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ABSTRACT

This paper empirically examines the impact of global shocks on monetary policy transmission in 24 emerging market economies (EMEs), using panel local projections over the period 2000 to 2022. The estimated results show that adverse global shocks, namely a tighter United States monetary policy stance, higher global financial market uncertainty, and global climate change, could dampen the transmission of monetary policy in EMEs. Specifically, the overall responses of industrial production and inflation to monetary policy shocks are more muted compared to the case where the impacts of global factors are isolated. We also study whether economy-specific characteristics across EMEs affect the monetary policy transmission impacts of global shocks. The results suggest that a higher level of financial development can partially offset the dampening effects of global shocks, while a higher degree of capital account openness and trade openness further amplify the impact of global shocks.

Keywords: **global shocks, monetary policy transmission, emerging market economies**

JEL codes: **E52, F4**

1. Introduction

There is growing evidence that emerging market economies (EMEs) have become more synchronized with global factors over the last 2 decades, as they are increasingly integrated into the global economy through real and financial linkages (e.g., De Leo, Gopinath, and Kalemli-Ozcan 2022, Miranda-Agrippino and Rey 2022). A natural question that arises then is to what extent has the effectiveness of monetary policy in EMEs been affected by these global factors?

Despite the literature paying a great deal of attention to the international transmission of external shocks, less is discussed on the role of global shocks in the monetary policy transmission of EMEs. A few but growing recent studies examine whether an economy's exposure to the global financial cycle allows for effective monetary independence (e.g., Miranda-Agrippino and Rey 2020), indicating that a tightening United States (US) monetary policy shock may lead to adverse economic outcomes in other economies, which challenges the degree of monetary policy sovereignty of open economies. However, there is less direct empirical evidence on this issue, particularly from the perspective of EMEs. This paper aims to fill this gap in the literature by employing panel local projections as in Jordà (2005) to estimate impulse responses of key macroeconomic variables to monetary policy shocks in 24 EMEs, conditioning on a set of global factors, including the US monetary policy stance, global financial market uncertainty, and global climate change.

To overcome potential endogeneity concerns, we estimate a series of identified monetary policy shocks for each of the 24 EMEs. Using a set of structural vector autoregressive (VAR) models, we orthogonalize short-term interest rate changes against the central bank's responses to current and past macroeconomic conditions by assuming a Taylor-type rule to extract the exogenous component. The estimated residuals therefore can be regarded as exogenous monetary policy shocks, and the basis for the impulse response function analysis. We estimate the responses of key macroeconomic variables to the identified monetary policy shocks and find that industrial production and inflation rate decrease after a monetary policy tightening. These textbook results suggest the validity of our monetary policy shock identification.

To investigate whether adverse global shocks have a dampening effect on the transmission of monetary policy in EMEs, we estimate impulse responses to monetary policy shocks, conditioning on these global factors. The estimated results show that adverse global shocks, namely a tighter US monetary policy stance, higher global financial market uncertainty, and global climate change, could dampen the transmission of monetary policy in EMEs. Specifically, the overall responses of industrial production and inflation to the monetary policy shocks are more muted compared to the case where the impacts of global factors are isolated. These results are robust to a set of sensitivity checks, including alternative monetary policy measures.

We also study whether economy-specific characteristics across EMEs could affect monetary policy transmission against the impact of global shocks. The results suggest that a higher level of financial development can partially offset the dampening effects of global shocks while a higher degree of capital account openness and trade openness may further amplify the impact of global shocks.

Overall, the estimated impulse responses of monetary policy shocks suggest that adverse global shocks impair the effectiveness of monetary policy transmission in EMEs and the magnitude of these adverse impacts can vary across different economy-specific characteristics. Therefore, policymakers need to be aware that global shocks can make monetary policies less effective and need to ensure that global and external factors are adequately taken into account in monetary policy decision making. Policymakers could also strengthen macroprudential regulations aimed at buttressing financial stability, which would also help to mitigate the impact of global financial shocks on economic activity in EMEs.

This paper contributes to several strands of the literature. First, it is related to recent studies on the effectiveness of monetary policy transmission in developing and emerging market economies. Several studies have highlighted the role of financial development and monetary regimes in the effectiveness of monetary policy transmission (e.g., Mishra, Montiel, and Spilimbergo 2012; Bulir and Vlcek 2021). Some studies highlight the increasing prominence of the exchange rate channel in monetary policy transmission (e.g., Eklou 2023; Brandão-Marques et al. 2020; Gadanecz, Miyajima, and Urban 2014). Other studies argue that the monetary policy transmission in EMEs could be impaired through a disconnect between policy rates and short-term market rates (e.g., De Leo, Gopinath, and Kalemli-Ozcan 2022).

Second, this paper complements a few but growing studies on the role of global factors in monetary policy transmission. By investigating the relationship between global forces and key macroeconomic variables over the 1984–2005 period, Boivin and Giannoni (2008) find no evidence of a change in the US monetary policy transmission due to global forces. However, Ha et al. (2020) find that movements in global factors play a major role in explaining domestic business cycles in G-7 countries. De Leo, Gopinath, and Kalemli-Ozcan (2022) show that global financial conditions could cause a disconnect between policy rates and short-term market rates in emerging economies. Some studies show that the transmission of global shocks depends on individual economies' macroeconomic policies and the degree of global trade and financial integration (e.g., Bräuning and Sheremirov 2023, Ehrmann and Fratzscher 2009). Eklou (2023) finds that global monetary policy tightening could complement domestic efforts to achieve price stability by inducing global disinflation. Ramos-Francia and Garcia-Verdu (2014) find mixed evidence on the role of global factors that the possibility of structural change in the policy rate, exchange rate, and long-term interest rate channels generally depends on the EME in question. Gadanecz, Miyajima, and Urban (2014) argue that easy monetary conditions in advanced economies have played an important role in determining domestic monetary conditions in EMEs.

The remainder of this paper is structured as follows. Section 2 describes the data and outlines the empirical methodology. Section 3 presents the empirical results with robustness checks and extensions. Section 5 concludes.

2. Data and Empirical Methodology

In this section, we first describe the data source of variables we use in the empirical analysis. We then discuss the identification of the monetary policy shocks. Finally, we present our econometric framework used to produce the empirical results.

2.1 Data

We use available monthly data with an unbalanced panel for 24 EMEs spanning from 2000:M1 to 2022:M12.[1] To analyze the monetary policy transmission in EMEs, we consider the following variables to reflect a standard theoretical setup. We collect data on the real industrial production index as a domestic output measure, the year-on-year change of the consumer price index as a measure of the inflation rate, the real effective exchange rate as the exchange rate measure, and the 3-month interbank rate as the short-term rate measure.[2] The data are all from the International Financial Statistics of the International Monetary Fund (IMF) and the Bank for International Settlements (BIS) database.

For global factor variables, we use data from a variety of sources. We use the shadow policy rate proposed by Wu and Xia (2016) as a measure of the US monetary policy stance, which reasonably reflects both conventional and unconventional monetary policy regimes. We use the VIX index that stands for the Chicago Board Options Exchange (CBOE) Volatility Index, as a measure of global financial market uncertainty. To measure global climate change, we use the year-on-year growth rate of monthly atmospheric carbon dioxide concentrations, obtained from the National Oceanic and Atmospheric Association Global Monitoring Laboratory.

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[1] The selected EMEs include Argentina; Brazil; Chile; Colombia; Czech Republic; Egypt; Hong Kong, China; Hungary; Indonesia; India; Israel; Mexico; Malaysia; the People's Republic of China; Peru; the Philippines; Poland; the Republic of Korea; Romania; the Russian Federation; Singapore; Thailand; Türkiye; and South Africa. The data starting year for a specific variable varies across economies due to the data availability and reliability.

[2] As most central banks are aiming with their open market operations to closely align a specific short-term interest rate with their monetary policy stance.

As structural economy characteristics may be important for the effectiveness of monetary policy transmission in EMEs, we also include the following variables in our empirical analysis. First, to measure the level of financial development, we use the Financial Development Index from the IMF, which summarizes how developed financial institutions and financial markets are in terms of their depth, access, and efficiency. Next, we calculate trade openness as the sum of an economy's exports and imports relative to its gross domestic product (GDP), obtained from the IMF's World Economic Outlook. Finally, we use the Chinn-Ito index as a measure of an economy's degree of capital account openness (Chinn and Ito 2006). Table 1 presents the summary statistics of the main variables used in the empirical analysis.

Table 1: Summary Statistics

Variable	Mean	SD	Min	Max
Real GDP (log)	4.6	0.3	2.0	5.6
Inflation (%)	1.2	1.5	-6.0	21.7
Real effective exchange rate (log)	4.6	0.5	1.6	6.2
Short-term interest rate (%)	6.1	6.7	-0.1	91.1
US shadow policy rate (%)	1.1	2.4	-3.0	6.6
VIX (log)	2.9	0.4	2.3	4.1
Global climate change (%)	0.6	0.2	0.1	1.1
Financial development (index)	0.4	0.1	0.2	0.7
Trade openness (%)	96.2	89.4	27.3	361.8
Capital account openness (index)	0.01	1.0	-1.3	2.3

GDP = gross domestic product, IMF = International Monetary Fund, US = United States, VIX = Chicago Board Options Exchange Volatility Index.

Notes: The table shows summary statistics for the main variables used in the empirical analysis. Global climate change is measured by the year-on-year growth rate of monthly atmospheric carbon dioxide concentrations, obtained from the National Oceanic and Atmospheric Association Global Monitoring Laborator. Trade openness is measured as the sum of an economy's exports and imports relative to its GDP, obtained from the IMF's World Economic Outlook. Capital account openness is measured by the Chinn-Ito index (Chinn and Ito 2006).

Source: Authors' calculations.

2.2 Identification of Monetary Policy Shocks

As most of the variation in the central bank's policy rates usually reflects the economic conditions, it is therefore necessary to orthogonalize short-term rate changes against the current or past economic performances. Following the standard literature, we assume a Taylor-type rule to identify the exogenous part of monetary policy variations. A standard approach is to extract the residuals from a three-variable structural VAR (SVAR), where the short-term interest rate is ordered last after output and inflation using a Cholesky decomposition (Christiano, Eichenbaum, and Evans 1999). The estimated residuals serve as a measure of monetary policy shocks. Moreover, to highlight the importance of the exchange rate channel of the monetary policy transmission in emerging economies, we incorporate the real effective exchange rate in our identification setup. Specifically, a 4-variable SVAR framework is used to estimate the monetary policy shocks for a given emerging economy, which can be denoted as follows:

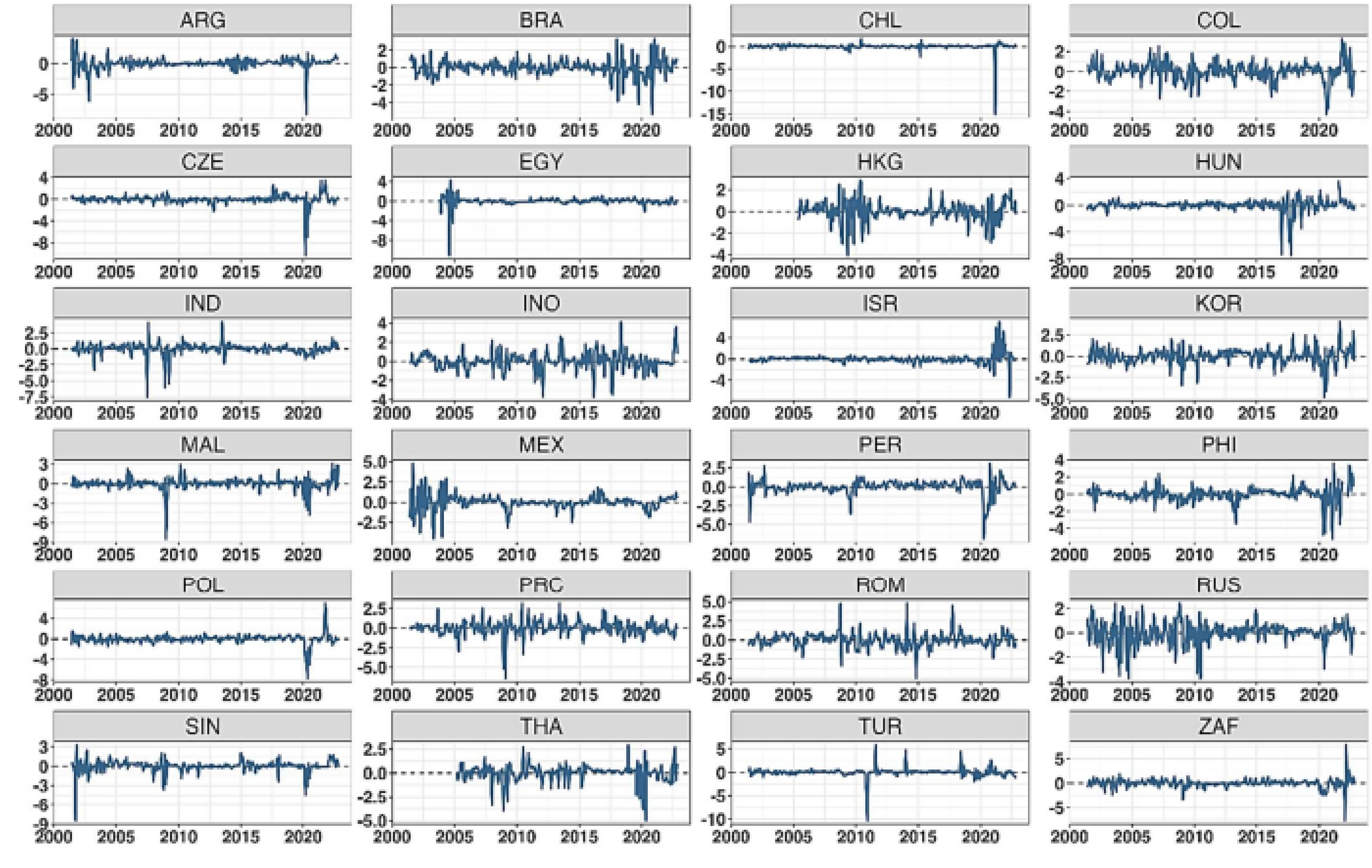
$$Y_t = A(L)Y_{t-1} + \mu_t \tag{1}$$

where Y_t refers to a vector of our selected endogenous variables, including the log of real GDP, inflation rate, the log of real effective exchange rate, and the short-term rate; $A(L)$ is a matrix of polynomials in the lag operator L; and μ_t is a vector of disturbances. The SVAR includes four lags, which are selected using the Schwarz information criterion (SIC). The identification strategy is based on a block recursive restriction, which results in the following matrix A to fit a just-identified model:

$$A = \begin{bmatrix} a_{1,1} & 0 & \cdots & 0 \\ a_{2,1} & a_{2,2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{bmatrix} \tag{2}$$

The ordering of the variables imposed in the recursive form implies that the variables at the top will not be affected by the contemporaneous shocks to the lower variables while the lower variables will be affected by the contemporaneous shocks to the upper variables. We then place real GDP at the top in the ordering, which implies that it will only be affected by contemporaneous shocks to itself. Following real GDP, we place the inflation rate, which implies that the inflation will be affected by real GDP and itself, but not by contemporaneous shocks to the policy rate. Finally, we place the exchange rate before the short-term rate in the ordering, which is based on the assumption that the central bank's monetary policy will reflect wider economic conditions. Figure 1 plots the estimated monetary policy shock series.

Figure 1: Monetary Policy Shock Series



ARG = Argentina; BRA = Brazil; CHL = Chile; COL = Colombia; CZE = Czech Republic; EGY = Egypt; HKG = Hong Kong, China; HUN = Hungary; IND = India; INO = Indonesia; ISR = Israel; KOR = Republic of Korea; MAL = Malaysia; MEX = Mexico; PER = Peru; PHI = Philippines; POL = Poland; PRC = People's Republic of China; ROM = Romania; RUS = Russian Federation; SIN = Singapore; THA = Thailand; TUR = Türkiye; ZAF = South Africa.

Note: The figure plots the monetary policy shock series for the sample of emerging market economies.

Source: Authors' calculations.

2.3 Econometric Methodology

Following the framework proposed by Jordà (2005), we use the panel local projection (LP) to estimate the model and calculate impulse responses to exogenous monetary policy shocks. The baseline model can be given as follows:

$$y_{i,t+h} = a_{i,h} + \lambda_t + \sum_{l=0}^{L} \delta_{h,l}\, z_{i,t-l} + \beta_h\, shock_{i,t} + \varepsilon_{i,t+h}, \qquad h = 0,1,2,\cdots, \tag{3}$$

where $i = 1,\cdots N$ refers to the specific economy in the sample, y is the variable of interest (e.g., industrial production or inflation), $shock_t$ is the series of identified monetary policy shocks, z is a vector of control variables including lagged values for y and $shock_t$ as well as other control variables, and $\delta_{h,l}$ is a vector of coefficients associated with the lags of z. Specifically, we set $L =$ 3, therefore we include three months of lagged values of z. The coefficient β_h gives the response of y at time $t + h$ to the shock at time t. Thus, one constructs the impulse responses as a sequence of the β_h estimated in a series of separate regressions for each horizon h. a_i denotes economy-specific fixed effects, controlling for the time-invariant characteristics of the economy. λ_t represents the time fixed effects.[3] Finally, $\varepsilon_{i,t+h}$ denotes disturbances. One particular complication associated with the LP method is the serial correlation in the error terms induced by the successive leading of the dependent variable. Thus, we use the Newey-West correction for our standard errors (Newey and West 1987).

We can further adapt the LP framework to allow for nonlinearities in the specification that are associated with global shocks. We therefore make the response of output or inflation to a monetary policy shock also dependent on the contemporaneous change in global factors by interacting the interest rate shock with the change in global factors. The specification is as follows:

[3] The time fixed effects also control for structural breaks due to the coronavirus disease (COVID-19) pandemic.

$$y_{i,t+h} = a_{i,h} + \lambda_t + \sum_{l=0}^{L} \delta_{h,l}\, z_{i,t-l} + \beta_h\, shock_{i,t} + \theta_h\, GF_t \times shock_{i,t} + \sigma_h\, GF_t + \varepsilon_{i,t+h},$$

$$h = 0,1,2,\cdots, \tag{4}$$

where GF_t is a variable representing our key global factor, including the US monetary policy stance (measured as the US shadow policy rate), global financial market uncertainty (measured as the VIX index), and global climate change (measured as the growth rate of monthly atmospheric carbon dioxide concentrations). Therefore, βh measures the response of output or inflation to the monetary policy shock at each horizon (month) h when the global shocks are isolated, and βh + σθh represents the total effects of monetary policy shocks when we consider the impact of global shocks.

To investigate whether economy-specific characteristics matter for monetary policy transmission, we divide EMEs into groups according to their levels of financial development, trade openness, and capital account openness and estimate separate impulse responses for each group. Regarding the estimation of local projections, we incorporate a dummy variable I that takes a value of 1 for EMEs whereby their level of economy-specific characteristic (e.g., financial development, trade openness, or capital account openness) falls within a certain level $m \in M$ of their economy-specific characteristic distributions. Following Cloyne et al. (2023), we extend the local projection as follows:

$$y_{i,t+h} = a_{i,h} + \lambda_t + \sum_{m \in M} I\Big[\sum_{l=0}^{L} \delta_{h,l}^{m}\, z_{i,t-l} + \beta_h^{m}\, shock_{i,t} + \theta_h^{m}\, GF_t \times shock_{i,t} + \sigma_h^{m}\, GF_t\Big] + \varepsilon_{i,t+h},$$

$$h = 0,1,2,\cdots, \tag{5}$$

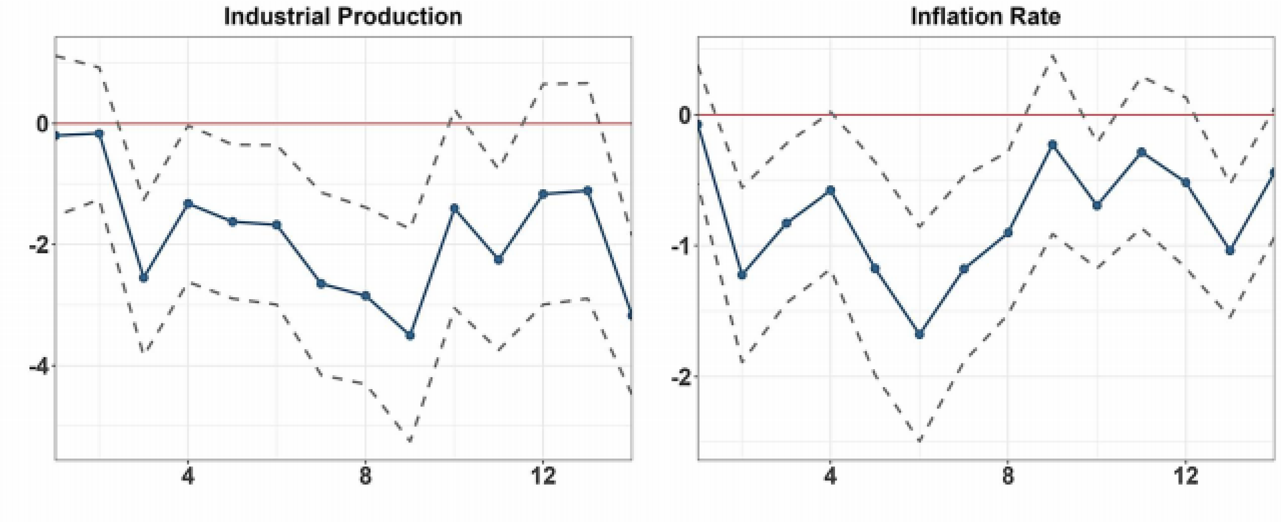
where the notation is as in Eq. (4).

3. Empirical Results

3.1 Macroeconomic Effects of Monetary Policy Shocks

Before showing the estimation results for the impacts of global factors on the monetary policy transmission, we first present the responses of key macroeconomic variables, namely industrial production and inflation, to the estimated monetary policy shocks by assuming that the spillovers of global factors are isolated. This is not only to reassure the validity of our identification strategy but also to provide a benchmark against which we can evaluate the impact of different global shocks. Figure 2 shows the estimated impulse responses based on the linear model of Eq. (3). The solid line in each graph represents the estimated impulse responses in percentage points over the following 14 months to a contractionary monetary policy shock. We normalized the scale of the monetary policy shock such that it increases the short-term interest rate by 100 basis points (bps). The dotted lines represent 95% confidence bands based on robust standard errors by Newey and West (1987).

Figure 2: Impulse Responses of Macroeconomic Variables to a Contractionary Monetary Policy Shock



Notes: The figure plots the impulse responses of industrial production and inflation rate to a 100-bps contractionary monetary policy shock. 95% confidence bands in dashed lines are reported. The vertical axis unit is 1 percentage point, and the unit of the horizontal axis refers to 1 month.

Source: Authors' calculations.

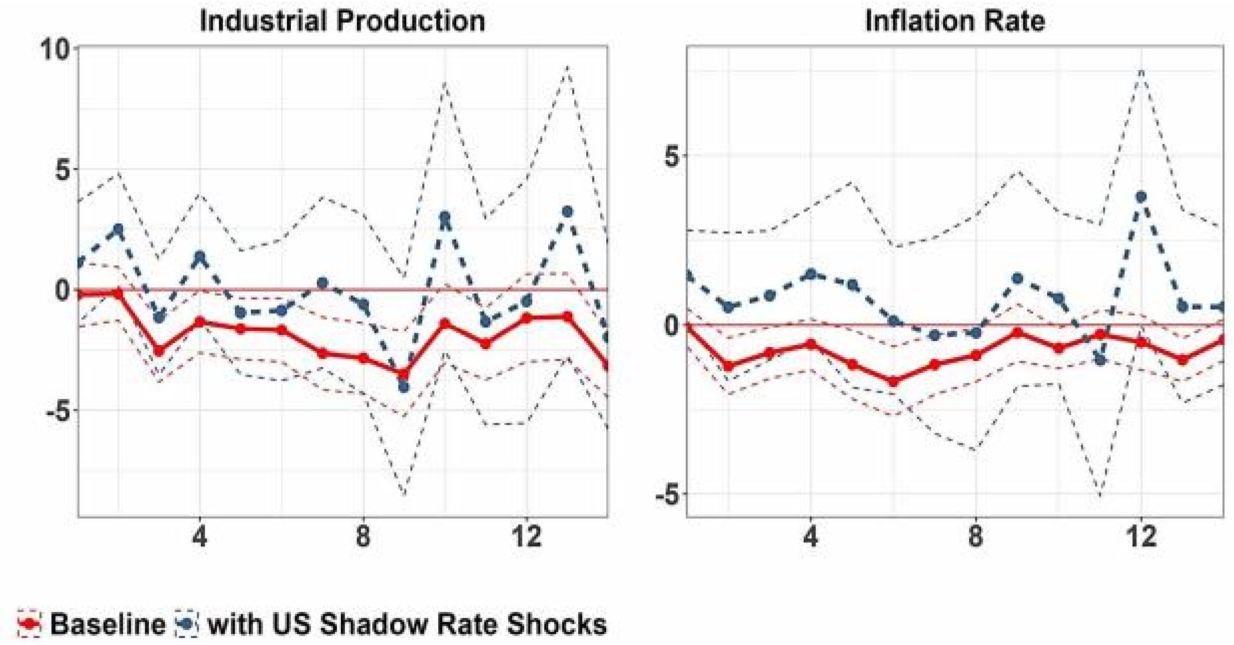
The impulse responses of macroeconomic variables are consistent with the prediction of standard macroeconomic theory, indicating the soundness of our monetary policy shock series. Following a contractionary monetary policy shock, industrial production decreases persistently with a maximum impact of around 3.5 bps. The inflation rate also shows a dampening and statistically significant effect after the shock. A 100-bps contractionary monetary policy shock is associated with a 1.7-bps decline in inflation at peak after 5 months. Our results also empirically support the findings of other studies that many emerging economies have succeeded in implementing countercyclical monetary policy (Gadanecz, Miyajima, and Urban 2014; Takats 2012).

3.2 Impulse Responses Conditioning on Global Factors

In this part of the analysis, we allow the responses of industrial production and inflation to monetary policy shocks to condition on global factors, namely the US monetary policy stance, the global financial market uncertainty, and the global climate change.

United States monetary policy stance. Figure 3 shows the impulse responses of industrial production and inflation to contractionary monetary policy shocks depending on the stance of US monetary policy. The dashed blue line in each graph represents the estimated impulse responses in percentage points over the following 14 months to a contractionary monetary policy shock interacted with US shadow policy rates. By comparing to the baseline estimates that isolate the impacts of global factors (red solid line), the shocks due to the US shadow policy rate seem to matter a great deal for the monetary policy transmission of EMEs. The response of industrial production is muted and not significantly different from zero. The inflation rate also exhibits little response after the monetary policy shocks, which is contrary to the expected outcome of a tightening monetary policy. This can be explained as a surprise rise in the US interest rate that leads to a weaker local currency and a slower US aggregate demand, resulting in a mixed impact on EMEs' domestic output and pushing up the domestic inflation rate (Magud and Pienknagura 2023). Moreover, as the US monetary policy stance can be an indicator of global financial conditions, a higher US shadow policy rate may lead to a decrease in the EMEs' domestic credits (Miranda-Agrippino and Rey 2022). These potential channels reveal that spillovers of US monetary policy shocks weaken the effectiveness of EMEs' monetary policy transmission.

Figure 3: Impulse Responses to a Contractionary Monetary Policy Shock: US Shadow Policy Rates



US = United States.

Notes: The figure plots the impulse responses of industrial production and inflation rate to a 100-bps contractionary monetary policy shock, conditioning on US shadow policy rates. 95% confidence bands in dashed lines are reported. The vertical axis unit is 1 percentage point, and the unit of the horizontal axis refers to 1 month.

Source: Authors' calculations.

Global financial market uncertainty. Figure 4 shows the impulse responses of industrial production and inflation to contractionary monetary policy shocks depending on the global financial market uncertainty, as measured by the VIX index. The dashed blue line in each graph represents the estimated impulse responses in percentage points over the following 14 months to a contractionary monetary policy shock interacted with the VIX. Similar to US monetary policy, rising global financial market uncertainty also impairs the monetary policy transmission of EMEs,