.) that is accompanied by a contraction in the real sector (0.2 p.p.) and then a return to pre-shock levels after five months. Furthermore, the dynamic response is statistically significant for at least the first five months.

[5]See e.g. Gertler and Karadi (2015), Nunes et al. (2022).

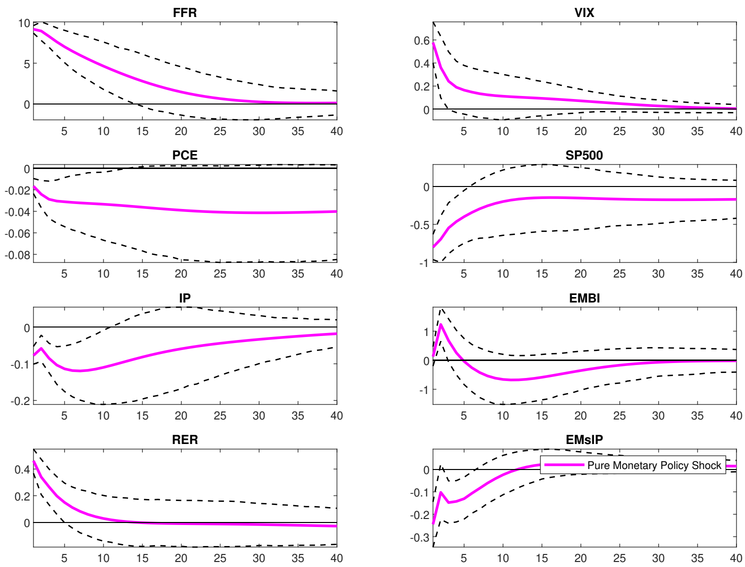

Figure 4: Pure monetary policy shock
(First stage F stats: 24.22)

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with a pure monetary policy shock with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to personal consumption expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

On the other hand, the information shock that reveals new information about the current state of the economy implies less adverse effects to the local economy and EMs (Figure 5). In this case, the PCE does not move much on impact and is not significant, while IP has the same negative impact as in the previous shock but with less persistence. The less adverse effect in the real sector is also reflected in lower global uncertainty, explained by upward revisions to the macroeconomic outlook by the Fed jointly with the optimism of the stock market, counterpose the effects of the appreciation of the USD (with a slightly lower increase than in the previous case of the order of 0.4 p.p.). The VIX exhibits a drop of 0.4 p.p., while the S&P 500 shows an increase of 0.2 p.p. over five months. For EMs, this also implies lower adverse effects on the spread and in the real sector. Contrary to the monetary policy shock where the spread increases, in this case of the information shock, the spread decreases by 1 p.p. after five months. Moreover, the EMs industrial production shows not only a minor drop (0.1 p.p.) but also less persistence.

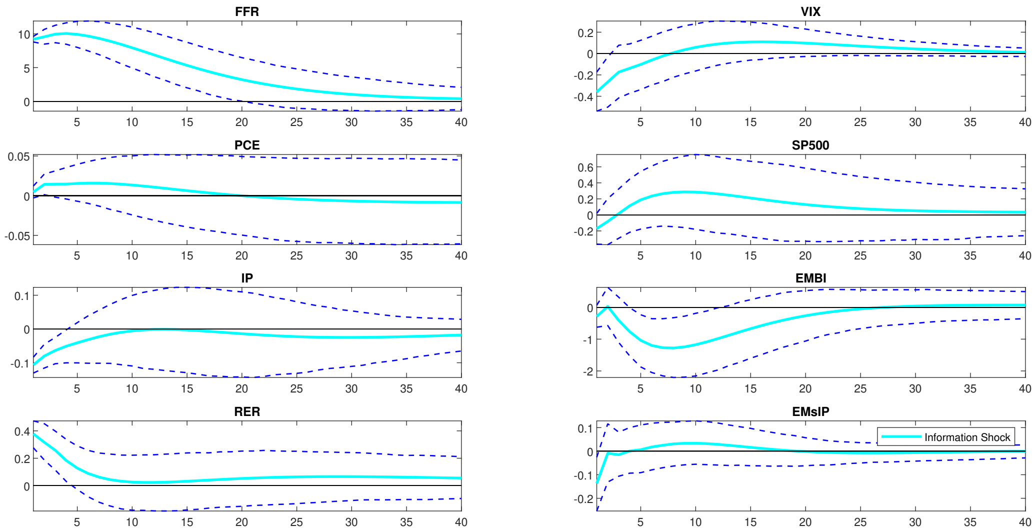

Figure 5: Information shock
(First stage F stats: 18.80)

Notes: The impulse response shows a 10 b.p. increase in the fed fund rate associated with the information instrument with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

Taking both shocks together, the results indicate that the fed fund rate increases have mixed effects depending on the driver, especially for EMs. A pure monetary policy shock has negative effects on the local economy and particularly, on EMs. In contrast, If the interest rate is linked to an upward revision in the macroeconomic outlook due to new information about the current state of the economy, investors tend to increase their risk appetite and shift towards riskier assets. This leads to capital outflows to other economies and results in less adverse effects compared to a pure monetary policy shock, which also are less persistent. For comparison, Figure 6 shows a ”general shock” case using Cholesky, which produces some counterintuitive results that my approach resolve. In particular, in terms of the exchange rate, and country spread dynamic, as the specific drivers behind the interest rate movements.

The mixed effects on domestic and foreign variables mentioned above are consistent with an “outlook-at-risk” quantitative approach, which provides a similar estimation in terms of risks around macroeconomic forecast, capturing how such risks evolve as financial conditions tighten (Adrian, Boyarchenko, and Giannone (2019)). Applied to monetary policy surprises, an “outlook-at-risk” approach should reflect different risks if the economy is affected by pure monetary policy shocks or information shocks. To quantify these risks, I analyze the GDP forecast dispersion of different analysts around FOMC announcements and employment releases.

Figure 7 reports the probability density function (PDF) of the one-year forecast growth rate dispersion separating between a pure monetary policy shock and an information shock. The PDF of the pure monetary policy shock has greater dispersion and lower kurtosis than the distribution associated with the information shock; this indicates a significant probability of greater uncertainty and volatility about the future state of the economy. In contrast, as the economy is closer to its potential level (given an upward revision of the current state of the economy), the disagreement between market analysts about future economic outcomes tend to be smaller as the Fed maintains a stable economy in the information shocks.

These findings suggest that the main driver of the effect to foreign economies is the risk aversion and exchange rate channel, and my results are consistent with by Jarociński and Karadi (2020), Pinchetti and Szczepaniak (2021), and Ciminelli et al. (2022), who also explain that both shocks can have opposite effects on global risk appetite. However, these mixed shock effects for EMs could be amplified depending on their macroeconomic fundamentals. Some studies document that global monetary policy spillovers would have heterogeneous effects depending on the local conditions and vulnerabilities that the economy faces. EMs that exhibit a high fiscal debt, lending problems, high inflation, currency problems, among other economic woes, are more exposed to U.S. monetary policy spillovers. Yet, EMs with solid fundamentals exhibit less adverse effects (Akıncı (2013), Iacoviello and Navarro (2019)).

4.2 Robustness analysis

In this subsection, I perform two robustness checks. First, to study the sensitivity of my estimation to the instrument, the 3-month federal funds rate future is replaced with the 6-month and 1-year interest rate surprises when constructing monetary policy surprises in the benchmark VAR model. The results are presented in Figure 8, 9, 10, and 11. My findings indicate that the dynamic responses of both shocks using different instruments are similar to my results, and, in general, the relevance condition holds. Yet, as this new interest rate contains forward guidance elements to a larger degree and incorporates other news associated with the medium and long-term path of the economy (Gründler, Mayer, and Scharler (2022), Nakamura and Steinsson (2018)), the dynamic effects are more pronounced.

As a next step, employing a sign restriction approach (which is an alternative methodology commonly used in the literature to analyze the spillovers of global financial tightness), the main results are compared. In order to achieve a sign restriction identification, Table 1 indicate some conditions that I take to simulate the pure monetary policy shock and the information shock. The main identifying assumption is that a pure monetary policy shock impacts negatively in the real sector and inflation, which is accompanied by an increase in the global uncertainty and a drop in the S&P Index. While an information shock (which as discussed above is associated with an upward revision to the current state of the economy) also implies a negative impact on the real sector. But an increase in inflation that is associated with better economic prospects, jointly with a drop in global uncertainty and a greater appetite for risk. As I am interested on the dynamic response to EMs, for both shock cases, I am agnostic about the impact on RER, EMBI and EMsIP, and I assume that the sign restriction effect is exclusively for one month. Given the fact that this paper uses exclusively high-frequency movements of the interest rate to capture the specific driver of the shock, the sign restriction methodology will capture this shock but in a broader sense.

In both cases, the results are not substantially different with the narrative described in the previous subsection: pure monetary policy shocks produce contractionary effects on EMS, while information shock produce less adverse effects. Figure 12 exhibits a 10 b.p. increase in the federal funds rate associated with a pure monetary policy shock. Looking at the restricted variables, I obtain a decrease in economic activity and inflation in the order of 0.2 p.p. and 0.5 p.p, respectively, over five months. Global uncertainty increases by 2 p.p., while the stock market decreases by 3 p.p. over the same horizon. More importantly, the non restricted variables show a similar pattern as the external instrument identification with an appreciation of the RER, an increase in the spread, and a decrease of EMs IP (1 p.p., 7 p.p., and 0.8 p.p, correspondingly).

In regard to the information shock case, an increase in U.S. rates have favorable effects on the restricted variables, although with little significance (Figure 13). As the interest rate hike is associated with a booming economy, inflation, and economic activity growth by 0.2 p.p., while the global uncertainty decreases by 2 p.p and the stock market exhibits a 2 p.p. increase. The dollar has no major movements, but the favorable global conditions imply a decrease in the EMs' risk as the spread falls by 5 p.p. and economic activity increases by 0.5 p.p.

5 Conclusion

Fed announcements are events of great importance for emerging market economies (EMs), leading to significant movements in real and financial variables. Accordingly, understanding the true drivers underlying the U.S. interest rates movements is an important issue to follow for policymakers when U.S. monetary policy spillovers are quantified towards foreign economies.

This paper sheds light on the relative importance of the specific drivers behind FOMC announcements and their spillovers to EMs, highlighting the heterogeneous effects on both domestic and foreign economies. To do so, I separate the U.S. federal funds rate movements between a pure monetary policy shock and an information shock based on high-frequency movements of the interest rate related to the monetary policy decision (pure monetary policy shock) and major macroeconomic releases (information shock). Using a proxy-SVAR, I determine that when the U.S. interest rate is driven by a pure monetary policy shock, it has a contractive effect on the U.S. economy, increasing global uncertainty, and consequently a depreciation in EMs currencies, as well as a higher country spread and lower economic activity. Yet, if the interest rate increase is driven by an information shock, this does not necessarily means bad news for emerging market economies.

These findings seek to respond to the counterintuitive effects related to the aggressive effects of the federal funds rate movements and their transmission to foreign economies. Such as the RER movements or EMs leading indicators that anticipate the economic cycle like the country spread. This analysis confirms the intuition that a monetary policy surprise to the market related to inflation expectations, or changing in perceptions of the Fed's reaction function are especially harmful to emerging market economies. However, if the federal funds rate increase is driven by an upward revision to the macroeconomic outlook, the impact on EMs could be more benign.

Further research is warranted in light of the significant vulnerabilities foreign economies face with respect to global financial tightness. In particular, countries that exhibit high inflation, high fiscal debt, currency problems, among other economic challenges could be disproportionately harmed by U.S. monetary policy surprises. To this end, the U.S. central bank's macroprudential tools and the forward guidance effect – which are not included as external instruments in this paper – could play an important role in quantifying the transmission mechanisms towards EMs. Overall, my results point to the need to fully understand the drivers underlying U.S. interest rate movements, so that both structural and semi-structural policymaker models incorporate these transmission mechanisms to better understand their effects on foreign economies.

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6 Annex: Figures and tables

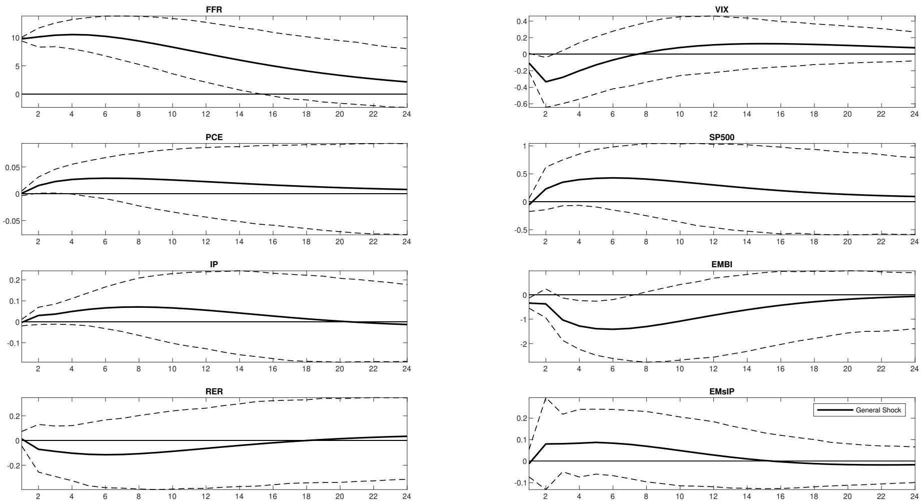

Figure 6: General shock

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with a general shock using Cholesky with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

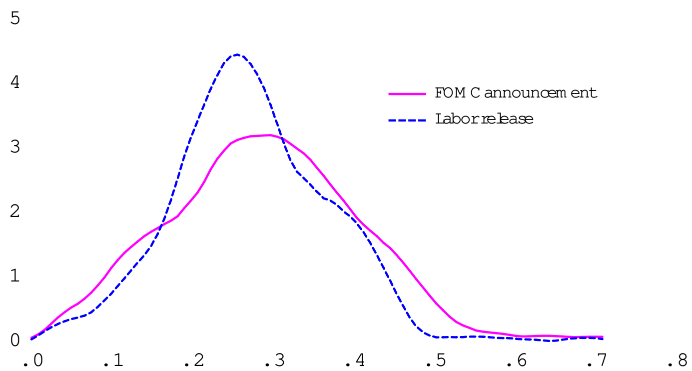

Figure 7: Probability density function of one-year forecast growth rate dispersion

Notes: Probability density functions are estimated using kernel distribution, based on the standard deviation of 16 banks' growth rate forecast around FOMC announcements and labor releases. Includes: Bank of America Merrill Lync, Citigroup, Commerzbank, Deutsche Bank, Goldman Sachs, JP Morgan, Nomura Securities, UBS, Barclays, BNP Paribas, Credit Suisse, ING Groep, Morgan Stanley, Natixis, Scotia Capital, and Wells Fargo.

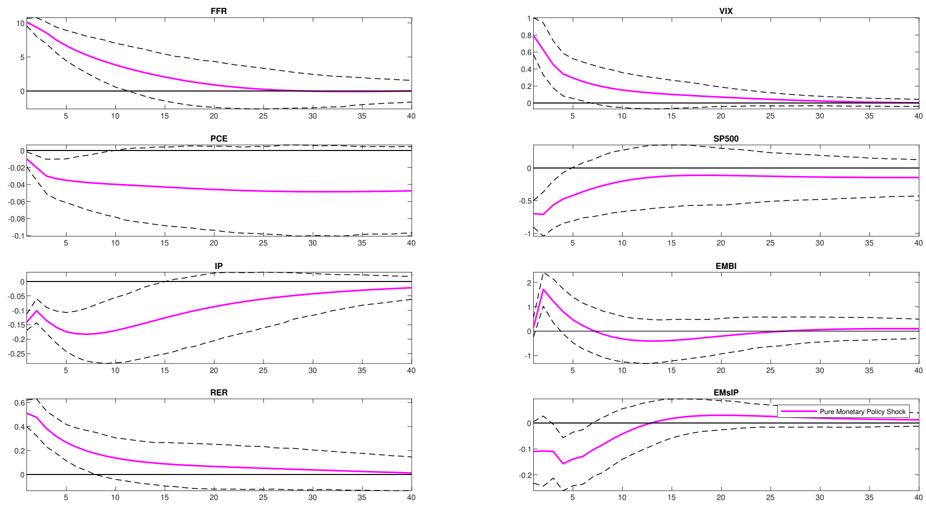

Figure 8: Pure monetary policy shock using 6-month rate futures
(First stage F stats: 17.29)

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with the pure monetary policy shock with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

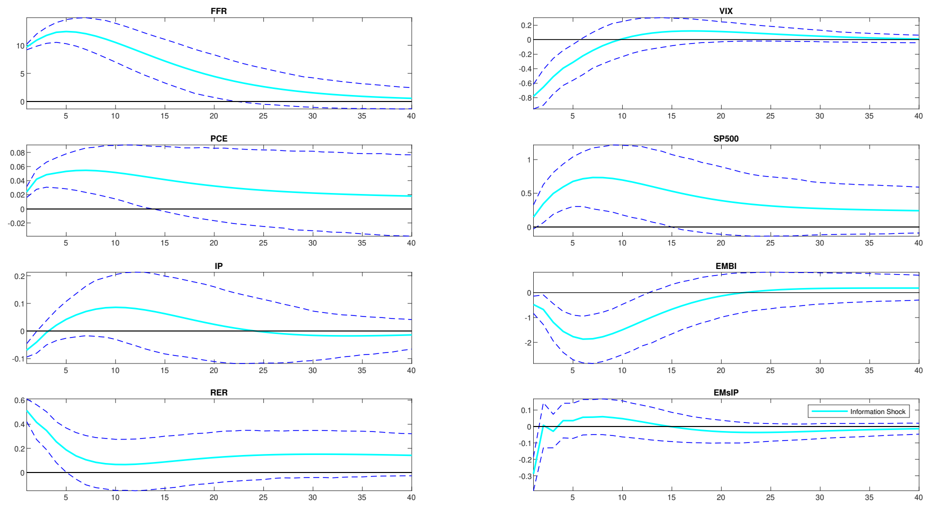

Figure 9: Information shock using 6-month rate futures
(First stage F stats: 18.27)

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with the information instrument with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

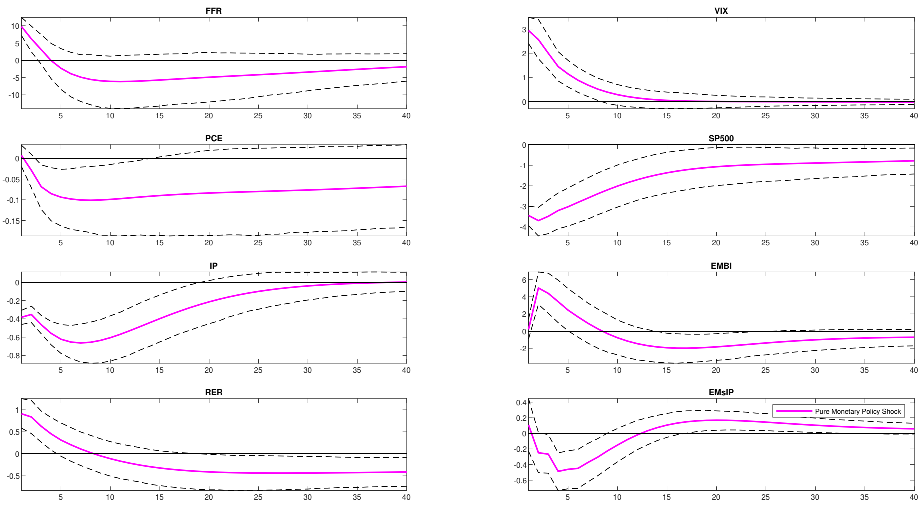

Figure 10: Pure monetary policy shock using one-year rate futures
(First stage F stats: 2.14)

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with the pure monetary policy shock with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p except the federal funds rate. The VAR sample includes 2000-2019.

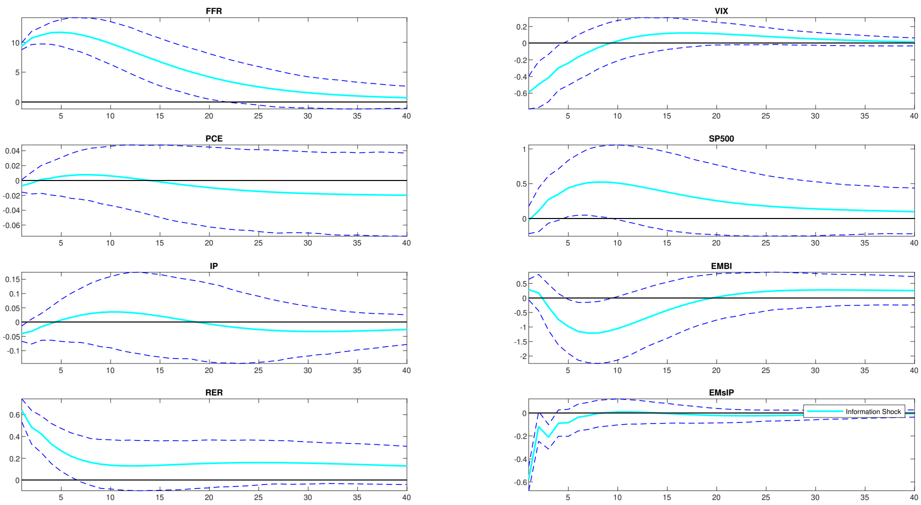

Figure 11: Information shock using one-year rate futures
(First stage F stats: 14.34)

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with the information instrument with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.

Table 1: Sign restriction identification for one period

	Pure MP Shock	Information Shock
FFR	positive	positive
PCE	negative	positive
IP	negative	negative
RER	?	?
VIX	positive	negative
SP500	negative	positive
EMBI	?	?
EMsIP	?	?

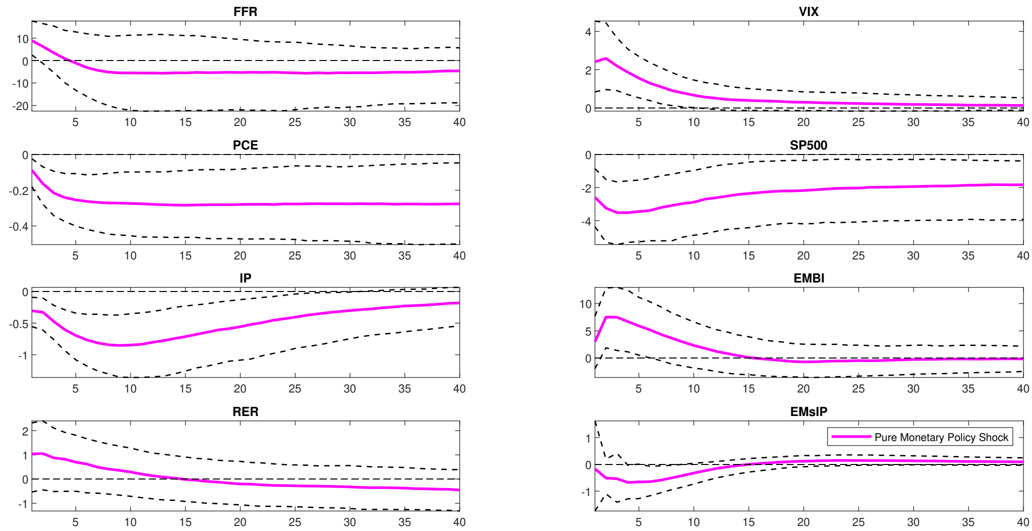

Figure 12: Pure monetary policy shock using SR identification

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with a pure monetary policy shock with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p except the federal funds rate. The VAR sample includes 2000-2019.

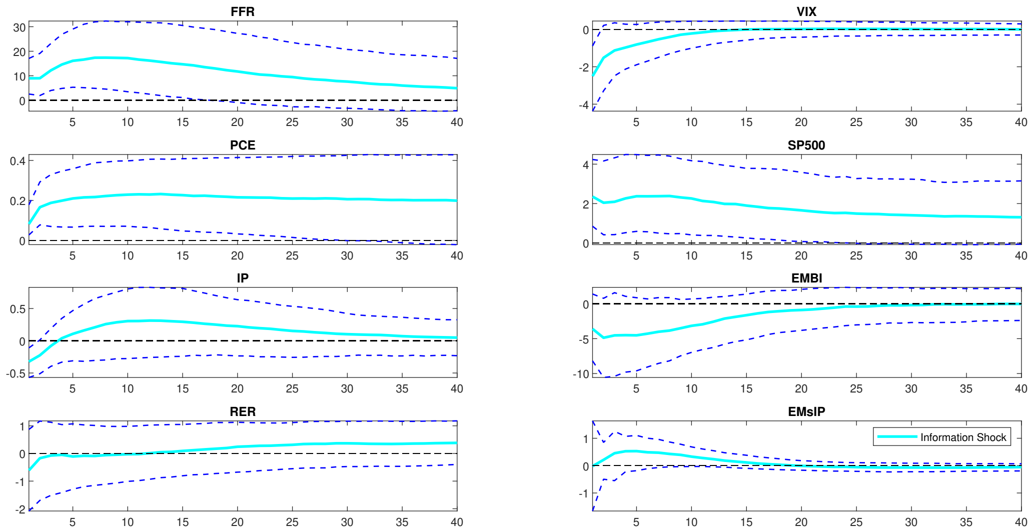

Figure 13: Information shock using SR identification

Notes: The impulse response shows a 10 b.p. increase in the federal funds rate associated with an information shock with respect to a long-term trend, and 68 percent confidence interval bands. The first column shows the dynamic response to the federal funds rate, personal consumer expenditure, industrial production, and real exchange rate, while the second column indicates the response to VIX, $S\&P$ 500 index, spread, and EMs' industrial production. All variables are expressed in p.p. except the federal funds rate. The VAR sample includes 2000-2019.