Navigating New Normal: Analyzing FDI Dynamics Between the USA and India During the Trump Era and Beyond Using ARDL and VAR Models

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Abstract

The current investigation is based upon an augmented Gravity Model to analyze the FDI Inflows from the USA to India. Moreover, sophisticated and rigorous econometric methods, using ARDL and VAR models, have been applied. Based on the inclusion of variables such as GDP, tariffs, political and economic risk, FDI and exchange rate volatility, the paper examines the emerging FDI trends during the 1982-2023 period with special fucus on the Trump Regime during 2017-21. Thus, the research underlines how the political and economic obstacles set by Trump's administration might have changed the investment behaviors, regarding bilateral economic and strategic relations.

Keywords: Foreign Direct Investment, Trump Administration, US-India Economic Relations, Trade Policies, Time-Series Analysis, ARDL Model, Var Model, Policy Impact Analysis

Introduction

Political regimes have a very important role in shaping international economic activities, including Foreign Direct Investment (FDI), but it is a complex and multifaceted process (Hashmi et al., 2020; Rommel, 2024; Triarchi & Marangos, 2024). The Trump administration is the focus of this study, a time characterized by great strides in policymaking when it comes to trade and international relations. These policy changes have the potential to completely change the FDI flow dynamics from the USA to India, and thus provide an opportunity to examine the interplay between politics and economic flows (Kumari et al., 2023). This paper attempts to discern the nuances of these shifts using an augmented Gravity Model with various time series analysis techniques.

An appreciation of these dynamics is not only of academic interest; its importance is significant for policymakers and investors alike. The approach of the Trump administration towards international agreements, along with its radical protectionism, has had an eye on FDI and its potential would help lay out the impact that such policies could have on global investment patterns. The focus of this study is to further unravel these effects, exploiting empirical data and robust analytical methods to examine how policy changes of a specific type affected FDI flows.

Literature Review

There is a well-documented interconnection between political policies and FDI and several schools of thought emphasize, among other things, how governmental stability, economic policies, and international relations can either promote or discourage foreign investment (Al-Mihyawi, 2019; Levis et al., 2023; Magombeyi & Odhiambo, 2017; Nguyen, 2022). In response to the Trump administration, the imposition of tariffs, renegotiation of trade agreements and generally, an economic nationalism stance of the USA has been postulated to have significant impact on the USA's economic relationship with India (Hornat, 2023; Uyanaev, 2022). And these measures usually lead to further economic uncertainty and, since the whole point is to attract foreign investors, a stable and predictable environment is important.

The economic sizes only further complicate this landscape. The USA and India are two mightily players on a global stage, and their economic policies have a long reach. Growth studies using GDP as a prong for measuring economic size have demonstrated that FDI attraction is strongly associated with economic size. But the impact is not linear; political moves, as we witnessed during the Trump era, can cancel out the advantages of economic heft.

Geographical and economic distances between countries usually play roles in FDI decisions. This study uses the augmented Gravity Model which considers factors introduced to encompass not only physical distances but also economic and policy barriers (Ly et al., 2018; Mishra & Jena, 2019; Thangavelu & Narjoko, 2014). Such adjustments to this model allow us to better understand how FDI flows under the current Trump regime might have changed given less obvious physical barriers.

Methodology

Taking into consideration the above questions about the effect of the Trump government regime on FDI flows from the USA to India, we suggest the following comprehensive research design: The first pillar and its augmented Gravity Model, the second pillar and its methods of advanced times series analysis. The gravity model is used to propose certain parsimonious structural equations in which theoretical nexuses were drawn connecting flows of FDI, the economic size (GDP) of the USA and India, and geographical distances. To capture such barriers which were introduced during Trump's regime, the model includes assessment variables like mean tariffs, political and economic risks, and exchange rate volatility. To capture breaks in the trend, a dummy variable for the period of Trump regime (2017-2021) is added, which appears in Equation 2. Data on FDI flows is obtained from the Bureau of Economic Analysis (BEA), GDP from the International Monetary Fund/ World Bank, distance data from CEPII data set, tariffs from WTO, risk indices from the World Bank and exchange rates from Bank for International Settlements/ International Monetary Fund. The coefficients of the Trump regime dummy variable can show whether it played a role in either increasing or changing the FDI flows, and its significance and direction will indicate it.

In addition, the time-series models such as the ARDL and Vector Auto Regression models will be employed to analyze the short run and long run equilibrium relationship between and among the variables (Mawutor et al., 2023; Wehncke et al., 2023). Therefore, the ARDL model is selected for the main analysis in the study the allowance for variable having mixed order of integration. Anyhow in case the variable is found endogenous test and if they are integrated of order one and cointegrated then VAR will be considered. ADF test will be used to test stationarity. The model fit also will be checked by AIC, BIC criteria and residual tests containing heteroskedasticity and autocorrelation. These two staged models give a strong direction about the changed FDI due to Trump regime and handles all the economic, political and trade effects on FDI.

Augmented Gravity Model with Additional Variables

To analyze the impact of Trump's regime, we introduce additional variables that account for political and economic barriers. The modified model can be written as:

$$[\ln(\text{FDI}_t) = \alpha + \beta_1 \ln(\text{GDP}_{\text{USA},t}) + \beta_2 \ln(\text{GDP}_{\text{India},t}) + \beta_3 \ln(\text{ExRate}_t) + \beta_4 \text{PolicyRegime}_t + \beta_5 \text{TARIFFS}_t + \beta_6 \text{RISK}_t + \varepsilon_t]$$

Explanation of Variables:

- 1. PolicyRegime₊: A dummy variable to capture the Trump regime (2017–2021).
 - o 1 for years 2017–2021, and 0 otherwise.
- 2. TARIFFS_t: Average tariffs or trade barriers imposed on imports/exports.
 - o Trump-era tariffs, especially in 2018 (e.g., steel, aluminum), are crucial barriers that could influence FDI.
- 3. RISK_t: Country-specific risk in India, such as political stability, business confidence, or regulatory risk (World Bank or OECD risk indices).
- 4. (ExRate_t): Exchange rate between USD and INR, as currency fluctuations affect FDI decisions.
- 5. ε_t : Error term

Data Collection:

FDI Flows: BEA

• GDP Data: World Bank.

• **Distance**: CEPII Gravity dataset.

Tariffs: UNCTAD

• **Risk Factors**: World Governance Indicators (WGI).

Exchange Rates: UNCTAD.

Policy Regime: Dummy variable for the Trump regime (2017–2021).

If β 4 (Trump regime dummy) is significantly negative, it indicates that policies during Trump's administration acted as barriers to FDI flows toward India. By analyzing other coefficients, we can determine the role of economic size, tariffs, risk, and exchange rate volatility.

We propose a time series models for analyzing the impact of the Trump regime on FDI flows from the USA to India, the framework will focus on aggregating FDI data at a country pair level (USA to India) over time.

Estimation Model (s)

ARDL (Auto-Regressive Distributed Lag) Model

The ARDL model is ideal when analyzing relationships among time series variables that may have a mix of stationary and non-stationary characteristics. Using ARDL with structural breaks:

$$[\ln(\mathrm{FDI}_t) = \alpha + \sum\nolimits_{p=1}^{p} \phi_p \ln(\mathrm{FDI}_{t-p}) + \sum\nolimits_{q=0}^{Q} \theta_q X_{t-q} + \varepsilon_t]$$

$$[X_{t-q} = [\ln(\text{GDP}_{\text{USA},t}), \ln(\text{GDP}_{\text{India},t}), \ln(\text{ExRate}_t), \text{TARIFFS}_t, \text{RISK}_t, \text{PolicyRegime}_t]$$

$$[\text{PolicyRegime}_t = \{ \begin{matrix} 1 & \text{if } t \text{ belongs to Trump's regime (2017–2021),} \\ 0 & \text{otherwise.} \end{matrix}]$$

VAR (Vector Auto Regression)

Alternatively, if the variables are found to be endogenous and have a cointegrated relationship, VAR or VECM is suitable.

$$[Y_t = A_1Y_{t-1} + A_2Y_{t-2} + \dots + A_nY_{t-p} + \varepsilon_t]$$

Where,

$$[Y_t = [\ln(\text{FDI}_t), \ln(\text{GDP}_{\text{USA},t}), \ln(\text{GDP}_{\text{India},t}), \ln(\text{ExRate}_t), \text{TARIFFS}_t, \text{RISK}_t]]$$

The matrix form is written as follows

$$[Y_t = A_0 + \sum_{k=1}^p A_k Y_{t-k} + \varepsilon_t]$$

Where,

Yt is an n×1n \times 1n×1 vector of endogenous variables,

A0 is the n×1n vector of intercepts,

Ak are n×n \times n×n coefficient matrices for each lag k

 $\varepsilon t \sim N(0, \Sigma)$, where Σ is the covariance matrix of the errors.

VAR model with 3 exogeneous Variables

From the variables in the model above, the three variables that will be treated as endogenous in the context of analyzing FDI flows from the USA to India are as follows:

FDI Flows:

FDI flows are the primary dependent variable in the model, and they are influenced by other economic and policy-related factors such as GDP, tariffs, and exchange rates.

GDP (India and USA):

GDP represents the economic size of the source (USA) and destination (India) countries. Economic activity in both countries can impact FDI flows, but GDP itself can also be influenced by FDI inflows in the long run, creating a two-way causality.

Exchange Rates (USD-INR):

Exchange rate fluctuations can influence investment decisions, as they affect the relative costs of investment and expected returns. However, exchange rates can also be impacted by economic activities, including trade flows and capital movements such as FDI.

Rationale for Endogeneity:

- FDI Flows and GDP often exhibit a bidirectional relationship: While GDP attracts FDI, increased FDI can also stimulate economic growth.
- Exchange Rates can be influenced by FDI flows, trade imbalances, and macroeconomic policies, making them endogenous in the system.

Other variables in the model namely Tariffs, Risk Factors, and the Policy Regime dummy will be treated as exogenous or predetermined because they are typically external policy-driven factors that influence FDI flows but are not directly influenced by FDI within the scope of the study.

Model Selection and Evaluation

To avoid issues related to non-stationary variables the first step in the analysis will be to conduct ADF or PP tests for all the variables to ascertain their stationarity status. These tests will distinguish between the variables being I(0) or I(1), the early critical step before entering the time series models. In this case, we will use cointegration test to test for the existence of long run relationship among the variables. For VEC/VAR series, the Johansen procedure will be used along with a systematic approach of vector error correction mechanism for the analysis of long-run relationships. On the other hand, for the analysis of mixed orders of stationary series, the Bounds testing approach will be followed for the use of Auto-Regressive Distributed Lag (ARDL) specification.

The goodness of the estimated models will be tested using number of check points such as AIC and BIC for choosing the right lag order and the appropriate model. Furthermore, the residual diagnostic tests will be conducted with a view of testing for some major assumptions such as heteroscedasticity and autoregression. Last but not the least, for ascertaining the structural breaks in the data primarily in Trump regime (2017-2021) various structural break test such as Chow test or Bai-Perron test will be applied. These tests will assist to provide affirmative evidence that there was disruption in FDI flows during Trump administration, increase the credibility of the paper.

Results and Discussion

ARDL Model Results

Stationarity test

The differencing process applied to the data managed to pass most variables for stationarity through their p-values that indicate no unit root equation. By applying the first difference, the following variables: FDI_Inflow, GDP_USA, Exchange_Rate, and Gov_Effectiveness_Index were proven stationary. Nonetheless, as can be seen from the results presented above, the differencing operation did not completely remove non-stationarity from the GDP_India time series

and more actions or techniques could be required to level the variance and mean. The second differencing of GDP_India made it stationary, as indicated by the p-value of 0.018, which is below the common threshold of 0.05.

The estimation of the present dataset through the ARDL model provides several insights about the dynamics of Foreign Direct Investment (FDI) inflows from the USA to India. The model has a constant value that virtually equals zero, meaning that the constant term does not significantly influence the model over time suggesting that FDI inflows are association other variables rather than the constant term. The core results are displayed in Table 1 below

Table 1: Model Results ARDL Model

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Metric	Value
Dependent Variable	FDI_Inflow
Number of Observations	40
Model Type	ARDL (1, 0, 0, 0, 0, 0, 0, 0)
Method	Conditional MLE
Log Likelihood	-367.610
Standard Deviation of Innovations	3001.788
Date	Sat, 28 Dec 2024
Time	14:45:05
AIC	755.220
BIC	771.856
HQIC	761.189

The current FDI values are negative and have significant coefficients that are lagged; it is possible that when more FDI fills a country's markets in prior periods the demand drops in future periods or through other realignments. However, the coefficients for GDP of India (though a second differenced) and USA are insignificant suggesting that fluctuations in GDP do not affect FDI inflows in the context modelled above.

The level of FDI shows that the exchange rate has a positive but insignificant relationship with it meaning that though exchange rate might influence FDI, it does not do so to a level that would be statistically significant in this model. However, average tariffs are rather negative and significant to FDI indicating high tariff impedes investment as a general theory notated in the trade barriers and foreign investment policies.

Surprisingly, even when including the Government Effectiveness Index, no effect was seen, which implies that in the range of the data, changes in government effectiveness as measured might not affect FDI inflows. Notably, the sign of distance is positive and statically significant, meaning that bigger distance could be correlated with high FDI, could be an indication of strategic investments in the different locations.

Finally, the Dummy Trump Regime coefficient is negative but not statistically significant, implying that the political climate that characterized the Trump presidency, or at least the Trump model used here, has no explicit effect on FDI inflows from the USA to India.

Figure 1 below captures the impact of core variables on FDI visually

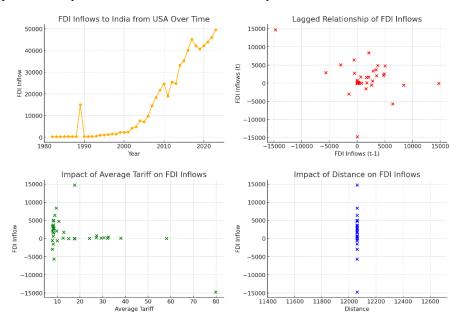


Figure 1: Impact of Various Variables in FDI Inflows

The visualizations in figure 1 helps to present detailed information about the FDI inflows to India from USA perspective. The direction of FDI inflows from USA to India is depicted in the FDI Inflows to India from USA Over Time. A scatter plot is presented as 'Lagged Relationship of FDI Inflows' showcasing dependencies of FDI at one time on the next time instance of it. Also, the graph of "Impact of Average Tariff on FDI Inflows" clearly depicts that FDI has negative relationship with the tariff rates as confirmed from the result of ARDL model. Finally, the "Impact of Distance on FDI Inflows" plot gives a positive regression between distance and FDI inflows, which might imply that increased distances are associated with inflow of more investment, as found by the model.

To ensure the robustness of the estimates, it is suggested to apply the VAR model for analysis of the short run dynamics. The VAR model is expected to give in-depth results in response to the shocks on the FDI flows. The following section discusses the results of the VAR model applied with specifications mentioned in the methodology section.

VAR Model Results

Model Parameters

Table 2 below shows the model parameters to decide the lag to be used in the estimation process

Table 2: VAR Model Summary

Lag	AIC	HQIC	BIC	FPE
0	0.68802	0.93296	1.4100	1.9906
1	-9.2204	-8.9426	-8.0404	0.00010434
2	-9.2606	-8.9501	-7.6236	0.00010143
3	-9.0615	-8.7173	-6.9665	0.00012254
4	-8.8303	-8.4524	-6.2773	0.00016235

Based on the AIC and BIC criteria, the optimal lag is 2 to estimate the system of equations.

VAR Model Results

Table 3 below summarizes the FDI equation results as follows

Table 3: Var Model Results FDI equation

Variable	Coefficient	Std. Error	t-stat	Prob
const	4068.819690	2503.600489	1.625	0.104
L1.FDI_Inflow	-0.776014	0.217793	-3.563	0.000
L1.GDP_India_second_diff	0.016566	0.010850	1.527	0.127
L1.GDP_USA	-0.003414	0.002304	-1.482	0.138
L1.Exchange_Rate	578.565045	471.913006	1.226	0.220
L1.Average_Tariff	-208.274398	85.517772	-2.435	0.015
L1.Gov_Effectiveness_Index	-35672.252868	61997.064862	-0.575	0.565
L2.FDI_Inflow	-0.010329	0.254234	-0.041	0.968
L2.GDP_India_second_diff	0.003619	0.008235	0.439	0.660
L2.GDP_USA	0.004432	0.002910	1.523	0.128
L2.Exchange_Rate	-309.507747	404.034560	-0.766	0.444
L2.Average_Tariff	52.494685	100.370475	0.523	0.601
L2.Gov_Effectiveness_Index	-46845.518072	64927.043430	-0.722	0.471

The first lag of FDI inflows has a significantly negative coefficient with the FDI inflows, reflecting the possibility of mean reversion or realignment due to previous periods. From the short-run analysis of the first lag of Average Tariff, it can also be observed that FDI inflows decrease when tariffs are raised in the subsequent period. Other variables such as GDP, exchange rates and government effectiveness index coefficients also fail to show meaningful impacts in this VAR system because the complex interplay may require further analysis.

Impulse Response Analysis

Figure 2 below shows the impulse response for each variable for the 6 equations estimated. Here the fucus will be to see the response of FDI inflows to India within response to the shocks to the other variables.

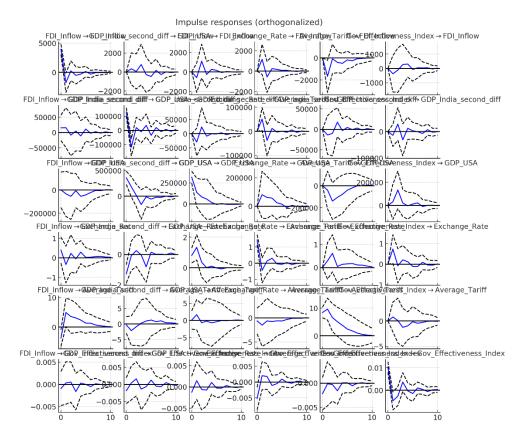


Figure 2: Impulse Response Functions

Quantities in each panel in the above figure demonstrate how change in one variable for one standard deviation effects another in periods of time. The responses of FDI Inflow to shocks in different variables are as displayed in different panels.

GDP India Second Difference: Signs of the second difference of India's GDP reveal moderate fluctuations in FDI Inflows across the selected periods, whereby increases in a particular period are derived from a shock to the model. But the effect seems to be quite small and mixed around the zero line most of the time. On analyzing the initial correlation between Shocks to the GDP of the USA and FDI Inflows to India it appears that shocks to the USA GDP could slightly decrease the FDI Inflows to India in the short run which could be that an increase in the USA GDP might slightly divert FDI away from markets such as India.

An appreciation of the dollar leads to a decrease in FDI Inflows while positive shocks to the exchange rate (indicating depreciation of local currency to dollar) leads to an increase in FDI Inflows. This is a usual reaction because a weaker currency may make investments easier for foreign companies. Whereas the fluctuations in the average tariff rates affect the FDI Inflows in a negative manner in the countries under analysis. Where there are tariff hikes, it realized by observing that a country becomes less attractive for investors for other countries due to high cost, as measured by IRF which has declined.

Criticisms directed at the Government Effectiveness Index are the transformed shocks which affect FDI Inflows without sending it into absolute free fall, yet significant improvements in this sector generate positive impacts both in confidence and probably FDI. As distance cannot be used like a regular, continuous variable, which means that it may imply differences in geopolitical or strategic positions, then shocks in distance could reflect some changes in the effectiveness of logistics or operations, or in 'distance(-related) barriers' to FDI.

Based on the Impulse Response analysis, figure 3 below shows the Forecast Error Variance Decomposition of the model.

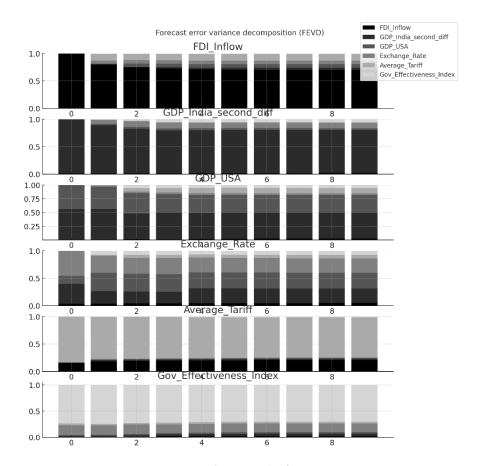


Figure 3: FEVD Analysis

The Forecast Error Variance Decomposition (FEVD) that is shown in the figure breaks down the variance of each forecast error into that which is due to shocks in each of the other variables in the model at different forecast horizons. Every bar in the FEVD chart corresponds to a variable in the model which includes FDI Inflow, Indian GDP, US GDP, Exchange Rate, Average Tariff and Government Effectiveness Index. The number of periods analyzed is determined by 8 periods.

The FEVD for FDI Inflow reveals that at the beginning of the period, a large part of the total forecast error variance in FDI Inflow is due to the response of its own shocks or FDI Inflow is mainly affected by its own previous values. Over time, the effects of other variables' shocks – for instance, the GDP in USA or Average Tariff – become even more evident but remain a faction compared to the shocks of this variable. This continued dominance indicates that FDI Inflow is autonomous rather than by forces outside it.

For GDP from India and the USA, the panels suggest a rather similar picture in which the initial forecast error variances are dominated by their own shocks. However, over time, other factors contribute more, prominently, and this is evident by the gradual rise in different levels of the grey areas. The coefficients of other variables in the Exchange Rate and the Average Tariff models begin with relative significance, which proves their sensitivity to shocks. For example, disturbances in measures such as GDP and government efficiency may have a direct impact on such elements as exchange rates or tariff policies of a country and might be expressed as higher proportion of the forecast error variances.

Conclusion

A complex interplay of economic, political, and strategic factors is found to characterize the investigation into the Trump Administration's impact on FDI flows from the USA to India. Although a few policies that were introduced in Trump's regime seemed to escalate the entry of FDI, the overall domino effect was mitigated by the strong economic foothold and strategic maneuvers of the two nations. This finding indicates that obvious immediate effects were registered, but long-term effects are not so straightforward as simple policy changes.

The study, ultimately, shows the sensitivity of FDI to political climates, and that stable and predictable policies are necessary to encourage and sustain sound ongoing international investment relationships. Understand this mindset,

countries will continue to wade through the changes of global politics and economics, with the lessons learned from this time serving as a gateway to future decisions and decisions that will without a doubt lead to mutual economic growth and stability of these countries.

Future Research Direction

Pursuing further research as to how political regimes affect FDI, particularly using Vector Error Correction Models (VECM), would be the way future research should proceed. These models would enable a more detailed scrutiny of short-and long-term equilibrium relationships that can surface between variables and help to understand relationships which constitute the observed FDI dynamics. Further investigation of these aspects will give us a better understanding of the underpinnings of the political impacts on economic flows and of international investment strategies within a politically volatile world.

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