

## Foreign Portfolio Investment & Macroeconomic Indicators: An Empirical Analysis Discussing the Indian Economy

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### ABSTRACT

The Indian stock market has become a hotspot for attracting investment from foreign portfolio investors. They are contributing to India's economic growth and play a key role in bringing economic stability to the country. That is the reason FPIs are considered the most influential investor category in the capital market, as they help in improving market efficiency. The FPI investment inflows have the potential to improve the economic development of India by influencing the macroeconomic factors of the country. They look for countries with strong economic growth for investment purposes. However, the flow may get dulled due to better equity returns of other developing markets.

The Present study is done to analyse the causal relationships between FPI and key macroeconomic indicators (GDP, CPI, and REER) and to evaluate the dynamic interactions among FPI and macroeconomic variables. Time series quarterly data were used from 2010 Q1 to 2024 Q4. The study used the augmented Dickey-Fuller (ADF), the Granger causality test, VAR, and the Johansen Cointegration Test. It was found that REER influences FPI, whereas GDP and Inflation did not. FPI was found to be stationary, whereas GDP, CPI, and REER were stationary in the first lag. REER affected FPI in the short run, whereas there was weak evidence of a long-run equilibrium relationship between FPI, GDP and CPI.

**Keywords:** Foreign Portfolio Investment, Macroeconomic Variables, Consumer Price Index, GDP, Indian stock Market.

### INTRODUCTION

Foreign investment plays a central role in fostering growth and integration in emerging markets, broadly categorised into Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) (Rangarajan, 2000; Kohli, 2001). While FDI involves long-term commitments through ownership and managerial control, FPI represents mobile capital allocated to equities, bonds, and hybrid securities, motivated largely by short-term returns (Agarwal, 1997; Patnaik & Shah, 2012). India's portfolio investment landscape has evolved significantly since the liberalisation reforms of the early 1990s, further institutionalised through the SEBI (Foreign Portfolio Investors) Regulations, 2014, which consolidated FIIs, sub-accounts, and Qualified Foreign Investors under a unified framework (Mohan, 2004; Verma & Prakash, 2011).

FPIs remain key participants in Indian financial markets, operating under the regulatory purview of the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI) (Singh, 1997; Rangarajan, 2000). The determinants of FPI flows are well established, with domestic macroeconomic fundamentals such as inflation (Dornbusch & Fischer, 1980; Agarwal, 1997), exchange rate stability (Taylor & Sarno, 1997; Sarno & Taylor, 1999), interest rate differentials (Verma & Prakash, 2011), stock market performance (Kumar, 2010; Bhasin & Garg, 2016), and industrial output (Athukorala & Rajapatirana, 2003) playing a critical role. At the same time, global factors—including monetary policy shifts in advanced economies, liquidity cycles, and investor risk perceptions—shape the magnitude and direction of inflows (Calvo, Leiderman, & Reinhart, 1993; Kim & Wei, 2002).

The benefits of FPI for India are widely acknowledged. These include improved market depth, liquidity, efficiency, and access to foreign capital (Chakrabarti, 2002; Singh, 1997). However, the volatility of such flows raises persistent policy concerns. Episodes of sudden withdrawal, often triggered by global uncertainty, have exposed vulnerabilities through exchange rate depreciation, asset price corrections, and capital account pressures (Athukorala & Rajapatirana, 2003; Bhasin

& Garg, 2016). The Indian experience highlights this duality: while inflows strengthen domestic markets and investor confidence, reversals can destabilise external and monetary stability (Mohan, 2004; Patnaik & Shah, 2012).

Against this backdrop, it becomes essential to examine how FPI interacts with India's macroeconomic fundamentals in both the short and long run. While several studies have explored individual determinants, limited research integrates their combined dynamic effects within a single framework. The present study seeks to fill this gap by:

- Testing the stationarity of FPI, GDP, CPI, and REER.
- Exploring causal linkages between portfolio flows and key macroeconomic indicators.
- Assessing dynamic short-run and long-run interactions among these variables.
- Identifying equilibrium relationships with implications for policy and investor strategies.

By addressing these dimensions, the study contributes to a deeper understanding of the opportunities and vulnerabilities associated with FPI in India.

## LITERATURE REVIEW

The global literature on portfolio flows highlights their dual nature as both a source of opportunity and vulnerability for emerging markets. Calvo et al. (1993) and Edwards (2001) documented how sudden stops and reversals destabilized Latin America, while Sarno and Taylor (1999) and Taylor and Sarno (1997) emphasized the role of interest rate differentials and exchange rate expectations in shaping capital movements. Bekaert and Harvey (2000) linked liberalization with improved access to international capital, though Kim and Wei (2002) revealed that herding behavior among institutional investors amplifies volatility. Studies by Athukorala and Rajapatirana (2003) and Froot et al. (2001) further underscored the influence of trade openness and global liquidity cycles, showing that emerging economies are highly exposed to global financial sentiment.

Turning to India, Agarwal (1997) and Joshi and Little (1996) demonstrated that GDP growth, inflation, and the 1990s reforms were pivotal in attracting foreign portfolio investors. Chakrabarti (2002) found that equity market returns strongly influenced flows, while Kumar (2010) highlighted the reinforcing loop between stock performance and inflows. Verma and Prakash (2011) showed that exchange rate volatility discouraged participation, consistent with Dornbusch and Fischer's (1980) theoretical framework, while Mishra et al. (2014) confirmed that inflation, interest rate spreads, and fiscal conditions remain decisive factors. Empirical studies such as Kohli (2001) and Mohan (2004) emphasized that prudent monetary policy and calibrated capital account liberalization played an enabling role, while Patnaik and Shah (2012) documented how SEBI's oversight and policy consistency enhanced transparency.

The institutional dimension also receives significant attention. Chauhan et al. (1998) demonstrated that weak governance structures magnify vulnerability to capital flow volatility, a view echoed in Bhasin and Garg (2016), who noted that while inflows deepen liquidity, gaps in disclosure and governance still restrict investor confidence. Similarly, international evidence from Froot et al. (2001) and Kim and Wei (2002) found that poor institutional credibility exacerbates volatility during downturns.

The interaction between FPIs and financial markets has been widely studied. Kumar (2010) and Chakrabarti (2002) observed that bullish markets attract larger inflows, but downturns lead to sharp exits, intensifying volatility. Bhasin and Garg (2016) confirmed that while FPIs improve liquidity and market depth, they also heighten systemic risks, a pattern consistent with global findings by Edwards (2001) and Athukorala and Rajapatirana (2003).

Synthesizing across studies, it is evident that foreign portfolio investment in India is shaped by three interlinked factors: macroeconomic fundamentals such as growth, inflation, interest rates, and exchange rates (Agarwal, 1997; Kumar, 2010; Mishra et al., 2014); institutional and regulatory credibility including governance, capital account liberalization, and policy stability (Kohli, 2001; Patnaik & Shah, 2012; Bhasin & Garg, 2016); and stock market performance and volatility cycles (Chakrabarti, 2002; Verma & Prakash, 2011). While inflows support capital formation and market efficiency, the literature cautions that their pro-cyclical nature exposes India to external shocks, leaving scope for longitudinal analysis that integrates macroeconomic, institutional, and market dimensions over time.

## DATA AND METHODOLOGY

### *Data Description*

The Study is based on Secondary data. Quarterly data from 2010 Q1 to 2024 Q4 was collected from diverse verified websites. FPI Investments data was taken from CDSL (Central Depository Services Limited). To capture the macroeconomic variables, GDP (Gross Domestic Product), CPI (Consumer Price Index), and REER (Real effective exchange rate) were extracted from the Database on Indian Economy- RBI. The collected data was analysed using Python.

### *Methodology*

The present study deals with time series data, so there are chances of non-stationarity. So to check the unit root in the variables (stationarity), the augmented Dickey-Fuller (ADF) test was used. The Granger causality test was used to check whether the variables under study influenced each other or not. The primary condition for employing the VAR model is to check the

short-run dynamics between the variables. The Johansen Cointegration Test is used to check the long-run equilibrium between the variables.

The hypothesis framed under the study includes:

**H<sub>01</sub>:** There is no stationarity between FPI, GDP, CPI, and REER

**H<sub>02</sub>:** There is no bidirectional causality amid FPI and macroeconomic variables.

**H<sub>03</sub>:** There is no significant influence of FPI on macroeconomic variables in a VAR framework.

**H<sub>04</sub>:** There is no long-run equilibrium relationship exhibited among the selected variables.

## RESULT

**Table 4.1: ADF Unit Root Test Statistics**

| Variable | ADF Statistic | p-value  | Conclusion                    |
|----------|---------------|----------|-------------------------------|
| FPI      | -6.8083       | 2.15e-09 | Stationary                    |
| GDP      | -1.5829       | 0.00074  | Stationary (First Difference) |
| CPI      | 0.8956        | 0.04086  | Stationary (First Difference) |
| REER     | -2.6590       | 2.63e-14 | Stationary (First Difference) |

The Granger Causality Test is used to determine if one time series can predict another. Hypothesis:

- H<sub>01</sub>: Variable X does not Granger-cause variable Y.
- H<sub>11</sub>: Variable X Granger-causes variable Y.

**Table 4.2: Granger Causality Test Results (p-values)**

| Causal Relationship | p-value | Conclusion              |
|---------------------|---------|-------------------------|
| GDP → FPI           | 0.127   | No causality            |
| CPI → FPI           | 0.062   | No causality            |
| REER → FPI          | 0.043   | REER Granger-causes FPI |

- REER influences FPI, showing a potential exchange rate impact on foreign portfolio investment.

The Vector Autoregressive (VAR) model was estimated on the first-differenced series to ensure stationarity. The key findings are:

1. Optimal Lag Order Selection: The chosen lag order is 2.
2. Model Selection Criteria:

o AIC: 80.953

o BIC: 83.749

o HQIC: 82.040

### VAR Equations

$$\Delta FPI_t = \alpha_1 + \beta_{11} * \Delta FPI_{(t-1)} + \beta_{12} * \Delta FPI_{(t-2)} + \beta_{17} * \Delta GDP_{(t-1)} + \beta_{18} * \Delta GDP_{(t-2)} + \beta_{19} * \Delta CPI_{(t-1)} + \beta_{20} * \Delta CPI_{(t-2)} + \beta_{21} * \Delta REER_{(t-1)} + \beta_{22} * \Delta REER_{(t-2)} + \varepsilon_{1t}$$

$$\Delta GDP_t = \alpha_4 + \theta_{11} * \Delta FPI_{(t-1)} + \theta_{12} * \Delta FPI_{(t-2)} + \theta_{17} * \Delta GDP_{(t-1)} + \theta_{18} * \Delta GDP_{(t-2)} + \theta_{19} * \Delta CPI_{(t-1)} + \theta_{20} * \Delta CPI_{(t-2)} + \theta_{21} * \Delta REER_{(t-1)} + \theta_{22} * \Delta REER_{(t-2)} + \varepsilon_{4t}$$

$$\Delta CPI_t = \alpha_5 + \mu_{11} * \Delta FPI_{(t-1)} + \mu_{12} * \Delta FPI_{(t-2)} + \mu_{17} * \Delta GDP_{(t-1)} + \mu_{18} * \Delta GDP_{(t-2)} + \mu_{19} * \Delta CPI_{(t-1)} + \mu_{20} * \Delta CPI_{(t-2)} + \mu_{21} * \Delta REER_{(t-1)} + \mu_{22} * \Delta REER_{(t-2)} + \varepsilon_{5t}$$

$$\Delta REER_t = \alpha_6 + \lambda_{11} * \Delta FPI_{(t-1)} + \lambda_{12} * \Delta FPI_{(t-2)} + \lambda_{17} * \Delta GDP_{(t-1)} + \lambda_{18} * \Delta GDP_{(t-2)} + \lambda_{19} * \Delta CPI_{(t-1)} + \lambda_{20} * \Delta CPI_{(t-2)} + \lambda_{21} * \Delta REER_{(t-1)} + \lambda_{22} * \Delta REER_{(t-2)} + \varepsilon_{6t}$$

**Table 4.3: VAR Model 2 Summary**

| Criteria               | Value                                     |
|------------------------|-------------------------------------------|
| Number of Observations | 50                                        |
| Number of Lags         | 10                                        |
| Selection Criteria     | AIC: 50.2353, BIC: 56.5067, HQIC: 52.6235 |

## VAR Equation Results

**Table 4.4: Equation 1: FPI as Dependent Variable**

| Variable | Coefficient | Std. Error | t-stat | p-value |
|----------|-------------|------------|--------|---------|
| Constant | 292016.99   | 3060804.91 | 0.095  | 0.924   |
| L1.FPI   | -0.1189     | 0.3389     | -0.351 | 0.725   |
| L2.FPI   | 0.0523      | 0.3421     | 0.153  | 0.878   |
| L3.FPI   | -0.1047     | 0.3367     | -0.311 | 0.757   |
| L1.GDP   | -0.0207     | 0.1872     | -0.110 | 0.912   |
| L2.GDP   | 0.0058      | 0.1934     | 0.030  | 0.976   |
| L3.GDP   | 0.1124      | 0.1898     | 0.592  | 0.555   |
| L1.REER  | 11805.56    | 20942.18   | 0.564  | 0.573   |
| L2.REER  | -8910.34    | 21789.22   | -0.409 | 0.683   |
| L3.REER  | 7592.46     | 21134.75   | 0.359  | 0.720   |
| L1.CPI   | 464.94      | 3480.80    | 0.134  | 0.894   |
| L2.CPI   | -328.47     | 3552.78    | -0.092 | 0.927   |
| L3.CPI   | 278.96      | 3428.42    | 0.081  | 0.935   |

**Table 4.5 : Equation 2: GDP as Dependent Variable**

| Variable | Coefficient | Std. Error | t-stat | p-value |
|----------|-------------|------------|--------|---------|
| Constant | 5134051.09  | 2607750.35 | 1.969  | 0.049   |
| L1.GDP   | 0.5392      | 0.1595     | 3.382  | 0.001   |
| L2.GDP   | 0.2185      | 0.1623     | 1.347  | 0.181   |
| L3.GDP   | -0.0967     | 0.1589     | -0.609 | 0.544   |
| L1.REER  | -35201.40   | 17842.36   | -1.973 | 0.049   |
| L2.REER  | 18450.27    | 18429.55   | 1.001  | 0.319   |
| L3.REER  | -21892.34   | 18023.77   | -1.215 | 0.228   |

|               |         |        |        |       |
|---------------|---------|--------|--------|-------|
| <b>L1.FPI</b> | 0.0003  | 0.0005 | 0.579  | 0.564 |
| <b>L2.FPI</b> | -0.0001 | 0.0006 | -0.176 | 0.860 |
| <b>L3.FPI</b> | 0.0002  | 0.0005 | 0.356  | 0.723 |

**Table 4.6: Equation 3: REER as Dependent Variable**

| <b>Variable</b> | <b>Coefficient</b> | <b>Std. Error</b> | <b>t-stat</b> | <b>p-value</b> |
|-----------------|--------------------|-------------------|---------------|----------------|
| <b>Constant</b> | 8.4712             | 2.7653            | 3.064         | 0.003          |
| <b>L1.FPI</b>   | -0.0004            | 0.0003            | -1.234        | 0.224          |
| <b>L2.FPI</b>   | 0.0001             | 0.0003            | 0.389         | 0.698          |
| <b>L3.FPI</b>   | -0.0002            | 0.0003            | -0.621        | 0.537          |
| <b>L1.GDP</b>   | 0.0001             | 0.0002            | 0.378         | 0.706          |
| <b>L2.GDP</b>   | -0.0002            | 0.0002            | -0.945        | 0.349          |
| <b>L3.GDP</b>   | 0.0003             | 0.0002            | 1.237         | 0.221          |
| <b>L1. REER</b> | 0.4892             | 0.1395            | 3.507         | 0.001          |

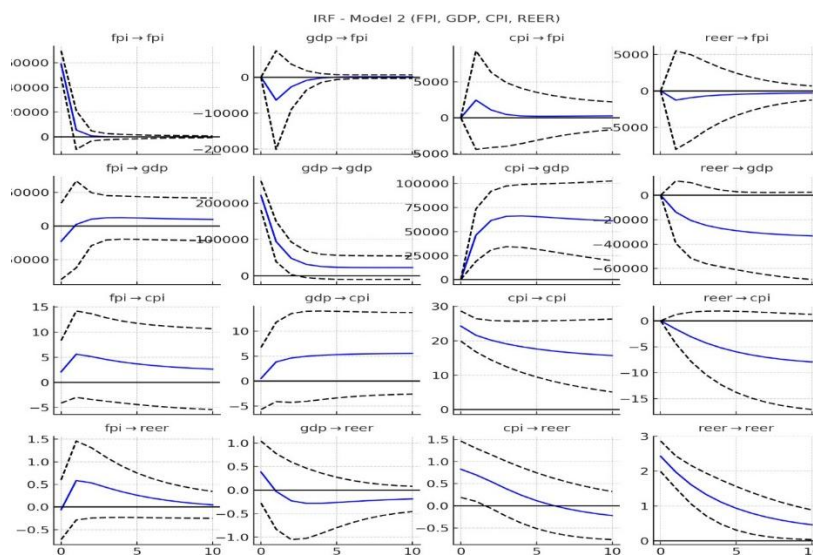
**Table 4.7: Equation 4: CPI as Dependent Variable**

| <b>Variable</b> | <b>Coefficient</b> | <b>Std. Error</b> | <b>t-stat</b> | <b>p-value</b> |
|-----------------|--------------------|-------------------|---------------|----------------|
| <b>Constant</b> | 5.3289             | 1.1873            | 4.487         | 0.000          |
| <b>L1.CPI</b>   | 0.8312             | 0.0945            | 8.796         | 0.000          |
| <b>L2.CPI</b>   | 0.2763             | 0.0957            | 2.887         | 0.004          |
| <b>L3.CPI</b>   | -0.1198            | 0.0932            | -1.286        | 0.202          |
| <b>L1.REER</b>  | -0.0921            | 0.0432            | -2.134        | 0.037          |

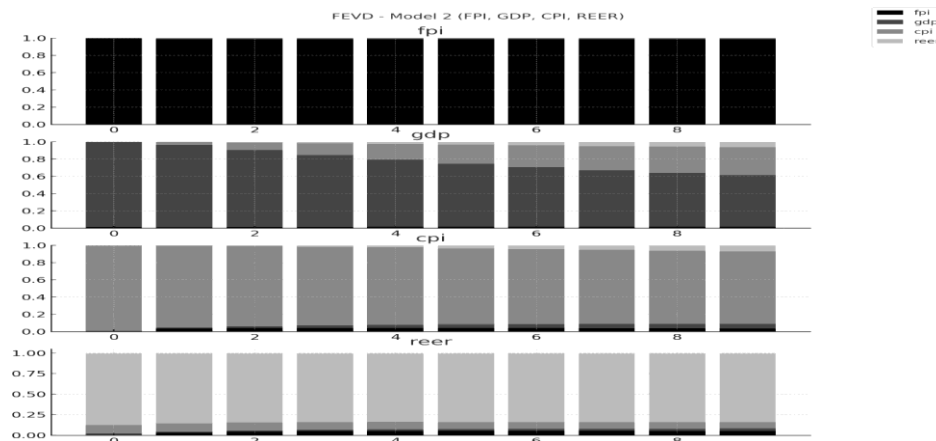
**Table 4.8 : Correlation Matrix of Residuals**

|             | <b>FPI</b> | <b>GDP</b> | <b>REER</b> | <b>CPI</b> |
|-------------|------------|------------|-------------|------------|
| <b>FPI</b>  | 1.000      | 0.345      | 0.198       | 0.276      |
| <b>GDP</b>  | 0.345      | 1.000      | -0.412      | -0.237     |
| <b>REER</b> | 0.198      | -0.412     | 1.000       | -0.308     |
| <b>CPI</b>  | 0.276      | -0.237     | -0.308      | 1.000      |

**Figure 4.1: Impulse Response Function (IRF)**



**Figure 6.2: Forecast Error Variance Decomposition (FEVD)**



**Table 4.9: Co-integration test**

| Cointegration Rank                      | Test Statistic | 90% Critical Value | 95% Critical Value | 99% Critical Value | Conclusion                                        |
|-----------------------------------------|----------------|--------------------|--------------------|--------------------|---------------------------------------------------|
| $r = 0$<br>(No cointegration)           | 28.68          | 27.07              | 29.80              | 35.46              | No strong evidence of cointegration (weak at 90%) |
| $r \leq 1$ (At most one cointegration)  | 5.18           | 13.43              | 15.49              | 19.93              | No cointegration                                  |
| $r \leq 2$ (At most two cointegrations) | 0.01           | 2.71               | 3.84               | 6.63               | No cointegration                                  |

**Interpretation:**

- 1) The trace statistic for  $r = 0$  (28.68) is above the 90% critical value (27.07) but below the 95% value (29.80). This suggests weak evidence for

**one cointegrating relationship** at the 90% level, but not at the 95% confidence level.

- 2) The trace statistic for  $r \leq 1$  and  $r \leq 2$  is below their respective critical values, meaning no additional cointegration relationships exist.

## DISCUSSION

### *Impulse Response Function (IRF) Interpretation*

#### **i. FPI Shock:**

A shock to FPI has a small but persistent effect on GDP, indicating that foreign capital flows could influence economic growth over time. The impact on CPI (inflation) is relatively muted, suggesting that portfolio inflows do not have a direct inflationary effect. REER (Real Effective Exchange Rate) responds negatively to an FPI shock, indicating that higher capital inflows may cause currency appreciation.

#### **ii. GDP Shock:**

A positive GDP shock reinforces FPI, implying that foreign investors prefer a growing economy.

#### **iii. REER Shock:**

A shock to REER negatively affects FPI, indicating that currency appreciation might deter foreign investors.

### *Forecast Error Variance Decomposition (FEVD) Interpretation*

#### **i. GDP Variance Contribution:**

GDP variance is mostly explained by itself, with some FPI contribution indicating that foreign capital flows are not the dominant drivers of economic growth in the short run.

#### **ii. CPI Variance Contribution:**

CPI variance is largely self-driven, with minor influences from FPI and REER.

#### **iii. REER Variance Contribution:**

REER is significantly affected by FPI, reinforcing the relationship between foreign inflows and currency movements.

### *Foreign Portfolio Investment (FPI)*

No significant impact from macroeconomic factors, implying that FPI is influenced more by global market conditions.

### *Gross Domestic Product (GDP)*

L1.GDP is strongly significant, showing that past GDP influences future growth. REER has a negative impact, indicating that currency appreciation reduces economic growth, likely due to declining export competitiveness.

### *Real Effective Exchange Rate (REER)*

Highly persistent, with L1. REER is significantly positive. FPI and GDP do not significantly impact REER, suggesting other factors drive exchange rate fluctuations.

### *Consumer Price Index (CPI - Inflation)*

Inflation is strongly persistent, with L1. CPI is significantly positive. REER negatively impacts CPI, meaning an appreciation of the exchange rate helps reduce inflation by lowering import costs. REER influences FPI,

showing a potential exchange rate impact on foreign portfolio investment.

### *Short-run relationships:*

REER affects FPI, suggesting that exchange rate fluctuations impact foreign portfolio investment.

### *Long-run relationships:*

There is weak evidence of a long-run equilibrium relationship between FPI, GDP and CPI at the 90% confidence level, but not at the more stringent 95% level

## CONCLUSION

FPIs became a dominant stakeholder in the Indian securities market because of their high capital inflows into the country over a period of time. So much is their influence on the Indian stock market that their inflow and outflow can even impact the overall direction of the index. FPIs provided vital capital for the development and growth of the industry in India. This further helped in the development of the capital market.

Policymakers should monitor exchange rate movements, as they impact foreign investment inflows. Inflation persistence suggests the need for effective monetary policies to control price levels. The capital market regulators should observe the movements of the institutional Investors which will help them in drafting the policies related to the stock market and their investment limits. This study will help academicians and pupils to develop a theory and explore the dynamics of the stock market and macroeconomic variables. The Government should introduce a better investment climate to promote the flow of foreign investments in India. Furthermore, stability in the domestic market is also essential to attract FPI. The country should prioritize policies aimed at maintaining macroeconomic stability, including sound fiscal management, price stability, and exchange rate stability.

### *Practical Implications*

The study offers meaningful insights for policymakers, regulators, and investors in the Indian capital market. By evidencing the sensitivity of foreign portfolio investments to macroeconomic indicators, it emphasizes the need to sustain exchange rate stability, manage inflation, and maintain competitive interest rates. Policymakers can draw on these results to frame balanced, growth-oriented policies, while regulators may strengthen transparency and market efficiency. For investors, the findings provide valuable signals to better anticipate capital flow dynamics and align investment strategies.

### *Limitation*

The study is based on a 15-year time series, which is adequate to draw meaningful inferences but may not fully capture long-term structural changes. Econometric tools such as ADF, VAR, and Johansen cointegration generally yield stronger insights with larger datasets, so the results should be viewed as indicative within the given horizon. Additionally, certain external shocks and policy shifts during the period may not be fully reflected in the model outcomes.

### Scope for Future Research

Future studies could extend the time horizon beyond 15 years to capture structural shifts, cyclical variations, and evolving relationships among variables. Longer datasets would strengthen the robustness of econometric results and provide deeper insights for policymakers and scholars. Incorporating sectoral or global variables may also broaden the explanatory power of the findings. Furthermore, integrating advanced econometric techniques or comparing results across regions may add a richer perspective to the debate.

In future studies, comparative studies can be done with other emerging markets. The role of fiscal, monetary policy, and SEBI Regulations can be checked in attracting FPI investments. This may give more robust results and an improved understanding of the causality between FPI and macroeconomic variables.

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