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Does domestic monetary policy affect foreign direct investment to India?

Virender Kumar
Delhi Technological University, India

Naveen Kumar
University of Delhi, India

Puneet Kumar Arora
Delhi Technological University, India

Apoorva Gupta
University of Delhi, India

Abstract

This paper employs the structural VAR methodology to empirically analyse how a domestic monetary policy shock affects foreign direct investment (FDI) to India. The paper uses two variables, interest rate differential and domestic money supply growth, as measures of domestic monetary policy shock to assess its impact on FDI flows. Empirical results reveal that interest rate differential is not a significant determinant of FDI flows to India, indicating that FDI flows are mainly driven by domestic fundamentals and the economy's growth potential. The results further reveal that domestic money supply growth has a positive and statistically significant impact on FDI flows. This suggests that while FDI flows to India are not affected by a change in interest rate differential, the central bank, using monetary policy, can influence FDI flows by managing domestic money supply growth. In particular, the central bank can attract greater FDI flows by increasing domestic money supply growth, which has a positive impact on ongoing domestic economic growth that creates an expectation of future GDP growth. Among other factors, domestic output growth is found to be the most important and significant determinant of FDI flows to India, followed by domestic infrastructure, domestic creditworthiness and domestic macroeconomic instability.

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Contact: Virender Kumar - virender0202@gmail.com, Naveen Kumar - econ7naveen@gmail.com, Puneet Kumar Arora - puneet.arora@dtu.ac.in, Apoorva Gupta - apoorvagupta@hrc.du.ac.in.
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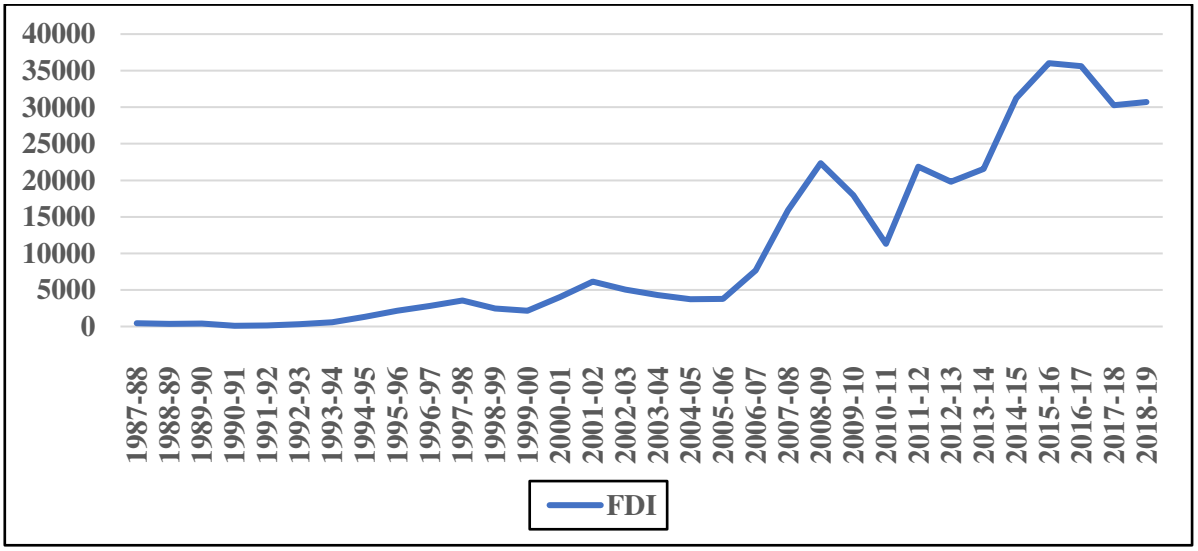
1. Introduction

FDI plays a vital role in stimulating economic growth, bridging the saving-investment gap, and meeting foreign exchange requirements (Dua and Garg 2015). Foreign direct investment (FDI) is a form of investment where a resident of one country invests in the assets of a firm in another country, gaining ownership rights and involvement in its operation and management. Unlike speculative portfolio flows, FDI brings not only capital but also knowledge, skills, and technology. As stable, long-term investments, FDI flows are less likely to be reversed and have a greater potential to contribute to the economic growth of developing countries like India.

Before the 1991 reforms, FDI inflows to India were negligible due to restrictive regulations. However, the reforms opened up sectors for investment and simplified procedures, leading to an upward trend in FDI inflows (Figure 1). India's sizable population, expanding consumer base, and favorable investment climate have also made it an attractive destination for foreign investors. Given its benefits, FDI flows are of vital interest to policymakers, who would like to frame effective policies to attract and sustain greater FDI flows to India. In this regard, understanding the role of domestic monetary policy in influencing FDI flows to India is crucial. While a change in domestic monetary policy is generally expected to affect overall capital flows through a change in the interest rate differential (Verma and Prakash 2011, Ahmed and Zlate 2014, Hannan 2017), how domestic monetary policy affects FDI flows is not clear given its long term nature. Gaining insights into how domestic monetary policy impacts FDI inflows can help ascertain whether the central bank, through monetary policy interventions, can influence FDI flows and, consequently, can help the central bank decide on an effective policy framework to attract greater FDI flows to India. Additionally, it would enable policymakers to assess the impact of specific monetary policy changes on FDI and take appropriate corrective actions if needed.

Figure 1: Net FDI flows to India, US$ Million



Source: Reserve Bank of India

The study contributes to the existing literature on FDI flows to India by examining the impact of the domestic monetary policy shock, which has received minimal attention in previous research (Dua and Garg 2015, Hannan 2017, Belke and Volz 2019). In this paper, we employ a structural VAR model to assess the proportion of total variation in FDI flows that is explained by the domestic monetary policy shock, offering new insights into the relationship between domestic monetary policy and FDI flows.

The rest of the paper is structured as follows. The next section shows the data and empirical strategy, followed by the results in Section 3 and the paper is concluded in Section 4.

2. Empirical Model, Data And Methodology

There are many well-established theories explaining why FDI occurs and what its potential determinants are, such as Heckscher-Ohlin's neoclassical trade theory, Vernon's product life cycle theory (1966), Hymer's market imperfection hypothesis (1976), Rugman's internalisation theory (1986), and Dunning's eclectic paradigm/OLI approach (1981)[1]. However, it is not entirely clear in theory how a shock in the domestic/host country's monetary policy will affect FDI flows.

It is said that FDI flows are generally for the longer term. Therefore, they are more likely to be driven by the economy's domestic fundamentals and its growth potential. Hence, a change in domestic monetary policy, which changes the expected return on domestic assets vis-à-vis foreign assets, will not affect FDI flows. There is also another view that if a change in domestic monetary policy causes interest rate differential (between the domestic and foreign country) to increase, foreign investors will access cheaper funds from their own country and invest in developing countries to exploit arbitrage opportunities, leading to an increase in capital inflows including FDI. In this paper, we use two variables—interest rate differential and domestic money supply growth—to empirically assess how domestic monetary policy shock will affect FDI flows to India. Their expected impact is discussed below.

(a) Interest rate differential: As stated above, there can be two opposite views on how interest rate differential affects FDI flows. First, an increase in interest rate differential allows foreign investors to access cheaper funds from their own country and invest in developing countries to exploit arbitrage opportunities, leading to a rise in capital inflows, including FDI. Second, as FDI flows are generally for the longer term, they are not likely to be affected by variables representing short-term financial conditions in domestic and foreign countries, such as interest rate differential. The empirical evidence on FDI (Verma and Prakash 2011, Hannan 2017, Belke and Volz 2019) seems to support the second point of view.

(b) Domestic money supply growth: Domestic money supply growth is another variable representing domestic monetary policy shock. Given the long-term nature of FDI, a change in domestic money supply growth which changes the interest rate differential (between the domestic and foreign country), is not likely to have a significant effect on FDI flows. However, there is also another view that says that an increase in domestic money supply growth will have a positive impact on ongoing domestic economic growth that creates an expectation of future GDP growth and, thus, more FDI inflows.

The empirical model of the study is as follows[2]:

$$FDI_t = \varphi + \varphi_1 (i_t - i_t^*) + \varphi_2 Mg_t + \varphi_3 (fd/y)_t + \varphi_4 y_t + \varphi_5 ex_t + \varphi_6 rm_t + \varphi_7 infra_t + \varphi_8 open_t + \varphi_9 globalVol_t + \varphi_{10} y_t^* + \mu_t \quad (1)$$

[1] OLI denotes Ownership, Location and Internalization.

[2] Variables other than interest rate differential and domestic money supply growth included in equation (1) are the control variables affecting FDI flows. Note that there are a wide range of variables that affect FDI flows. However, since our principal interest was to know the impact of domestic monetary policy shock, we opted to include those variables as control variables, which were found to be common across studies in the literature for the quarterly analysis. Please refer to the supplementary file for details on variables and their expected signs.

where

FDI_t	**:**	Net FDI flows
$(i_t - i_t^*)$	**:**	Interest Rate Differential
Mg_t	**:**	Domestic Money Supply Growth
$(fd/y)_t$	**:**	Fiscal Deficit to GDP ratio indicating Domestic Macroeconomic Instability
y_t	**:**	Domestic Output Growth
ex_t	**:**	Exchange Rate
rm_t	**:**	Foreign Reserves to Import ratio indicating Domestic Creditworthiness
$infra_t$	**:**	Domestic Infrastructure
$open_t$	**:**	Degree of Openness
$globalVol_t$	**:**	Volatility in the Global Market
y_t^*	**:**	Foreign Output Growth

The study employs the structural VAR (SVAR) model to empirically analyse how domestic monetary policy variables (*Mg and i-i**) affect foreign direct investment to India. In addition, two dummy variables called UScrisis and EUcrisis are created in the study to account for the impacts of the US crisis and the Eurozone debt crisis, respectively, on FDI flows to India. Given that India is a small open economy, variables like global market volatility ($globalVol_t$), foreign output growth (y_t^*) and the aforementioned dummy variables (UScrisis and EUcrisis) are treated as exogenous to the system. Degree of openness ($open_t$) is also assumed to be an exogenous variable***. Since the structural VAR model includes only endogenous variables, the study estimates the empirical model (1) with eight endogenous variables, namely, domestic money supply growth (Mg), interest rate differential (i-i*), domestic output growth (y), foreign exchange reserves to import ratio (rm), domestic infrastructure (infra), domestic fiscal deficit to GDP ratio (fd/y), exchange rate (ex), and net FDI flows (FDI) after controlling for all the exogenous variables in the framework of SVAR model.*** While the impact of two monetary policy variables (*Mg and i-i**) on FDI flows are to be determined, the other endogenous explanatory variables are expected to have the following signs: $\varphi_3<0$, $\varphi_4>0$, $\varphi_5>0<0$, $\varphi_6>0$, $\varphi_7>0$.

2.1 Data Description

For the analysis, the study utilizes quarterly data from 2000Q2 to 2019Q4. The OECD database, Federal Reserve Economic Data and the Reserve Bank of India are the primary data sources. Net foreign direct investment (***FDI***) to India denominated in US$ million is taken as the dependent variable. The difference between Indian 91-Day Treasury Bills rate and US 3-Month Treasury Bills rate is considered as the interest rate differential (***i-i****). The rate of growth of broad money supply in India is taken as the domestic money supply growth (***Mg***). The rate of growth of GDP in India is taken as the domestic output growth (***y***). Foreign exchange reserves to import ratio (***rm***) indicating domestic country's creditworthiness is defined as the ratio of total foreign exchange reserves and total imports in a quarter. The domestic fiscal deficit to GDP ratio (***fd/y***), which serves as an indicator of domestic macroeconomic instability, is defined as the ratio of the gross fiscal deficit to GDP for India.

Exchange rate (***ex***) is the rupee cost of a US dollar. Index of industrial production for electricity sector has been used as a proxy for domestic infrastructure (***infra***). The degree of openness

(***open***) is captured by considering both trade openness and financial openness. Trade openness is measured by the ratio of trade to GDP for India, while financial openness is assessed using the financial openness index developed by Chinn and Ito (2008) for India. Foreign output growth (***y****) is represented by the OECD countries' output growth. Volatility in global market (***globalVol***) is measured through US CBOE volatility index (VIX).

2.2 Methodology

This study employs the structural VAR model to empirically analyse how domestic monetary policy shock affects foreign direct investment to India. In particular, the study utilizes the applications of innovation analysis—the impulse response function and the variance decomposition function—under the structural VAR model to obtain empirical results. Impulse response function (IRF) is a useful tool for tracking the dynamic behaviour of a variable following a unit standard deviation shock to another variable. Forecast error variance decomposition function (VDF) calculates the percentage of total volatility in a given variable that can be attributed to shocks to other variables within the model. The two applications together makes it possible to determine the influence and the relative significance of domestic monetary policy shock in explaining FDI flows to India[3]. Additionally, the study makes use of Monte Carlo Integration for innovation accounting analysis. Monte Carlo Integration, a Bayesian technique, is utilized to calculate confidence bands around the impulse responses, allowing for an assessment of their statistical significance.

3. Empirical Results

3.1 Structural VAR Results

The structural VAR model is estimated using two as the optimal lag length[4,5]. A shock of one standard deviation to interest rate differential is found to have a statistically insignificant[6] impact on FDI flows (Figure 2). This result confirms the hypothesis that FDI flows are generally for the longer term, and therefore, they are mainly driven by domestic economic fundamentals and the economy's growth potential (Verma and Prakash 2011, Belke and Volz 2019). Hence, variables representing short-term financial conditions in domestic and foreign countries, such as interest rate differential, have no significant influence on FDI flows.

Figure 3 exhibits the impulse response of FDI flows to a unit standard deviation shock to domestic money supply growth. We find that the response is positive and significant for up to two quarters. As discussed earlier, the positive response of FDI in this case may be due to the fact that an increase in domestic money supply growth has a positive impact on ongoing domestic economic growth that creates an expectation of future GDP growth, which helps attract greater FDI inflows.

[3] Please refer to the supplementary file for details on methodology, SVAR model specification, and identification.
[4] The lag length criteria under VAR was employed to identify the optimal lag length.
[5] The structural VAR is estimated solely with endogenous variables (domestic money supply growth, interest rate differential, domestic output growth, foreign exchange reserves to import ratio, domestic infrastructure, domestic fiscal deficit to GDP ratio, exchange rate, and net FDI flows) after controlling for all the exogenous variables (EUcrisis dummy, volatilty in global market, degree of openness, UScrisis dummy, foreign output growth).
[6] The statistical significance of the impulse responses have been checked using 90% confidence interval calculated through Monte Carlo Integration.

Figure 2: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Interest Rate Differential (i-i*)

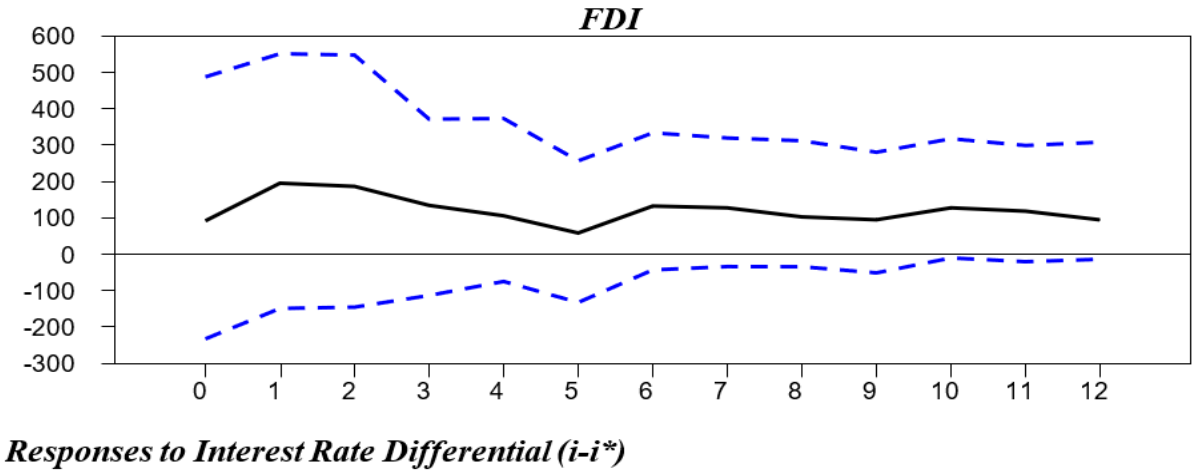
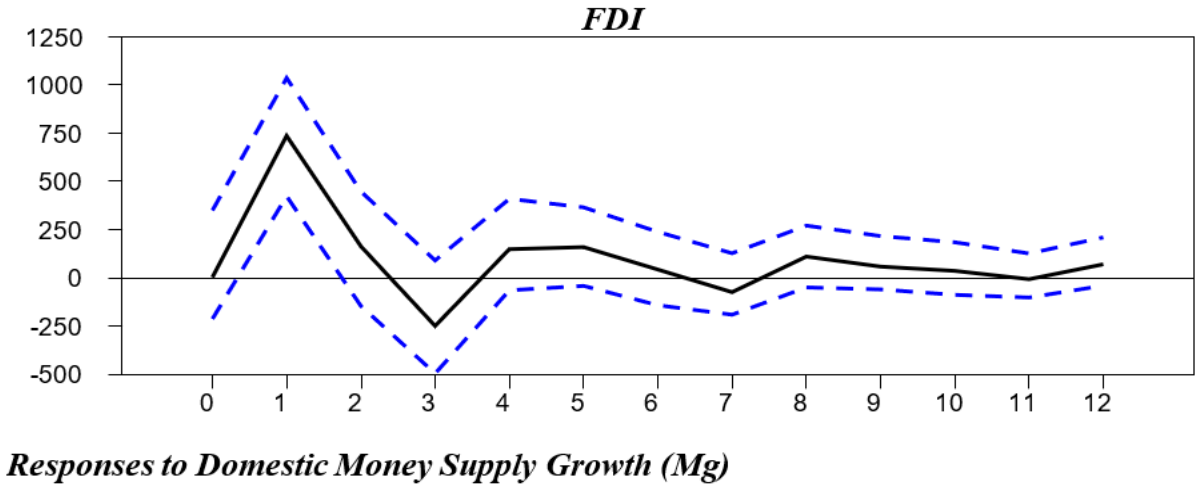


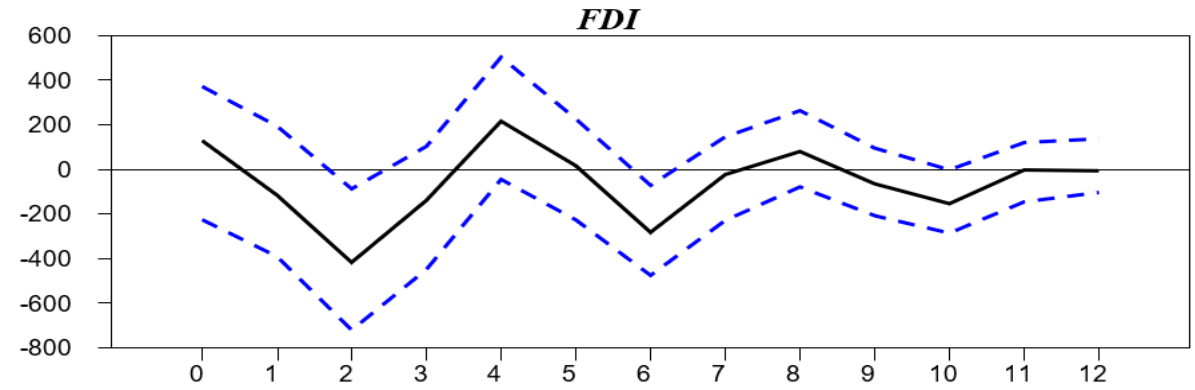
Figure 3: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Domestic Money Supply Growth (Mg)



The results in Figure 2 and Figure 3 implies that while FDI flows are not affected by a change in interest rate differential, domestic monetary policy can affect FDI flows directly through a change in domestic money supply growth.

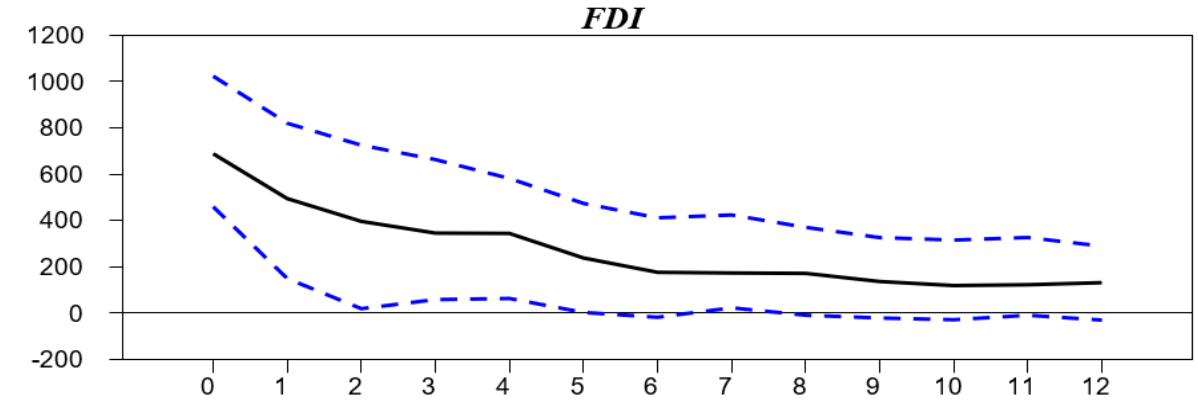
Figure 4 to Figure 8 shows the results with respect to other endogenous variables. Figure 4 depicts the impulse response of FDI to a unit standard deviation shock to domestic fiscal deficit to GDP ratio representing domestic macroeconomic instability. We find that the response is negative and significant for up to three quarters, which aligns with expectation. The impulse response of FDI to a unit standard deviation shock to domestic output growth representing growing domestic market size is depicted in Figure 5. As expected, the shock to domestic output growth has a positive and statistically significant impact on FDI, implying that a higher domestic output growth leads to a larger market size, creating profitable investment opportunities and greater demand for FDI.

Figure 4: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Domestic Fiscal Deficit to GDP Ratio (fd/y)



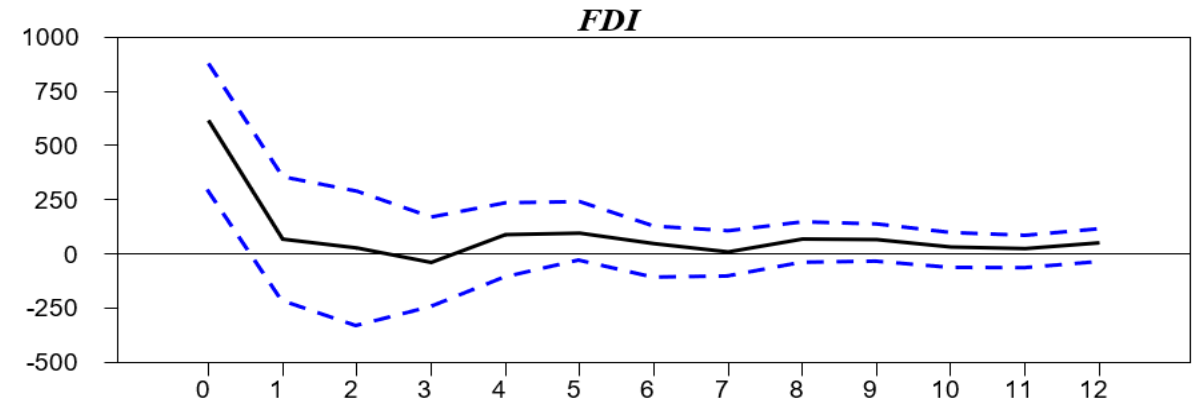
Responses to Domestic Fiscal Deficit to GDP Ratio (fd/y)

Figure 5: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Domestic Output Growth (y)



Responses to Domestic Output Growth (y)

Figure 6: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Foreign Exchange Reserves to Import Ratio (rm)



Responses to Foreign Exchange Reserve to Import Ratio (rm)

Figure 7: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Domestic Infrastructure (infra)

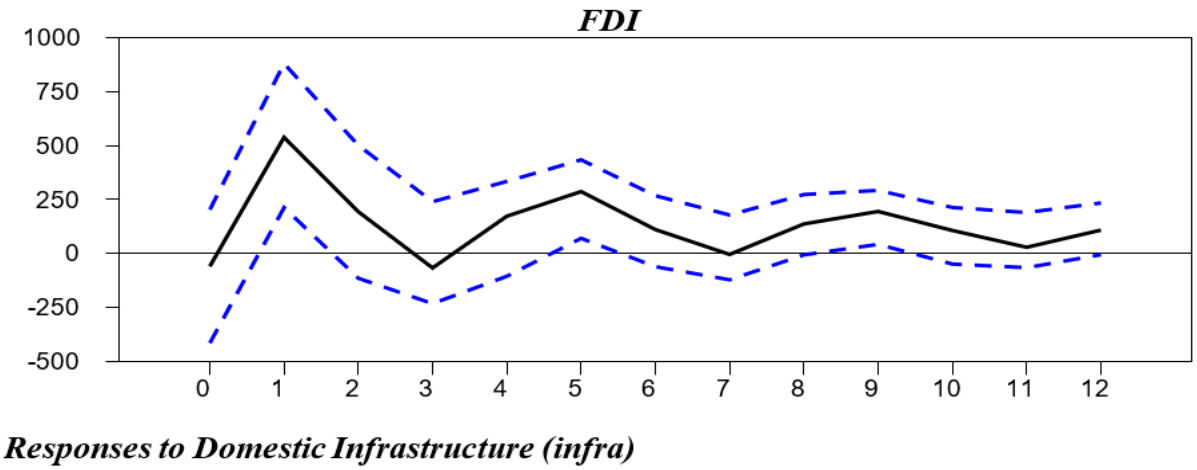
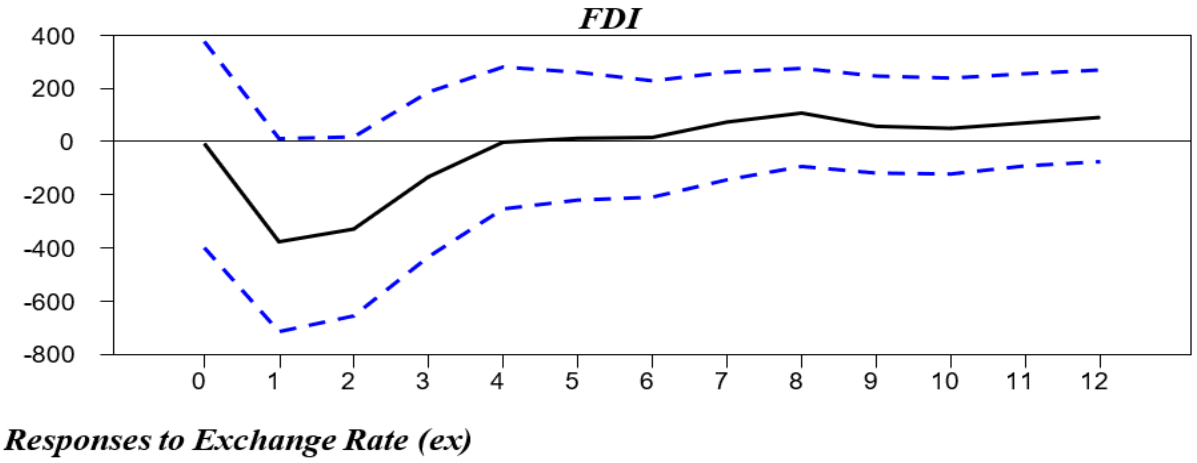


Figure 8: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to Exchange Rate (ex)



As expected, a unit standard deviation shock to foreign exchange reserves to import ratio which represents domestic country's creditworthiness causes an immediate positive and statistically significant impact on FDI (Figure 6), indicating that countries with sufficient foreign exchange reserves are considered creditworthy and hence receive greater FDI flows. Figure 7 depicts the impulse response of FDI flows to a unit standard deviation shock to domestic infrastructure. We find response to be positive and statistically significant for up to two quarters, which is in line with expectation, indicating that a well-developed and good quality domestic infrastructure is essential for attracting FDI flows. A unit standard deviation shock to the exchange rate is found to have a negative but statistically insignificant impact on FDI flows to India (Figure 8).

3.2 Forecast Error Variance Decomposition

Variance decomposition analysis, depicted in Table I, shows that domestic money supply growth explains about 4.5% and interest rate differential, on average, explains about 2.1% of the total variation in FDI flows, implying that domestic monetary policy variables together contribute about 6.6% of the total variation in FDI flows to India. Other variables such as domestic output growth explain about 14.9%, domestic infrastructure about 5%, exchange rate

about 3%, domestic country's creditworthiness (measured through foreign exchange reserves to import ratio) about 4.6%, and domestic macroeconomic instability (measured through domestic fiscal deficit to GDP ratio) about 4.3% of the total variation in FDI flows to India.

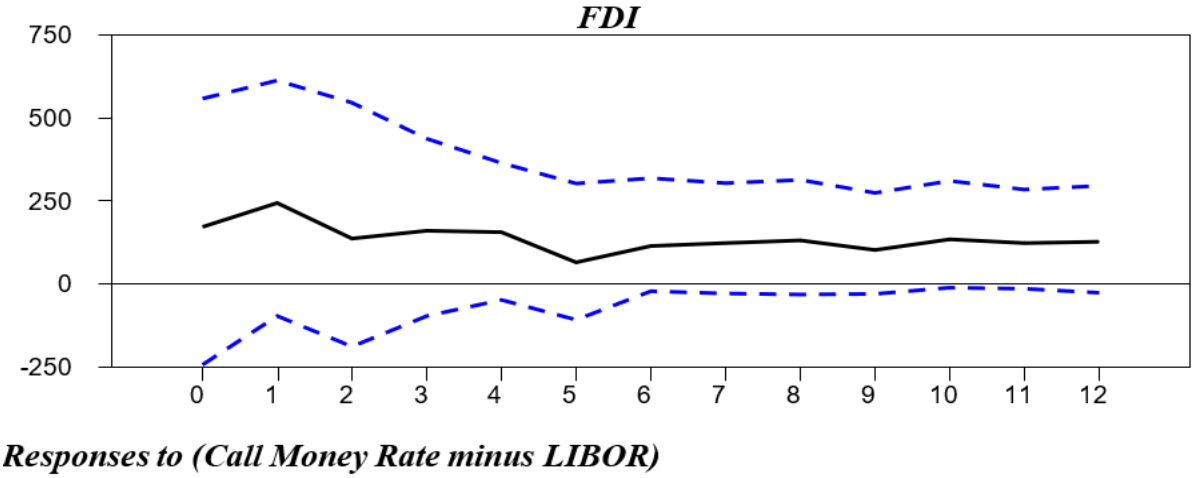
Table I: Forecast Error Variance Decomposition for FDI

Period	*Mg*	*(i-i*)*	*y*	*ex*	*fd/y*	*rm*	*infra*	*FDI*
1	0.006	1.112	9.344	0.838	2.105	6.118	0.031	80.446
2	5.256	1.776	12.364	1.423	3.214	5.076	4.757	66.134
3	4.968	2.081	14.286	2.911	3.462	4.674	4.789	62.829
4	5.250	2.123	15.838	2.913	3.648	4.570	4.672	60.986
5	5.130	2.192	16.344	3.269	4.260	4.467	5.755	58.583
6	5.051	2.158	16.264	3.539	4.275	4.394	5.424	58.895
7	4.964	2.204	16.126	3.572	5.015	4.367	5.534	58.218
8	4.956	2.270	16.121	3.908	5.020	4.369	5.505	57.851
9	4.872	2.303	15.932	3.577	5.134	4.328	5.663	58.191
10	4.808	2.341	15.792	3.940	5.098	4.326	5.974	57.721
11	4.756	2.456	15.673	3.146	5.241	4.360	6.064	58.304
12	4.713	2.560	15.573	3.511	5.214	4.396	6.085	57.948

3.3 Robustness Analysis

To check for robustness, we re-estimated the empirical model with an alternative measure of interest rate differential, given by Call money rate minus 3-Month US dollar LIBOR. The impulse response of FDI flows to a unit standard deviation shock to 'Call money rate minus LIBOR' is shown in Figure 9. We find that the response is statistically insignificant, verifying the result found in Figure 2[7,8]

Figure 9: Impulse Response of Foreign Direct Investment (FDI) to a unit S.D Shock to (Call Money Rate minus LIBOR)



[7] The results are also robust to the inclusion of a dummy variable to control for the effect of Indian cash crunch of 2016 (i.e., demonetization of currency notes) on FDI flows and also to the re-estimation of the model using the data from 2000Q2 to 2016Q2.

[8] We have also re-estimated the model with following variables in real terms, such as real money supply growth, real interest rate differential, and real exchange rate (REER). We find that the results (shown in the supplementary file) are broadly similar, thus providing robustness to our original results.

4. Conclusion And Implication

This paper employs the structural VAR methodology to empirically analyse how domestic monetary policy shock (proxied through interest rate differential and domestic money supply growth) affects foreign direct investment (FDI) to India. The applications of innovation analysis under the structural VAR model are exploited to obtain empirical results.

The empirical results reveal that interest rate differential is not a significant determinant of FDI flows to India, indicating that FDI flows are mainly driven by domestic fundamentals and the economy's growth potential. The results further reveal that domestic money supply growth has a positive and statistically significant impact on FDI flows. This implies that while FDI flows to India are not affected by a change in interest rate differential, domestic monetary policy can affect FDI flows directly through a change in domestic money supply growth. Among other factors, domestic output growth is found to be the most important and significant determinant of FDI flows to India (explaining 14.9% of the total variation in FDI), followed by domestic infrastructure (explaining about 5%), domestic creditworthiness (explaining about 4.6%), and domestic macroeconomic instability (explaining about 4.3%).

The results of the study suggest that while FDI flows to India are not affected by a change in interest rate differential, the central bank, using monetary policy, can influence FDI flows by managing domestic money supply growth. In particular, the central bank can attract greater FDI flows by increasing domestic money supply growth, which has a positive impact on ongoing domestic economic growth that creates an expectation of future GDP growth. The results further suggest that domestic policymakers can attract and sustain FDI flows by improving the domestic fundamentals, such as maintaining higher foreign exchange reserves, taking measures to increase economic growth, spending more on infrastructure development, and reducing macroeconomic instability.

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