Monetary Policy and Portfolio Flows in an Emerging Market Economy *

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Motivation

- Portfolio flows are important for founding SoE.
- Inflation, monetary policy (MP) and capital flows (CF) are strongly related. (**Interest Rate Channel**).
- Current developments in inflation and supply chains are diving MP responses with effects on CF (IMF, 2022)
  - Inflation can remain high in both Advanced Economies (AEs) and Emerging Market (EMEs).
  - In response, US policy rate has been increasing.
  - EMEs' policy rates have been increasing even more rapid.
- How CF react to changes in both US and EMEs policy rates?
  - CF are driven by ***Push*** **(external) and** ***Pull*** **(internal)** factors.
  - CF in EMEs are "risk-sensitive" (Kalemi-Ozcan, 2019)
    - Risk-sensitivity is affected by the U.S. policy **&** country-specific risk
    - Monetary policies in EMEs respond to this risk-sensitivity.
  - **In practice: Colombia board ➡ r … ➡ economic policy essay**

This Paper

- Central questions are:
  - What is the influence of domestic **and** US monetary policy on the behavior of portfolio inflows in an EM economy?
  - Does the type of instrument (**government securities, corporate bonds, or equities**) react in the same way to changes in domestic or US monetary policy rates?
  - Do portfolio inflows respond to movements in the inflation rate of the host country?

This Paper

- Our model follows the standard Push-Pull factors approach: In particular, Çulha (2006, Central Bank Review, Turkey) and Kim (2014, Asian Development Review, Korea).
- A meta-analysis in Villamizar et al (2022, wp CCB, 14 indiv. countries, avg. 34 when panel).
- We distinguish by instruments issued in the local market (i.e., government securities (TES), corporate bonds, and equities).
- We analyze data on **portfolio net inflows** (purchases minus sales) by non-residents in **Colombia**.
- We employ a structural VAR with long-run restrictions.
- We analyze the response of portfolio inflows to unexpected changes in:
  - Domestic policy rates (Push)
  - US policy rates (Pull)
  - Domestic inflation (Push) …

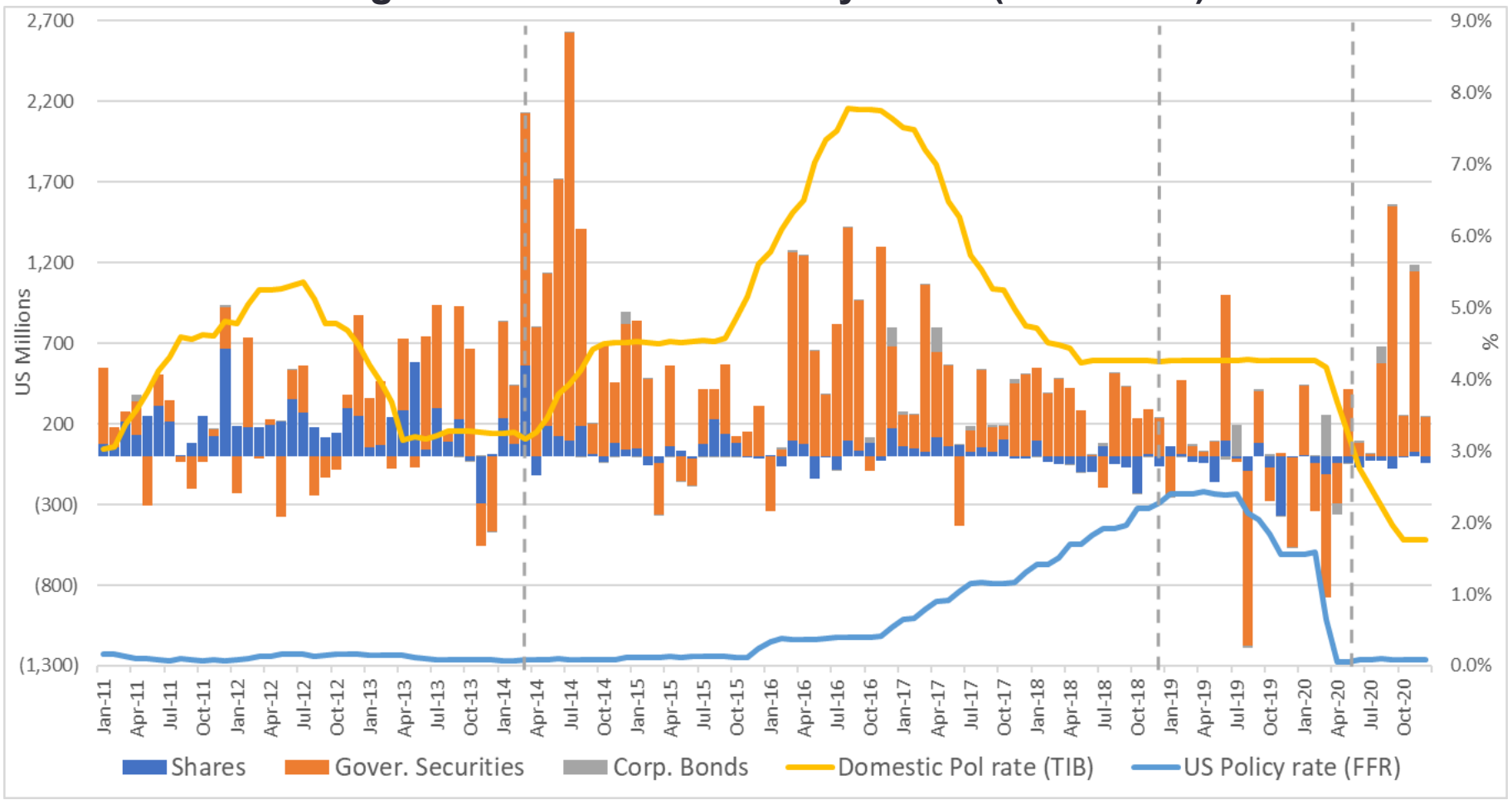
Main Results

- Portfolio inflows in government securities and corporate bonds significantly respond to changes in both domestic and US monetary policy rates.
- Equity inflows react more to changes in the inflation rate.
- Shocks to domestic inflation are associated with portfolio outflows (shocks to us inflation are associated to portfolio inflows).
- Our findings are **consistent with** the predictions of the **interest rate channel**.
- Portfolio inflows are risk-sensitive and inflation-sensitive.
- **Implication**: Domestic and US monetary policy actions influence the behavior of portfolio inflows in EMEs.

Data

- We analyze monthly data on **net** portfolio inflows (i.e., purchases and sales by non-residents) in Colombia (i.e., net flows from **Balance of Payments**)
- We distinguish by instruments issued in the local market (i.e., government securities (TES), corporate bonds, and equities)
- The evaluated period (2011-01 to 2020-12) covers:
  - JP Morgan reweight in March 2014.
  - Change of the tax on dividends in December 2018.
  - Covid-19 pandemic starting March 2020.

Evolution of Portfolio Inflows in Government Securities (TES), Equity Markets & Corporate Bonds along Domestic and US Policy Rates (2011-2020)



Notes: Information reported by portfolio managers of foreign investors to Banco de la República and registered in the **Balance of Payments**.

Avgs.: TES: USD 310 M. (70.3%); shares: 64.2 (26.8%); C. Bonds: 9.6 (2.9%)

The Model

- The proposed model follows the standard Push-Pull factors approach (Sarno et al., 2016; Koepke, 2019, Cerutti et al., 2019)
- **Endogenous** variables (Pull factors):
  - **Local Inflation rate (inf_t)**
  - **Domestic policy interest rate (ΔTIB_t)**
  - Long-run interest rate is the 10-years TES interest rate (ΔR_t^{TES10})
  - The stock price index ($\Delta COLCAP_t$) gauges asset prices
  - Real accumulated fiscal balance as a share of GDP ($FiscalBal_t$)
  - The real annual depreciation of the exchange rate ($Depr_t$)
  - Inflow …
- **Exogenous** variables (Push factors):
  - **US Federal Funds Rate (ΔFFR_t)**
  - Global Risk (ΔVIX_t)
  - US Industrial Production Index (ΔIPI_t).
- **Determinist** variables:
  - JP Morgan episode in March 2014 (JPM_t)
  - Change of the tax on dividends in December 2018 ($DIDIV_t$)
  - Pandemic in March 2020 ($Covid\text{-}19_t$)

The Model

- To identify the monetary policy shocks, we use a structural VAR-X with long-run restrictions.

- In a first step, a reduced form VAR-X is estimated as:

$$Y_t = A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + B_0 X_t + \cdots + B_q X_{t-q} + FD_t + e_t = A(L)Y_{t-1} + B(L)X_t + FD_t + e_t$$

Y_t : vector of endogenous variables (Pull Factors)
X_t vector of exogenous variables (Push Factors)
D_t: deterministic series (JP Morgan episode, tax change, Covid-19)

Implications: Y_t do not affect X_t and there is no effect among X_t

Identification: Long-run restrictions

- In the second step, we use the residuals of the reduced form to estimate the structural shocks, the SVAR:

$$Y_t - A_1 Y_{t-1} - \ldots - A_p Y_{t-p} = e_t = \bar{A}(L) Y_t \qquad (2)$$

- Since we are employing a **stationary model**, we can re-write (2) as:

$$Y_t = (\bar{A}(L))^{-1} G \varepsilon_t = C(L) \varepsilon_t \qquad (3)$$

- Long-term effects are considered as the cumulative effects over time

$$C^{ij}(1) = \sum_{h=0}^{\infty} C_h^{ij} = 0$$

- Long-run restrictions as in Blanchard and Quah (1989, AER)
- Estimation algorithm: Rubio-Ramírez, et al (2010, RES); Kilian and Lütkepohl (2017, Cambridge UP), Matlab code: Binning, 2013, WP NCB).

- **Long-run restrictions solve our price-puzzle.**

Identification: Long-run restrictions

Long-term effects are considered as the cumulative effects over time, that is:

$$\begin{bmatrix} Inf_t \\ \Delta TIB_t \\ \Delta R_t^{TES10} \\ \Delta Colcap_t \\ FiscalBal_t \\ Depr_t \\ Flow_t^j \end{bmatrix} = \begin{bmatrix} C^{11}(1) & C^{12}(1) & \cdots & C^{17}(1) \\ C^{21}(1) & C^{22}(1) & \cdots & C^{27}(1) \\ \vdots & \vdots & \ddots & \vdots \\ C^{71}(1) & C^{72}(1) & \cdots & C^{77}(1) \end{bmatrix} \begin{bmatrix} \varepsilon_t^{\pi} \\ \varepsilon_t^{i} \\ \vdots \\ \varepsilon_t^{f} \end{bmatrix} \quad (4)$$

The structure used is represented as:

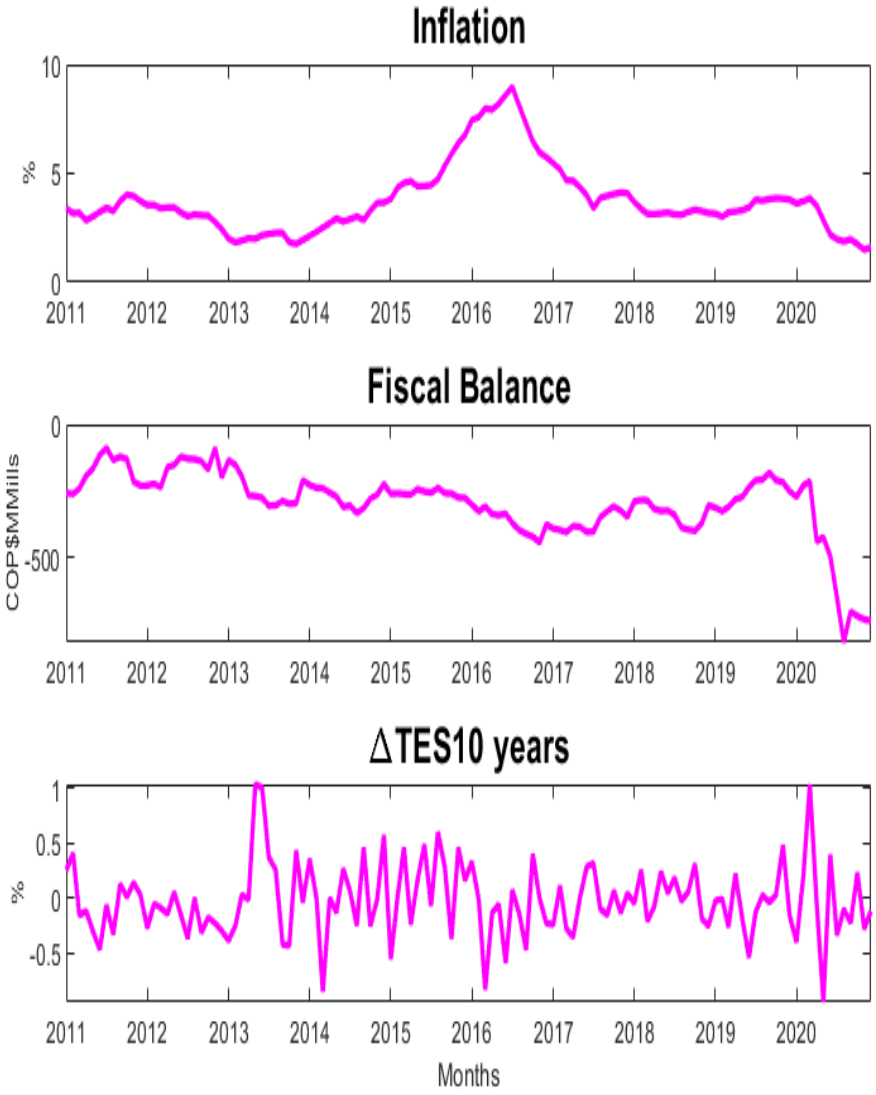
$$\begin{bmatrix} Inf_t \\ \Delta TIB_t \\ \Delta R_t^{TES10} \\ \Delta Colcap_t \\ FiscalBal_t \\ Depr_t \\ Flow_t^j \end{bmatrix} = \begin{bmatrix} C^{11}(1) & 0 & \cdots & 0 \\ C^{21}(1) & C^{22}(1) & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ C^{71}(1) & C^{72}(1) & \cdots & C^{77}(1) \end{bmatrix} \begin{bmatrix} \varepsilon_t^{i} \\ \varepsilon_t^{\pi} \\ \vdots \\ \varepsilon_t^{f} \end{bmatrix} \quad (5)$$

Identification: Long-run restrictions

- We identify the long-term effects of structural shocks by using the following restrictions:
  - Fisher equation: $r = i + \pi$; $i = f(i^{shock}, \pi)$; *r affects* Y_t *(endogenous variables)*
  - Long-term interert rates: $R_t^{TES10} = f(R_t^{TES10,\,shock}, i, \pi)$
  - Asset prices: $COLCAP_t = f(i^{shock}, \pi, COLCAP^{shock})$
  - Fiscal Balance: $FiscalBal_t = f(FiscalBal^{shock}, r^{Debt}, COLCAP^{shock})$
  - Current Account Deficit: $Depr_t = f(FiscalBal, r^{Debt*}, i^{US}, COLCAP^{shock}, Depr^{shock})$
  - The effect of portfolio flows on $Depr_t$ is transitory.
  - **Shocks to all variables affect portfolio flows in the long-run.**

  - **There is not short-run restrictions!!!**

Endogenous variables used in the structural VAR model



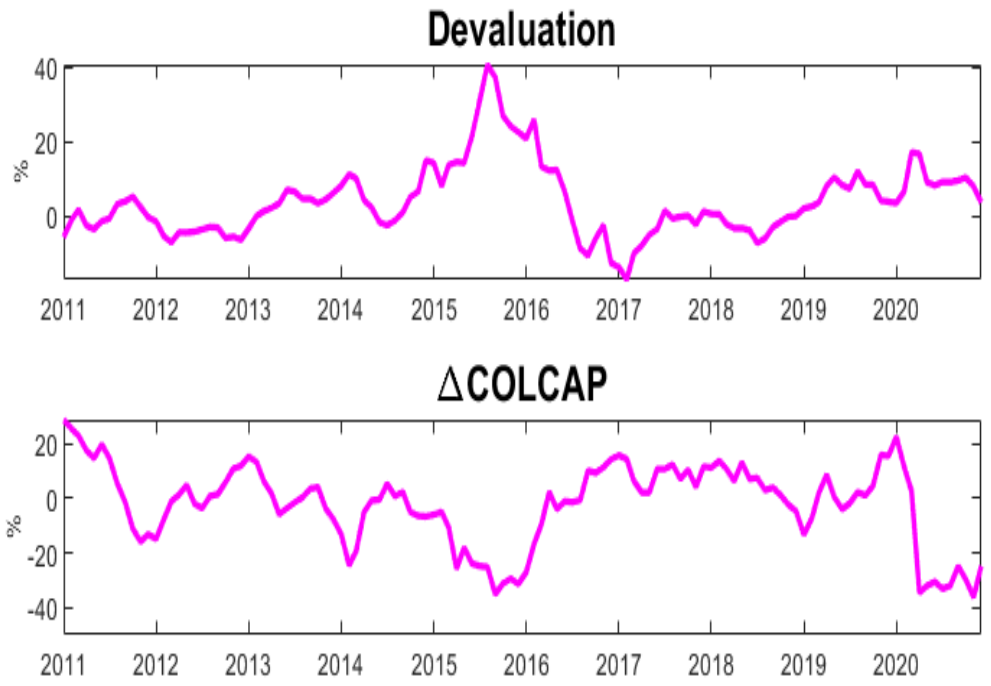
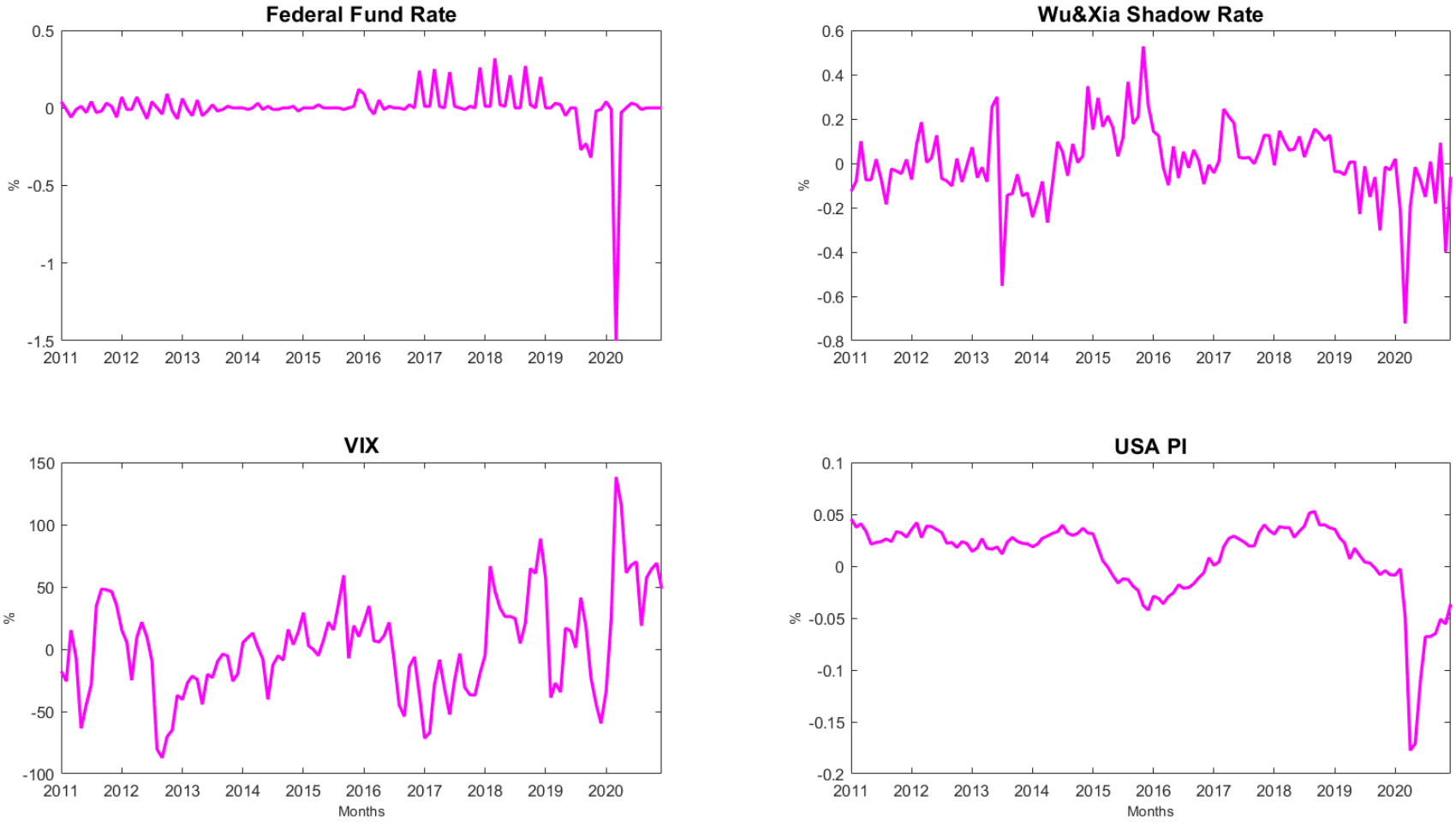
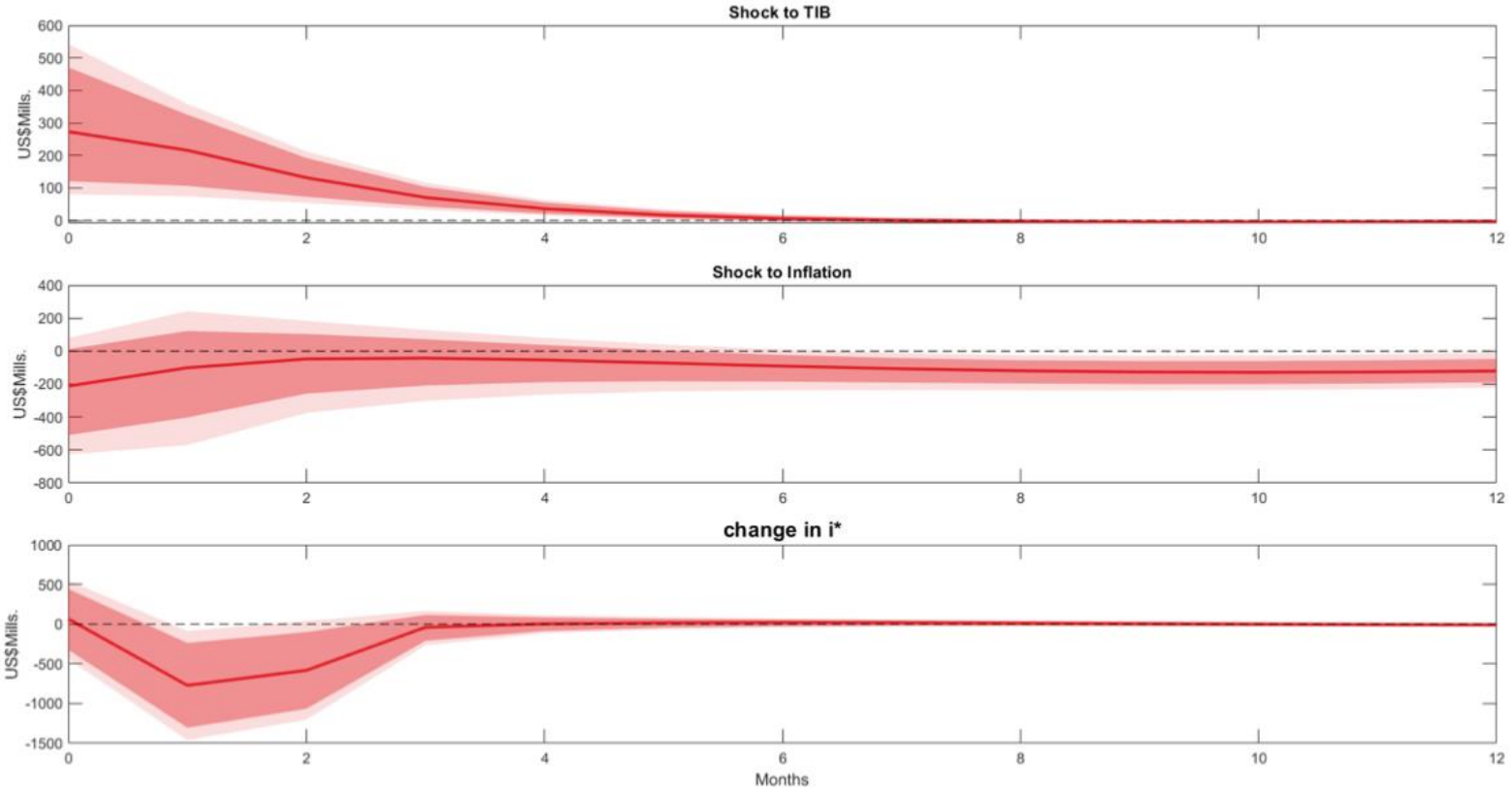


Figure 5. Exogenous variables used in the structural VAR model



Response of Portfolio Inflows in Government Securities (TES) to Shocks in Monetary Policy Rates (TIB, FFR) and Inflation (baseline)

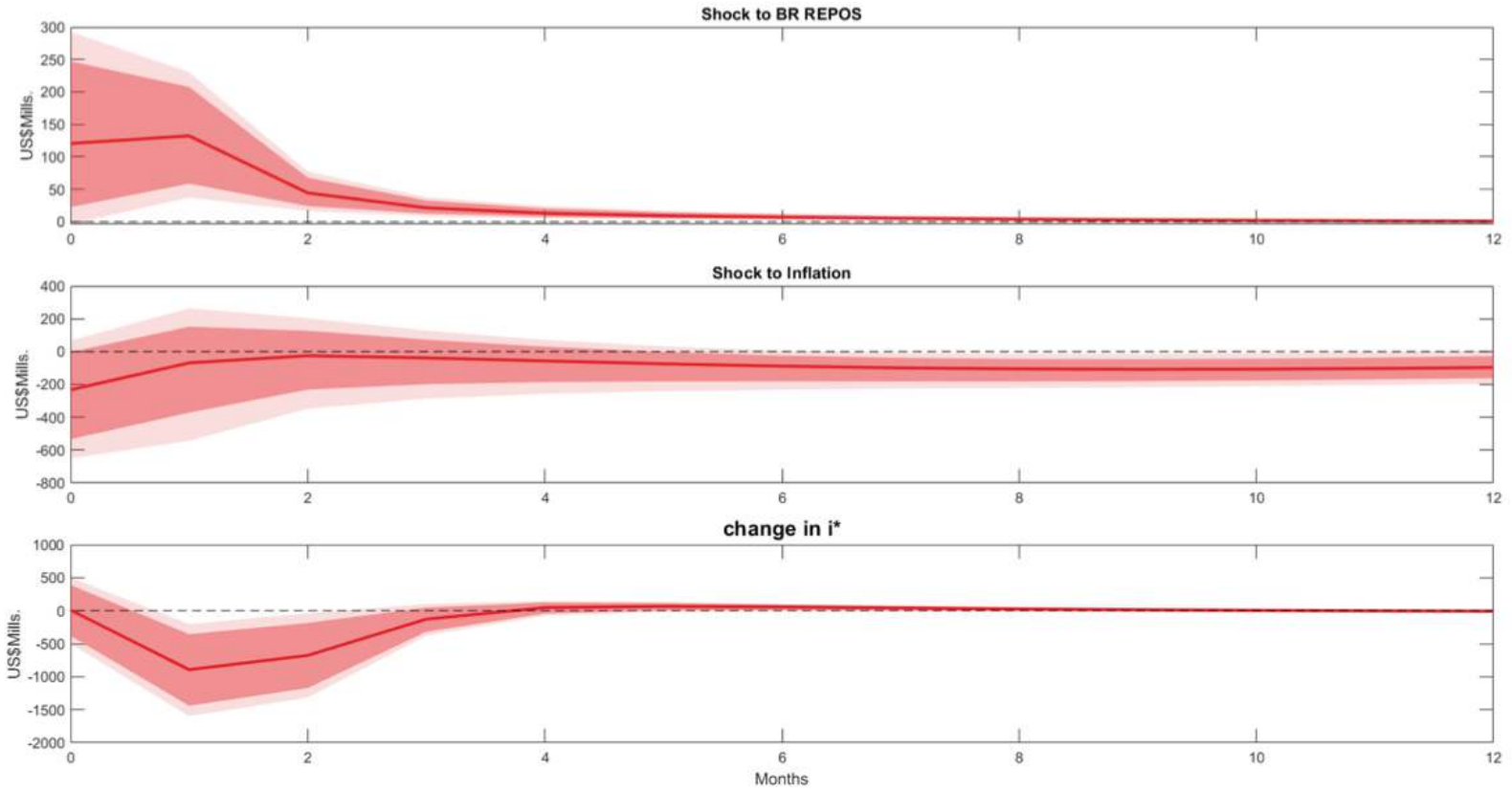


Increase in the **domestic monetary policy rate** of **25 bp** is associated with an increase in portfolio inflows in government securities (TES) of around **USD 291 million** in the first month (**0.11 percent of GDP**).

Unexpected increases in the **inflation rate (25 bp)** and the **US interest rate** (**100 bp**) are associated with portfolio outflows of around **USD 87 million** and **USD 810** million (0.03 and 0.30 percent of GDP), respectively. Portfolio inflows are in USD millions.

Bootstrapped confidence intervals at 80% and 90% (shaded areas).

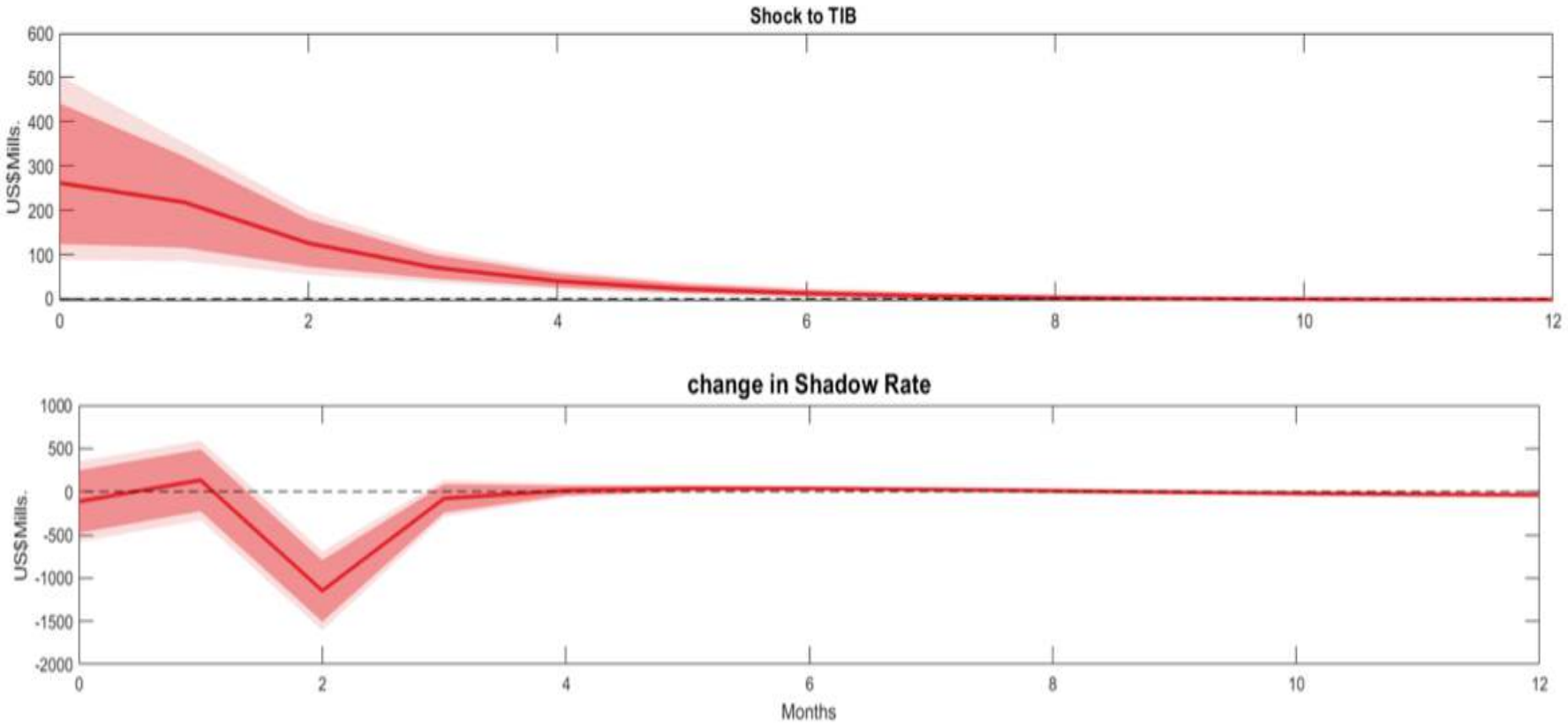
Response of Portfolio Inflows in Government Securities (TES) to Shocks in Monetary Policy Rates (REPOS_BR, FFR) and Inflation (benchmark 1)



Increase in the domestic monetary policy rate (BR Repos rate) of 25 bps is associated with an increase in portfolio inflows in government securities (TES) of around **USD 143 million in the first month (0.05 percent of GDP).**

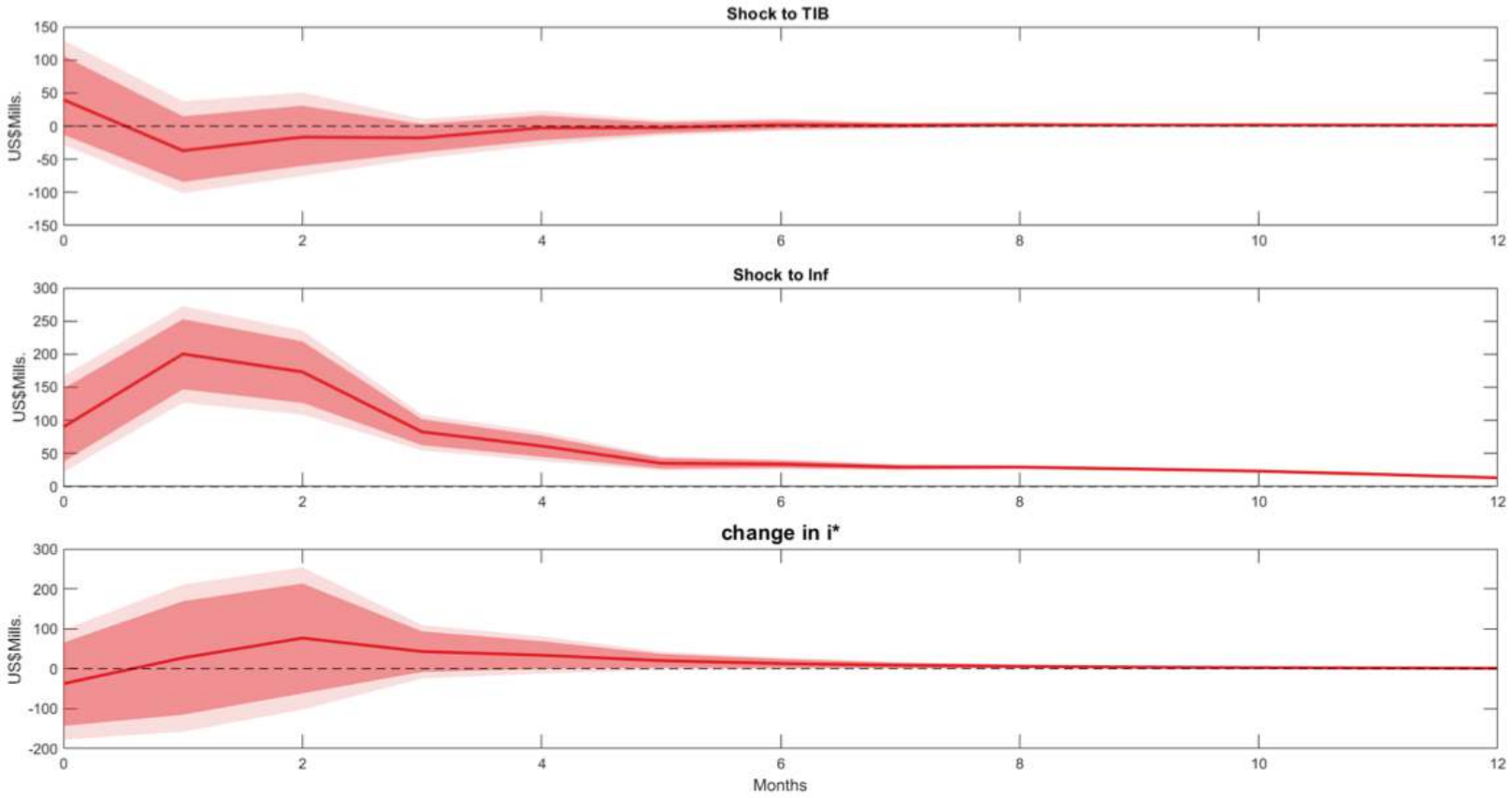
Unexpected increases in the inflation rate (25 bp) and the US interest rate (100 bp) are associated with portfolio outflows of around USD 72 million and USD 912 million (0.03 and 0.34 percent of GDP), respectively. Portfolio inflows are in USD millions. Confidence intervals at 80% and 90% (shaded areas).

Response of Portfolio Inflows in Government Securities (TES) to Shocks in Monetary Policy Rates (TIB and US Shadow Rate) (benchmark 2)



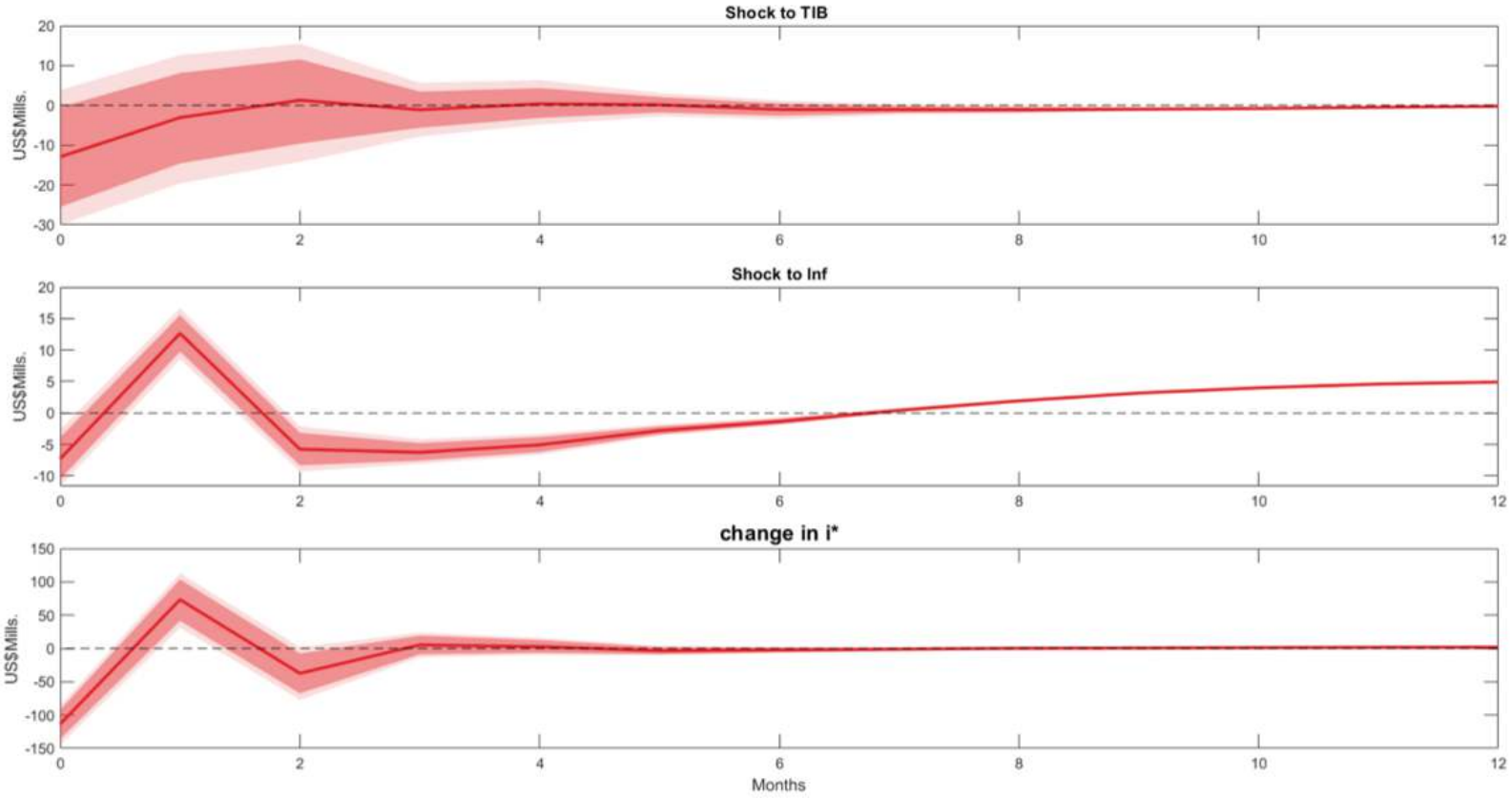
The results indicate that an unexpected increase in the domestic monetary policy rate (**TIB) of 25 bps** is associated with an increase in portfolio inflows in government securities (TES) of around USD 268 million in the first month (0.08 percent of GDP). An unexpected increase in the **US shadow rate (Wu and Xia, 2016)** is associated with portfolio outflows of around USD 1,000 million (0.37 percent of GDP) after two months.

Response of Portfolio Inflows in the Equity Market to shocks in Monetary Policy Rates (TIB, FFR) and Inflation



Note: The results indicate that an unexpected **increase** in **inflation rate** is associated with portfolio outflows of around **USD 195 million (0.07 percent of GDP)**. Portfolio inflows in equity markets **do not exhibit a statistically significant response** to shocks in both domestic and US policy rates.

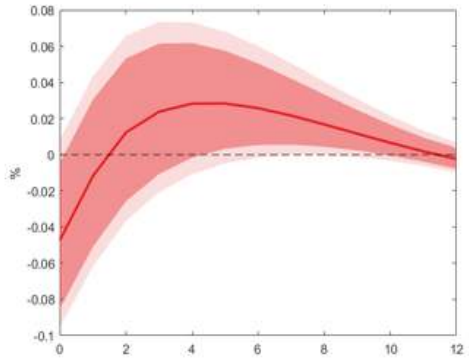
Response of Portfolio Inflows in Corporate Bonds to Shocks in Monetary Policy Rates (TIB, FFR) and Inflation



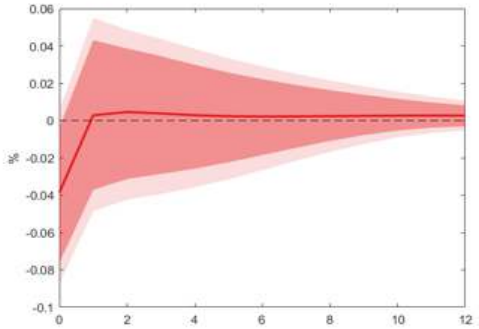
Note: The results indicate that an **unexpected increase in the domestic monetary policy rate** (TIB) of **25 bps** is associated with a **decline** in portfolio inflows in corporate bonds of **around USD 13.3 million** in the first month (**0.005 percent of GDP**) (i.e., potential substitution between corporate bonds and TES). Unexpected **increases in the inflation rate and the US interest rate** are associated with portfolio outflows of around **USD 6 million** and **USD 43 million**, respectively, after two months.

Response of inflation to shocks in the domestic monetary policy rate (No Price Puzzle)

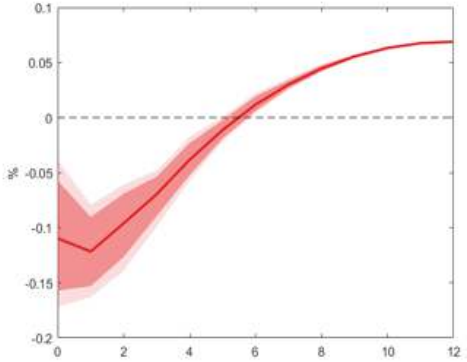
(a) TES using Interbank Rate (TIB)



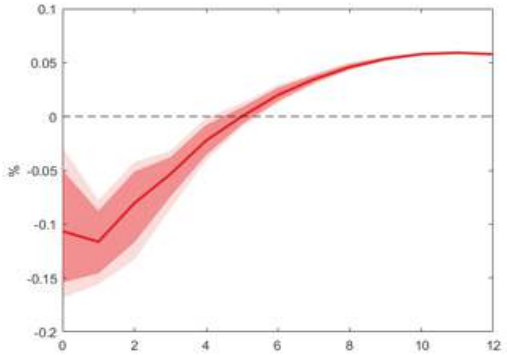
(b) TES using Central Bank Repo Rate (BR_REPOS)



(c) Corporate Bonds using TIB



(d) Shares using TIB



Notes: Panel (a) presents the shock to the TIB in the TES market. Panel (b) depicts the shock to the central bank repo rate in the TES market. Panel (c) shows the shock to the TIB in the corporate bonds market. Panel (d) depicts the shock to the TIB in the equity market. The values are in percentage. Confidence intervals at 80% and 90% (shaded areas).

Final remarks

- Portfolio inflows in government securities (TES) and corporate bonds significantly respond to changes in both domestic and US monetary policy rates
  - An unexpected shock of 25 bps in the domestic policy rate (TIB) is associated with portfolio inflows in TES of around 0.11 percent of GDP. In line with **Villamizar** et al (2022, wp CCB).
- Shocks to domestic inflation are associated with decline in portfolio inflows
  - As inflation is persistent, unexpected shocks to inflation changes investors wealth (lowers returns).
  - Equity inflows react significantly more to shocks in the inflation rate.

Final remarks (cont.)

- Our findings are consistent with the predictions of the interest rate channel and remark the predominant role of inflation in driving portfolio flows
  - Portfolio inflows are risk-sensitive and inflation-sensitive
- **Implication**:
  - Domestic and US monetary policy actions have an important effect on the behavior of portfolio inflows in Colombia (**MP spill over**).
- **Robustness check**:
  - Employ expectations on inflation rather than observed inflation
  - Including the Colombian CDS as country risk factor (Appendix).

Future work:

- We might try using capital flows as GDP shares.
- We could try Baumeister and Hamilton (2018, JME) identification strategy.
- Compute and present FEVD and Historical Decomposition.
- Does the type of investor matters? (institutional vs. retail) (IMF, 2022 GFSR).
- What about non-linearities?

Thanks!

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