



## THE IMPACT OF CAPITAL FLOWS ON THE REAL EXCHANGE RATE: EVIDENCE FROM SERBIA

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### Abstract:

As a small open economy increasingly integrated into global financial markets, Serbia is exposed to fluctuations in cross-border capital movements that may influence exchange rate dynamics and macroeconomic stability. This paper examines the relationship between international capital flows and the real effective exchange rate in Serbia, with particular attention to the structure of capital inflows. The structural vector autoregression (SVAR) model is applied to capture the dynamic interactions between external economic conditions, capital flows, monetary policy, domestic economic activity, and the real effective exchange rate, using quarterly data for the period from 2007 to 2024. The results, obtained through impulse response analysis, indicate that shocks to capital inflows lead to a moderate appreciation of the real exchange rate, although the magnitude and persistence of the effect vary depending on the composition of capital flows. Equity inflows show a somewhat more persistent appreciation effect compared with debt inflows, while the overall impact of total capital flows appears relatively limited. These findings highlight the importance of capital flow composition for exchange rate dynamics and provide useful insights for the design of exchange rate and macroprudential policies in small open economies.

### Keywords:

capital flows; real effective exchange rate; small open economy; Serbia; vector autoregression.

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## INTRODUCTION

In recent decades, Serbia has experienced a significant inflow of foreign capital, which has played an important role in shaping the country's macroeconomic environment. The dynamic inflow of foreign capital has been driven not only by domestic reform processes and market liberalization policies but also by broader global trends characterized by the increasing allocation of investment toward emerging and developing markets (Ahmad and Wu, 2022).



While capital inflows can generate substantial benefits, such as supporting investment, improving financial market development, and fostering economic growth, they also create important challenges for economic policy, particularly in the conduct of monetary and exchange rate policy (Liu and Lee, 2022; Miranda-Agrippino and Rey, 2022; Koepke and Paetzold, 2024).

In small open economies such as Serbia, exchange rate dynamics are influenced by a wide range of factors, including fundamental macroeconomic variables such as real income, inflation, interest rates, and the current account balance, as well as external shocks arising from fluctuations in international capital flows (Oskolkov, 2023; Itskhoki and Mukhin, 2024; Nenadović, 2022; Montes-Rojas and Toledo, 2021). In this context, both the volume and the composition of capital inflows have become increasingly important elements in exchange rate modeling. One of the key risks associated with large and volatile capital flows is the transmission of external financial shocks, which may increase the vulnerability of recipient economies to global financial disturbances. Sudden and unpredictable capital inflows or outflows can generate significant exchange rate volatility (Grossmann and Orlov, 2022), a phenomenon that is particularly pronounced in small and open economies. In response to these risks, central banks often employ a range of policy instruments aimed at stabilizing financial conditions and limiting excessive exchange rate fluctuations, including foreign exchange market interventions, accumulation of international reserves, liquidity sterilization measures, and, in some cases, temporary capital flow management tools (Bozhinovska, 2024; Ilzetzki *et al.*, 2022).

Against this background, the main objective of this paper is to empirically examine the relationship between net foreign capital inflows and movements in the real effective exchange rate (REER) in Serbia, with particular attention devoted to the structure of capital inflows. The analysis aims to identify the main channels through which capital flow shocks are transmitted to exchange rate movements and to assess the degree to which exchange rate dynamics respond to changes in international financial conditions. Understanding these mechanisms is particularly relevant for small open economies that are increasingly integrated into global financial markets.

To address this question, the paper employs a structural vector autoregression (SVAR) framework that captures the dynamic interactions between external conditions, capital flows, monetary policy, domestic economic activity, and exchange rate movements. The empirical model includes five variables ordered according to their degree of exogeneity: EU27 GDP (as a proxy for international economic conditions), net capital inflows, the reference interest rate of the National Bank of Serbia (monetary policy rate), Serbian GDP (domestic economic activity), and the real effective exchange rate. Quarterly data covering the period from the first quarter of 2007 to the fourth quarter of 2024 are used in the analysis. The primary methodological tool is impulse response analysis, which allows for the dynamic assessment of how shocks to capital flows affect exchange rate movements over time.

Beyond its general contribution to the literature on capital flows and exchange rate dynamics, this study introduces several elements of novelty. First, it provides one of the few empirical analyses focusing specifically on Serbia that simultaneously considers both the magnitude and the composition of capital inflows and their impact on the real effective exchange rate. While many existing studies examine aggregate capital flows, this paper distinguishes between equity and debt capital inflows, enabling a more detailed evaluation of how different types of financial flows affect exchange rate dynamics. Second, the study applies a structural VAR framework with a carefully specified ordering of external, financial, monetary, and real variables, allowing for the identification of transmission channels linking international financial shocks to domestic exchange rate movements. Third, the analysis covers an extended time horizon from 2007 to 2024, encompassing several important global and regional episodes, including the global financial crisis, the European sovereign debt crisis, and the post-pandemic recovery, thereby providing a comprehensive perspective on the role of capital flows under varying macroeconomic conditions.



The findings of this study contribute to a better understanding of how international capital movements influence exchange rate dynamics in emerging markets and small open economies operating under flexible exchange rate regimes. Such insights are important for the design of sustainable and adaptable macroeconomic policies, particularly in countries that face increasing exposure to global financial cycles.

The remainder of the paper is organized as follows. Following the introduction, the Literature Review provides a systematic overview of theoretical and empirical studies examining the relationship between international capital flows and macroeconomic variables, with particular emphasis on exchange rate dynamics in small open economies. The Methodology and Data section describes the empirical framework, including model specification, variable definitions, and data sources. The Results and Discussion section presents and interprets the empirical findings, focusing on the transmission channels through which capital flows affect the real effective exchange rate. Finally, the Conclusion summarizes the main results, discusses their implications for economic policy, and outlines possible directions for future research.

## LITERATURE REVIEW

There is a broad consensus in the contemporary economic literature that cross-border capital flows exert a significant influence on exchange rate dynamics, particularly in small open economies and emerging markets. However, both the nature and intensity of these effects depend on several factors, including the structure of capital inflows, the institutional framework of the recipient economy, and the prevailing exchange rate regime. Recent research increasingly emphasizes the importance of a disaggregated analysis of capital flows, as different forms of international capital, such as foreign direct investment (FDI), portfolio investment, debt instruments, and other financial flows, affect macroeconomic variables and the real effective exchange rate (REER) in different ways.

A number of studies highlight the destabilizing potential of portfolio investments, particularly in economies characterized by limited institutional resilience. Rafi and Ramachandran (2018), analyzing exchange rate volatility in ten developing countries, find that portfolio investment shocks are significantly more volatile and destabilizing than foreign direct investment. Similarly, Jongwanich and Kohpaiboon (2013) show that portfolio capital inflows in Asian economies tend to generate faster and stronger appreciation pressures on the REER compared with FDI inflows. Their analysis also suggests that the nature of FDI itself has evolved due to the growing importance of mergers and acquisitions, which may introduce characteristics typically associated with short-term capital flows. Furthermore, empirical evidence indicates that capital outflows tend to trigger stronger exchange rate adjustments than capital inflows, highlighting the asymmetric nature of exchange rate responses to capital movements (Đukić and Bodroža, 2022).

Evidence from cross-country analyses further supports the differentiated impact of capital flow components. Combes *et al.* (2012), using a dataset covering 42 countries, find that portfolio investments are up to seven times more likely to induce an appreciation of the REER than foreign direct investment or bank lending. Their findings also suggest that flexible exchange rate regimes may partially mitigate the effects of external shocks by absorbing appreciation pressures and preserving external competitiveness.

Several studies emphasize the role of capital flows in explaining short-term exchange rate fluctuations. Sun and An (2009) argue that traditional macroeconomic fundamentals alone cannot fully account for short-term exchange rate dynamics, and that capital flows, particularly portfolio investments, play a key role in explaining exchange rate movements. Similar conclusions are reached by Brooks *et al.* (2004),



who analyze the exchange rate behavior of the euro and the Japanese yen against the U.S. dollar and find that portfolio investments exhibit a stronger correlation with exchange rate movements than foreign direct investment.

The literature also highlights the potential systemic risks associated with exchange rate fluctuations in financially integrated economies. Kadirgan (2023) identifies a strong balance-sheet effect resulting from exchange rate depreciation, whereby a weakening domestic currency worsens the financial positions of firms with currency mismatches in their balance sheets. This increases banks' exposure to credit risk and restricts their access to international financing, particularly during periods of global liquidity tightening. These risks are especially pronounced in economies with a large share of foreign debt denominated in U.S. dollars. The role of the banking sector in transmitting currency shocks is further explored by Pedrono (2022), who introduces the concept of a currency channel within the global financial leverage cycle. The study shows that the international diversification of bank balance sheets influences the procyclicality of debt dynamics, while greater currency diversification can mitigate adverse effects during financial crises.

Empirical analyses focusing on European economies provide additional insights into the interaction between capital flows and exchange rate dynamics. Using data for Croatia, Bukovšak *et al.* (2020) find that capital inflows from abroad contribute to the appreciation of the national currency regardless of maturity structure, with particularly strong effects in the case of corporate and sovereign borrowing. Conversely, capital inflows directed toward export-oriented sectors may contribute to currency depreciation by strengthening the tradable sector. Interestingly, inflows into the banking sector do not appear to have a statistically significant impact on exchange rate movements, which provides support for the use of countercyclical macroprudential policies aimed at maintaining financial stability.

An important strand of the literature examines the interaction between global financial conditions and exchange rate regimes. Lu *et al.* (2022), analyzing a sample of 43 emerging economies, show that flexible exchange rate regimes can provide protection against capital flow volatility only under conditions of relatively low global risk aversion. During periods of financial turbulence, when global risk aversion increases, exchange rate flexibility alone is insufficient to mitigate the negative impact of capital flow reversals, particularly with respect to gross external liabilities. In such circumstances, larger deviations from covered interest rate parity may further reduce international bank lending and weaken the effectiveness of flexible exchange rates as an adjustment mechanism.

With regard to the determinants of international capital flows, Ledóchowski and Žuk (2022) emphasize the dominant role of U.S. monetary policy in shaping global financial conditions. Their empirical analysis, conducted on a sample of 28 countries over the period 2009–2019, demonstrates that the expansion of the balance sheet of the U.S. Federal Reserve significantly influences portfolio capital flows toward developing countries. By contrast, similar monetary policy actions by the European Central Bank do not appear to have a statistically significant impact, even for emerging European economies. These findings underline the limited monetary policy autonomy of small open economies, which remain strongly influenced by external financial conditions despite formally flexible exchange rate regimes.

Another important line of research investigates the interaction between exchange rate regimes and domestic credit dynamics in the presence of capital inflows. Maguda *et al.* (2011) find that countries with less flexible exchange rate regimes tend to experience faster credit growth and a higher degree of foreign currency borrowing during periods of increased capital inflows, thereby increasing systemic financial risks. Similarly, Boudias (2015) highlights the role of exchange rate regimes in shaping credit dynamics and the degree of dollarization in developing economies. While the exchange rate regime



does not directly determine the cyclical behavior of capital flows, fixed exchange rate arrangements are associated with more pronounced procyclical credit expansion and higher levels of financial vulnerability. Under such conditions, increased dollarization reduces the scope for countercyclical policy responses, although the influence of the exchange rate regime on dollarization diminishes when capital outflows intensify.

In a broader development context, Razmi *et al.* (2012) emphasize the importance of maintaining a competitive real exchange rate as a potential instrument for promoting capital accumulation and economic growth, particularly in economies characterized by high unemployment and underutilized production capacity. According to their findings, a stable but moderately undervalued exchange rate can support investment and structural transformation. However, this view has been challenged by more recent research. Morvillier (2020), analyzing data from 62 countries over the period 1980–2015, shows that excessive currency undervaluation may amplify the negative impact of inflation on economic growth, especially in middle-income economies experiencing rising production costs and capacity constraints. These findings suggest that strategies based on maintaining an artificially undervalued exchange rate may undermine macroeconomic stability and weaken long-term growth prospects (Aprilia *et al.*, 2024).

Overall, the literature indicates that the relationship between capital flows and exchange rate dynamics is complex and often non-linear, depending on the interaction between the structure of capital flows, the institutional framework of the recipient economy, global financial conditions, and the exchange rate regime. Capital inflows, particularly in the form of foreign direct investment, can support economic growth, improve the balance of payments, and contribute to financial stability. However, the macroeconomic effects of capital inflows depend heavily on their composition, stability, and sectoral allocation. Equity investments are generally considered more favorable because they tend to be longer-term, less volatile, and often concentrated in tradable sectors, thereby reducing inflationary pressures (Manić and Grubišić, 2020) and pressures on the nominal exchange rate. In contrast, large-scale short-term and speculative capital flows may destabilize the economy, contribute to overheating and asset price bubbles, and complicate the conduct of monetary policy. Together, these factors determine whether capital flows contribute to macroeconomic stability or generate exchange rate volatility and reduce the autonomy of domestic monetary policy. These findings highlight the importance of carefully calibrated exchange rate and macroprudential policies, particularly in economies that are highly integrated into global financial markets (Erić *et al.*, 2021).



## METHODOLOGY AND DATA

To examine the relationship between capital flows and exchange rate dynamics, the empirical analysis employs a vector autoregression (VAR) framework. VAR models allow for the joint modeling of multiple macroeconomic variables as endogenous, capturing their dynamic interrelationships without imposing strong a priori theoretical restrictions on the structural transmission mechanisms. This methodology has become a standard tool in empirical macroeconomics and international finance for analyzing the propagation of macroeconomic shocks (see Sims, 1980; Lütkepohl, 2005; Hamilton, 1994).

### VAR representation

Let  $Y_t$  denote a vector of endogenous variables of dimension  $k$ . A VAR( $p$ ) model can be written in reduced form as

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + u_t, \quad (1)$$

where

- $Y_t$  is a  $k \times 1$  vector of endogenous variables,
- $c$  is a vector of intercept terms,
- $A_i (i=1, \dots, p)$  are  $k \times k$  coefficient matrices,
- $u_t$  is a vector of reduced-form residuals with covariance matrix  $\Sigma_u$ .

The disturbances  $u_t$  are assumed to be serially uncorrelated with zero mean and positive definite covariance matrix  $\Sigma_u$ .

Following the approach of (Bukovšak *et al.*, 2020), the empirical model is specified as a five-variable VAR representing a small open economy. The vector of endogenous variables is defined as

$$Y_t = \begin{bmatrix} g\_gdp\_eu\_sa_t \\ cf\_n_t \\ d\_kpr_t \\ g\_gdp\_srb\_sa_t \\ g\_reer_t \end{bmatrix} \quad (2)$$

where

- $g\_gdp\_eu\_sa_t$  denotes the growth rate of **seasonally adjusted real GDP in the European Union**, used as a proxy for foreign economic activity;
- $cf\_n_t$  represents **net capital inflows expressed as a ratio to domestic GDP**;
- $d\_kpr_t$  denotes the change in the **key policy interest rate**;
- $g\_gdp\_srb\_sa_t$  is the growth rate of **seasonally adjusted real GDP of Serbia**;
- $g\_reer_t$  denotes the growth rate of the **real effective exchange rate**.

The use of growth rates for GDP and the exchange rate allows the variables to be interpreted as **percentage changes** while also helping ensure stationarity of the series. Stationarity is an important requirement for reliable estimation and inference in VAR models (Hamilton, 1994).

All real activity variables are expressed in **seasonally adjusted form**. Macroeconomic aggregates such as GDP typically exhibit strong seasonal patterns related to institutional and production cycles rather than underlying economic shocks. If these patterns are not removed prior to estimation, the VAR may attribute seasonal fluctuations to structural innovations, thereby distorting the impulse response analysis.



Capital flows are expressed relative to GDP rather than in absolute levels:

$$cf\_n_t = \frac{CF\_N_t}{GDP_t} \quad (3)$$

This transformation normalizes the magnitude of capital flows across time and facilitates economic interpretation by expressing shocks relative to the size of the domestic economy. Using ratios also reduces scale effects and improves comparability across periods.

### Structural identification, transmission mechanism and impulse response analysis

To identify structural shocks, the analysis employs a **recursive identification scheme based on the Cholesky decomposition** of the reduced-form covariance matrix  $\Sigma_u$ . In this framework, the reduced-form residuals  $u_t$  are related to the structural shocks  $\varepsilon_t$  through

$$u_t = B\varepsilon_t,$$

where

- $\varepsilon_t \sim (0, I)$  is a vector of orthogonal structural innovations;
- $B$  is a lower-triangular matrix obtained from the Cholesky decomposition.

This recursive structure implies that variables appearing earlier in the ordering are contemporaneously exogenous to those appearing later in the system (Lütkepohl, 2005). The ordering adopted in the baseline specification is therefore

$$g\_gdp\_eu\_sa_t \rightarrow cf\_n_t \rightarrow d\_kpr_t \rightarrow g\_gdp\_srb\_sa_t \rightarrow g\_reer_t \quad (4)$$

and reflects standard assumptions used in **small open economy VAR models**.

Foreign GDP, represented by  $gdp\_eu\_sa_t$ , is placed first in the ordering because Serbia is assumed to be too small to affect global or European economic activity contemporaneously. Consequently, foreign output is treated as **exogenous within the period**. Capital flows are ordered second, reflecting their rapid response to global financial conditions and investor sentiment. Within the recursive identification scheme, they are assumed not to react contemporaneously to domestic output innovations, which typically become observable only with a delay. The domestic policy interest rate  $kpr_t$  appears next. This ordering reflects the assumption that the central bank observes international financial conditions and capital flows when setting monetary policy. However, the effects of monetary policy on real economic activity and the exchange rate typically occur with a lag, which justifies placing the policy rate before domestic output and the exchange rate. Domestic GDP growth is ordered fourth. Real economic activity is influenced by external conditions, financial flows, and monetary policy shocks. Within the recursive structure, output does not contemporaneously determine the exchange rate. Finally, the real effective exchange rate is placed last in the ordering. Exchange rates are highly flexible financial variables that respond quickly to a wide range of macroeconomic shocks. Placing the exchange rate last allows it to **react contemporaneously to all other innovations in the system**.



Within this framework, the dynamic effects of shocks are analyzed using **impulse response functions (IRFs)**. These functions trace the response of each variable in the VAR to a one-standard-deviation structural innovation over time. Formally, the VAR can be expressed in its moving-average representation:

$$Y_t = \mu + \sum_{i=0}^{\infty} \Phi_i \varepsilon_{t-i}, \quad (5)$$

where  $\Phi_i$  represents matrices of dynamic multipliers describing how shocks propagate through the system. Impulse response functions derived from this representation provide a dynamic characterization of how the real exchange rate and other macroeconomic variables respond to structural shocks, particularly shocks to capital inflows.

Economic theory suggests that a positive shock to capital inflows increases demand for domestic financial assets and domestic currency. This process typically leads to an **appreciation of the real exchange rate**. At the same time, increased capital inflows may stimulate domestic economic activity through expanded credit availability and investment. Monetary authorities may respond by tightening policy, reflected in changes in the policy rate, in order to contain inflationary pressures or financial imbalances.

## Variables and Data

The empirical analysis is based on quarterly macroeconomic and financial data covering the period from the first quarter of 2007 to the fourth quarter of 2024. The definitions of all variables and their corresponding data sources are summarized in Table 1.

**Table 1.** Definition of Variables and Data Sources

Variable	Notation	Description	Source
<i>Capital flows</i>			
Total net capital flows	tcf_n	Total net equity flows + Total net debt capital flows	National Bank of Serbia
Total net equity flows	teq_n	Direct investment: Equity and investment fund shares + Reinvestment of earnings + Debt instruments + Portfolio investment: Equity and investment fund shares	National Bank of Serbia
Total net debt capital flows	tdc_n	Portfolio investment of Government, Deposit-Taking Corporations, Other sectors (excluding National Bank): Debt securities + Other investment: Currency and deposits + Loans + Trade credit and advances	National Bank of Serbia
<i>Other variables</i>			
EU 27 real GDP, seasonally adjusted	gdp_eu_sa	Millions of chained 2010 EUR	Eurostat via FRED (Federal Reserve Economic Data)
Key policy rate	kpr	%, quarterly average	National Bank of Serbia
Serbia real GDP, seasonally adjusted	gdp_srb_sa	Millions of chained 2021 RSD	Statistical Office of the Republic of Serbia
Real effective exchange rate	reer	Index (2005 = 100), quarterly average	National Bank of Serbia

Source: Authors



It should be noted that the period under consideration (2007–2024) encompasses several major global economic episodes, including the global financial crisis, the European sovereign debt crisis, the pandemic and the post-pandemic recovery. These events may have introduced potential structural breaks in the underlying data-generating process. While this issue is recognized, the empirical framework does not explicitly incorporate structural break adjustments (e.g., through dummy variables or time-varying parameters). This choice is primarily motivated by the fact that the most prominent shocks occur at the beginning and the end of the sample period, which limits the feasibility and reliability of formally identifying and estimating breakpoints within the VAR framework. Instead, the model is estimated over the full sample in order to capture the average dynamic relationships between capital flows and exchange rate movements across different economic conditions. This approach is consistent with standard practice in VAR-based studies and allows the analysis to reflect the overall transmission mechanisms rather than period-specific effects.

Capital flows are measured using three indicators constructed from balance of payments statistics provided by the National Bank of Serbia. The main indicator is total net capital inflows ( $tcf_n$ ), defined as the sum of total net equity flows and total net debt capital flows. This variable represents the overall net inflow of foreign capital into the domestic economy and captures the aggregate financial integration of Serbia with international capital markets.

To better understand the role of capital flow composition, the analysis also distinguishes between equity and debt components of capital inflows. Total net equity flows ( $teq_n$ ) include foreign direct investment in equity and investment fund shares, reinvested earnings, debt instruments related to direct investment, and portfolio investment in equity and investment fund shares. Total net debt capital flows ( $tdc_n$ ) include portfolio investment in debt securities issued by the government, deposit-taking corporations and other sectors, as well as other investment instruments such as currency and deposits, loans, and trade credits and advances.

## RESULTS AND DISCUSSION

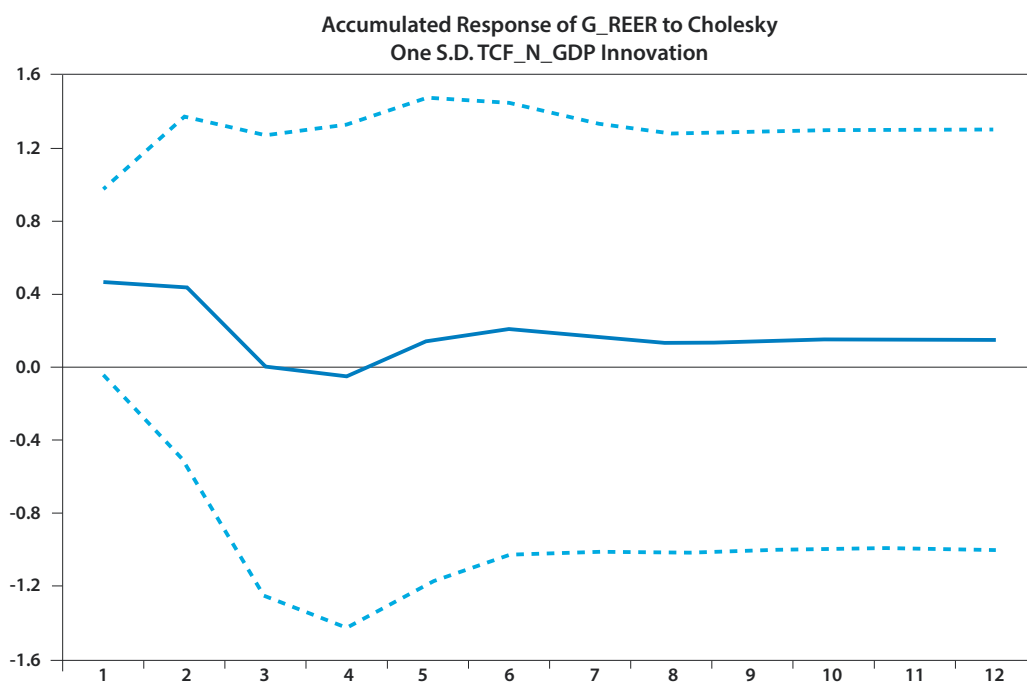
This section presents the results of the impulse response analysis derived from the estimated VAR model. The analysis focuses on the dynamic response of the real effective exchange rate to shocks in capital flows. In particular, three types of capital flow shocks are considered: total net capital inflows, equity capital inflows, and debt capital inflows. The impulse response functions trace the accumulated effect of a one-standard-deviation innovation in each capital flow variable on the growth rate of the real effective exchange rate over a twelve-period horizon.

Before presenting the results of the impulse response analysis, it is necessary to verify the time-series properties of the variables included in the model. To this end, the stationarity of all variables was examined using the Augmented Dickey–Fuller (ADF) unit root test. The ADF test was applied to each variable entering the VAR system in order to ensure that the series satisfies the stationarity requirement necessary for reliable VAR estimation. The results of the tests clearly indicate that all variables are stationary in their specified forms, which confirms the absence of unit roots and justifies the use of the VAR framework for the subsequent empirical analysis. The stationarity of the variables ensures that the estimated impulse response functions and other dynamic properties of the model are statistically valid and not affected by spurious relationships.



The first impulse response function (Figure 1) illustrates the accumulated response over a three-year period of the real effective exchange rate to a shock in total net capital inflows expressed as a ratio to GDP (denoted  $tcf\_n\_gdp$ ). The estimated response indicates that a positive innovation in total capital inflows leads to a modest appreciation of the real exchange rate in the short run. In the first two periods following the shock, the real exchange rate increases slightly, indicating upward pressure on the domestic currency.

Figure 1. Response of the Real Exchange Rate to Total Capital Flow Shocks



Note: The y-axis denotes the change in the REER appreciation rate (in percentage points), while the x-axis represents the forecast horizon (number of quarters ahead)

Source: Authors

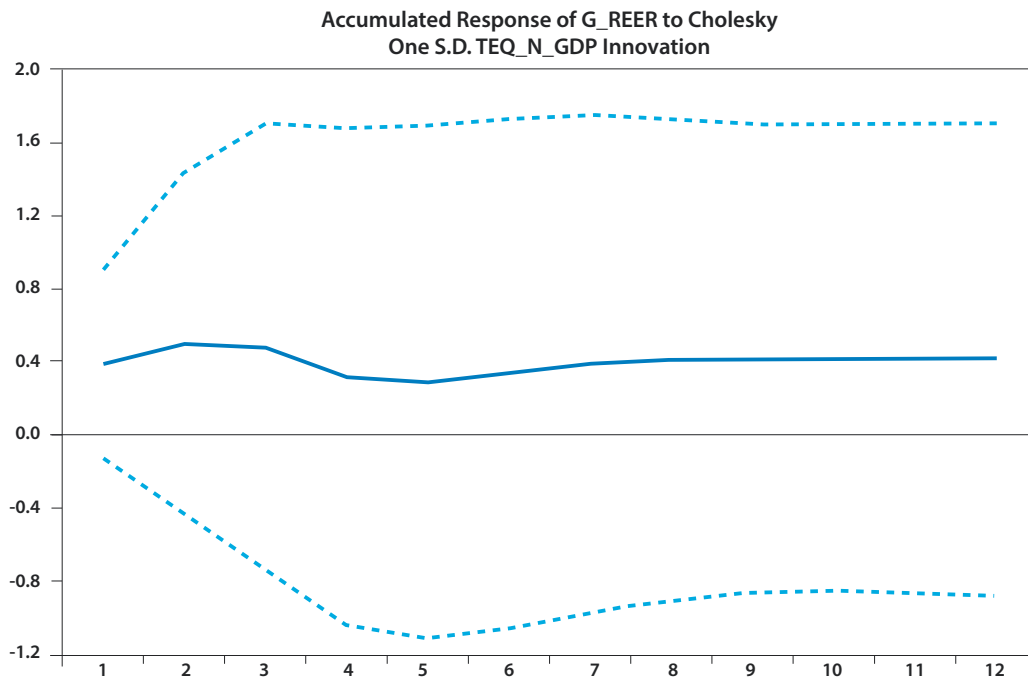
However, the response quickly weakens and approaches zero after approximately three to four periods. This suggests that the appreciation effect of aggregate capital inflows is relatively short-lived. After the initial adjustment, the real exchange rate stabilizes and the accumulated response remains slightly above zero throughout the remaining forecast horizon.

From an economic perspective, this finding may reflect the fact that total capital flows consist of heterogeneous components that can have different macroeconomic effects. Equity and debt flows differ in their persistence, reversibility, and sensitivity to global financial conditions. When aggregated, these effects may partly offset each other, resulting in a weaker overall relationship between total capital inflows and the exchange rate.

The second impulse response function (Figure 2) examines the effect of shocks to net equity capital inflows (denoted  $teq\_n\_gdp$ ). The results indicate that a positive innovation in equity flows produces a somewhat stronger appreciation of the real exchange rate compared with the response to total capital flows.



Figure 2. Response of the Real Exchange Rate to Equity Capital Flow Shocks



Note: The y-axis denotes the change in the REER appreciation rate (in percentage points), while the x-axis represents the forecast horizon (number of quarters ahead)

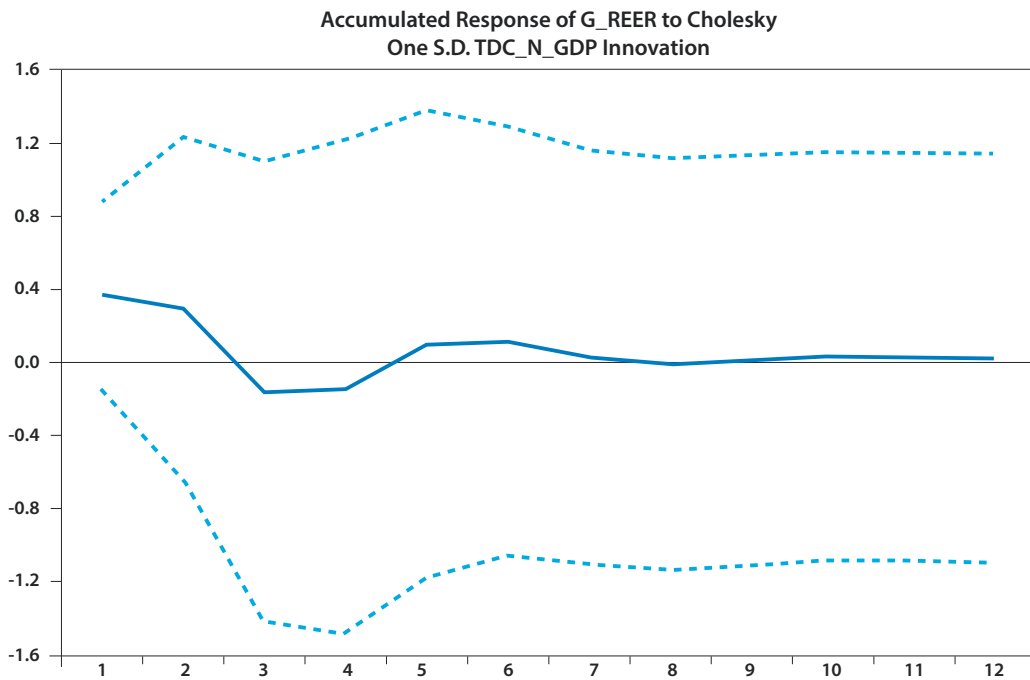
Source: Authors

Immediately after the shock, the exchange rate exhibits a positive response that increases slightly during the first two periods. This indicates that equity inflows generate appreciation pressures on the domestic currency. After reaching a peak in the early periods, the response gradually declines but remains positive throughout the entire twelve-period horizon.

Unlike the response to total capital flows, the effect of equity inflows appears more persistent. Even though the magnitude of the response is relatively modest, the accumulated effect does not disappear over time, suggesting that equity inflows may have a longer-lasting influence on the exchange rate.

This result is consistent with theoretical expectations and empirical findings in the literature on capital flows and exchange rate dynamics. Equity flows are often associated with foreign direct investment and portfolio equity investments that are typically more stable and less reversible than debt flows. Such inflows may reflect longer-term investment decisions and stronger investor confidence in domestic economic fundamentals. As a result, they can contribute to sustained demand for domestic assets and currency, leading to a more persistent appreciation of the real exchange rate.

The third impulse response function (Figure 3) analyzes the response of the real exchange rate to shocks in total net debt capital inflows (denoted  $tdc\_n\_gdp$ ). The results show that the exchange rate initially appreciates slightly following a positive innovation in debt inflows. However, this effect quickly diminishes and even turns marginally negative in the subsequent periods before stabilizing around zero.

**Figure 3.** Response of the Real Exchange Rate to Debt Capital Flow Shocks

*Note:* The y-axis denotes the change in the REER appreciation rate (in percentage points), while the x-axis represents the forecast horizon (number of quarters ahead)

*Source:* Authors

In contrast to the response to equity flows, the effect of debt inflows appears weaker and less persistent. The exchange rate reaction becomes negligible after a few periods, suggesting that debt inflows do not exert a sustained influence on the real exchange rate.

This pattern may reflect the more volatile and reversible nature of debt capital flows. Debt inflows, particularly those related to portfolio debt securities or short-term borrowing, are often highly sensitive to changes in global financial conditions, risk perceptions, and interest rate differentials. As a result, their effects on exchange rate dynamics may be temporary and quickly offset by subsequent adjustments in financial markets. Moreover, debt inflows may be partially sterilized through monetary policy or absorbed through adjustments in domestic financial markets. Such mechanisms can mitigate the impact of debt flows on the exchange rate and reduce their long-term macroeconomic consequences.

An additional explanation for the relatively weak and short-lived impact of debt inflows on the real exchange rate relates to the active sterilization policies conducted by the monetary authorities. In practice, the National Bank of Serbia may offset the liquidity effects of debt-related capital inflows through open market operations or foreign exchange interventions, thereby limiting their transmission to domestic monetary conditions and the exchange rate. This is particularly relevant in the case of short-term or portfolio debt inflows, which are more volatile and may trigger policy responses aimed at preserving financial stability. As a result, part of the potential appreciation pressure associated with debt inflows may be neutralized through policy actions, contributing to the observed lower persistence and magnitude of their effect on the REER.



A comparison of the three impulse response functions reveals several important insights regarding the relationship between capital flows and exchange rate dynamics in Serbia. First, the results suggest that the overall impact of capital flows on the real exchange rate is relatively moderate. Second, the composition of capital flows appears to matter for exchange rate dynamics. Equity inflows exhibit a somewhat stronger and more persistent appreciation effect compared with both total capital flows and debt inflows. This finding is consistent with the idea that more stable forms of capital inflows exert stronger and longer-lasting pressures on the exchange rate. Third, debt inflows appear to have the weakest and least persistent effect on the exchange rate. The response is short-lived and quickly converges toward zero, suggesting that debt flows may play a limited role in shaping longer-term exchange rate movements.

These findings have important implications for understanding the macroeconomic effects of capital flows in a small open economy such as Serbia. In such economies, capital inflows can potentially generate exchange rate appreciation pressures that affect external competitiveness and macroeconomic stability. However, the results indicate that the magnitude of these effects may depend significantly on the structure of capital inflows. In particular, sustained inflows of equity capital may contribute to gradual real appreciation, while debt flows appear to have more temporary effects. Policymakers should therefore pay attention not only to the volume of capital inflows but also to their composition when assessing potential risks for exchange rate stability and external balance.

In addition to conventional monetary policy instruments captured by the key policy rate, it is important to acknowledge that the National Bank of Serbia has actively relied on foreign exchange market interventions as a complementary tool for stabilizing exchange rate fluctuations. In the context of a managed floating exchange rate regime, FX interventions have been used to smooth excessive short-term volatility and mitigate the impact of large capital flow movements on the domestic currency. This institutional feature may partially explain the relatively moderate and short-lived exchange rate responses identified in the empirical analysis. Although FX interventions are not explicitly included in the VAR specification, their presence represents an important transmission channel through which monetary authorities influence exchange rate dynamics. Future research could extend the analysis by incorporating direct measures of FX interventions or foreign reserve changes in order to more explicitly capture this policy dimension.

Overall, the impulse response analysis suggests that capital flow shocks influence exchange rate dynamics in Serbia, but the strength and persistence of these effects are relatively limited. The results highlight the importance of distinguishing between different types of capital flows when analyzing the transmission of international financial shocks in small open economies.



## CONCLUSIONS

This paper investigates the relationship between international capital flows and the real effective exchange rate in Serbia, with particular emphasis on the structure of capital inflows. Using a structural vector autoregression (SVAR) framework and impulse response analysis, the study evaluates how shocks to different types of capital flows affect exchange rate dynamics in a small open economy context.

The empirical results suggest that capital inflows exert a moderate appreciation pressure on the real effective exchange rate, although the magnitude and persistence of this effect differ across components of capital flows. Shocks to total capital inflows generate a relatively small appreciation of the exchange rate, indicating that aggregate flows alone do not strongly determine exchange rate movements. However, when capital flows are disaggregated, equity inflows exhibit a somewhat more persistent appreciation effect compared with debt inflows. Debt-related inflows appear to have a weaker and less durable impact on the exchange rate, with their effects dissipating relatively quickly over time.

These findings are broadly consistent with theoretical expectations that capital inflows increase demand for domestic assets and currency, thereby creating appreciation pressures. At the same time, the relatively modest magnitude of the estimated responses suggests that exchange rate dynamics in Serbia are influenced by a wider set of macroeconomic and financial factors beyond capital flows alone. In particular, monetary policy responses, global financial conditions, and domestic macroeconomic fundamentals likely play an important role in shaping exchange rate adjustments. The results also support the broader theoretical perspective that exchange rate dynamics in small open economies are closely linked to international financial conditions and the global financial cycle. As highlighted in the literature, fluctuations in global liquidity and investor sentiment can influence capital flows and thereby affect exchange rate movements, even in economies with formally flexible exchange rate regimes.

From a policy perspective, the findings carry several implications that are particularly relevant for Serbia's macroeconomic framework. First, the relatively moderate response of the exchange rate to capital flow shocks suggests that the managed floating exchange rate regime, combined with active policy interventions of the National Bank of Serbia, has been effective in smoothing excessive short-term volatility. Second, the results highlight that the composition of capital inflows is crucial: while equity inflows tend to generate more persistent appreciation pressures, they are typically associated with longer-term investment and improvements in productivity, whereas debt inflows are more volatile and their effects are shorter-lived. Therefore, the policy objective should not be to discourage capital inflows per se, but rather to foster stable and productive forms of capital while managing their macroeconomic consequences, particularly with respect to exchange rate appreciation and external competitiveness. Finally, the findings underline the importance of a coordinated policy framework combining monetary policy, foreign exchange interventions, and macroprudential measures in order to mitigate risks related to capital flow volatility and maintain overall macroeconomic and financial stability.

Overall, the study contributes to a better understanding of the interaction between capital flows and exchange rate dynamics in small open economies. Future research could extend the analysis by incorporating additional financial variables, examining the impact of capital flows on the lower level of aggregation, or applying alternative econometric approaches in order to further explore the transmission of international financial shocks to domestic exchange rate dynamics.



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## UTICAJ TOKOVA KAPITALA NA REALNI DEVIZNI KURS: SLUČAJ SRBIJE

### Rezime:

Kao mala otvorena ekonomija koja se sve više integriše u globalna finansijska tržišta, Srbija je izložena fluktuacijama u prekograničnim kretanjima kapitala koje mogu uticati na dinamiku deviznog kursa i makroekonomsku stabilnost. Ovaj rad ispituje odnos između međunarodnih tokova kapitala i realnog efektivnog deviznog kursa u Srbiji, sa posebnim osvrtom na strukturu priliva kapitala. Model strukturne vektorske autoregresije (SVAR) primenjen je za analizu dinamičkih interakcija između spoljnih ekonomskih uslova, tokova kapitala, monetarne politike, domaće ekonomske aktivnosti i realnog efektivnog deviznog kursa, koristeći kvartalne podatke za period od 2007. do 2024. godine. Rezultati, dobijeni analizom impulsnog odgovora, ukazuju na to da šokovi u prilivu kapitala dovode do umerene apresijacije realnog deviznog kursa, iako se veličina i trajnost efekta razlikuju u zavisnosti od strukture tokova kapitala. Prilivi kapitala pokazuju nešto trajniji efekat apresijacije u poređenju sa prilivima duga, dok je ukupni uticaj ukupnih tokova kapitala relativno ograničen. Ovi nalazi ističu važnost strukture tokova kapitala za dinamiku deviznog kursa i pružaju korisne uvide za kreiranje politike deviznog kursa i makroprudencijalnih politika u malim otvorenim ekonomijama.

### Ključne reči:

tokovi kapitala;  
realni efektivni devizni kurs;  
mala otvorena ekonomija;  
Srbija;  
vektorska autoregresija.

### JEL klasifikacija:

F31, F42