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UNRAVELING THE IMPACT OF FPI AND DII ON INDIAN STOCK MARKET VOLATILITY

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RESEARCH ARTICLE

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Abstract

The purpose of this study is to examine how the flows of domestic institutional investment (DII) and foreign portfolio investment (FPI) impact the price volatility of Indian stock markets. This paper employing econometric models, including GARCH/ARCH models to capture volatility dynamics and the Johansen co-integration test to assess the relationships with secondary data from market indices the Nifty 50 and Sensex from 2006 to 2024. The analysis reveals that unexpected flow of FPI has a positive impact on market volatility. While DII flows play a stabilizing role, especially during the period of uncertainty. And there is ARCH effect in FPI and DII on Capital market. These findings have important implications for policy makers, researchers, regulators and Government.

Keywords: *DII, FPI, SENSEX, NIFTY, GARCH/ARCH, Granger causality test*

1. Introduction

An economy's ability to grow and develop relies heavily on the inflow and outflow of money, particularly in developing countries like China, India, and Brazil that frequently struggle with a lack of indigenous capital. Any corporate venture is built on capital, and the availability of this resource has a major impact on a company's ability to grow and maintain operations. Governments have implemented regulatory changes and liberalized investment frameworks to draw in both domestic and international capital in an effort to close the domestic capital gap (Sharma & Narayan, 2023).

India's capital market activity has risen dramatically in the post-liberalization era due to greater integration with international financial systems. Significant capital inflows from both domestic institutional investors (DIIs) and foreign portfolio investors (FPIs) have been sparked by the desire for higher returns. India's financial markets are now more efficient, have more liquidity, and have higher stock values as a result of these inflows (Mehta & Banerjee, 2023). However, market volatility is frequently triggered by the dominance of FPIs and their globally affected investment decisions. Their quick market entry and exit create volatility, although DIIs' generally cautious and steady conduct tends to reduce such swings (Singh & Pattanaik, 2021).

Market volatility, which is defined by unexpected and unpredictable changes in asset values, has a significant impact on how investments are chosen. It has an impact on important financial methods like portfolio management, risk hedging, asset pricing, and derivatives design (Raj & Sen, 2022). The susceptibility of rising markets like India to external shocks has been highlighted by events like the COVID-19 epidemic, the conflict between Russia and Ukraine, and recurring global financial crises. Massive FPI withdrawals from Indian markets in the early months of the pandemic added to the market's extraordinary volatility. Similar patterns were seen in 2022 when the crisis between Russia and Ukraine broke out, causing a worldwide capital flight to safer assets (Iyer et al., 2020; Ghosh & Goel, 2022).

By directing long-term consumer savings into capital markets, DIIs like mutual funds, insurance providers, and pension funds, on the other hand, contribute to stability. They are an essential counterbalance to unpredictable foreign investments while their investment methods are usually less susceptible to global shocks and more in line with domestic economic fundamentals (Sharma & Narayan, 2023). When FPIs withdrew during times of crisis, such the COVID-19 lockout and the global monetary tightening, DIIs frequently increased their purchasing activity, stabilizing stock market performance (Joshi & Bhattacharya, 2022).
The purpose of this study is to examine how investments made by FPIs and DIIs affect stock market volatility. The format of this document is as follows. Section 2 provides a review of previous study results. The study's data and methodology are described in Section 3. Section 4 reports and analyzes the empirical findings. While Section 5 discusses conclusions,

2. Review of Literature

Review related to the FPI and DII are shown below:
The dynamic relationships between DII flows and Indian stock market returns and volatility were examined by Saxena & Sikdar (2024). The study, which used a vector autoregression methodology, discovered that the most active DII component is mutual funds, and that increasing DII involvement can lower market volatility.

The impact of unforeseen DII and FPI flows on the volatility of large-, mid-, and small-cap equities in Indian markets is examined in the 2020 study by Bhaskar Chhimwal and Varadraj Bapat. Utilizing the TGARCH (1, 1) and ARMA (1, 1) models, we calculate the effect of unexpected volatility-related FPI and DII flows. The study's key finding indicates that unexpected FPI flow positively affects market volatility, but unexpected DII flow lessens this effect. Additionally, the findings indicate that unexpected FPI sales raise volatility more than unexpected purchases. The impact of the unexpected DII flow is especially pronounced in small-cap equities. The study's findings are helpful to regulators and policymakers.

Sethi (2015) this work proposed that international capital flows to Indian capital market under the new scenario. The Study considers time series monthly data on FDI, FPI and FII from April 1995 to December 2014. And used different econometric unit root test models like Dicky- Fuller (DF) test, Augmented- Dicky Fuller (ADF) test and Phillips-Perron (PP) (1988) test. If Coefficient of FDI, FPI and FII under t-statistics value is greater than two are significantly differ from zero, i.e. these have significant influence on economic growth; especially FDI has a positive impact than FII and others.

Gumus and Gungor (2013) study analyses the relationship between FPI and macro-economic variables in a period from 2006-2012, they used 12 macro variables and analysed the data with VAR, Granger Causality Tests and they brief their study, FPI is affected by industrial production index only but FPI also affect the Istanbul stock exchange's stock price index and exchange rate.

Onuorah, Anastasia chi-chi and Akujuobi, Linus Eze (2013) the study considered 30 years as a period from 1980-2010 and analysed the impact of macro-economic variables on FPI in Nigeria during this period. They collected the required data for empirical study from the World Bank database, used Philip-Peron test with a lag free, co-integration test and Granger causality test. It revealed that GDP and Money supply are the inverse relation and other variables have direct relation with FPI and there is no causality between macroeconomic variables and FPI. It concluded that there is no good relation with macro-economic variables and FPI and recommended, countries should make a better policy on investment strategic plan and macro-economic variables for the efficient performance.

Pal (2013) in this paper analysed the volatility in capital market and FII, under this study set aside a section for foreign portfolio investment and its impact on the Sensex. This paper focuses in detail the trend of FPI in Indian capital market and its influence on sensex index of BSE different time periods. FIIs in India are registered as 500, they poses very high control over price movement than other market participants. It leads to the sudden reaction in sensex. Under these circumstances, the researcher asks some questions how this has changed the shareholding pattern of these companies, how the actions of financial institutions (FIIs) and other investment groups during the uncertain post-election period.

Anayochukwu (2012) this work tries to learn the influence of FPI and inflation rate on the stock market returns in Nigeria. The results of this study are found by using multiple regression equation, While the inflation rate has a positive but negligible effect on stock returns, the FPI has a positive and considerable impact on stock market returns. There is unidirectional causality of stock returns to FPI and found with the help of the model Granger causality test. He recommended that FPI induce the stock returns in Nigeria.

Gupta and Sengupta (2012) this study tries to make a trade-off between all the different objectives of macro-economic variables in India. They find an intermediate method to manage the conflicts of objectives in financial trireme like monetary autonomy, exchange rate stability and an open capital account and use multiple methods to deal capital flows (FPI, FDI and Debt). Since 2007 exchange rate flexibility induce to start more independent monetary policy and hand-off approach leads the stagnant reserves to the deterioration of adequate measures.

Oskooee and Hajilee (2012) this work studies the impact of volatility of exchange rate on domestic investment. It analyses the short run volatility and long run volatility of exchange rate by using time series data from 36 countries. The results of the study were having a significant influence in the short run on 27 countries and other 12countries have a long run impact.

Olotu and Jegbefume (2011) this paper examine the FPIs influence on the economic development of Nigeria. A study has taken into consideration Engel- Granger regression model with Error Correction Model (ECM) and the result of this analysis is that FPI has positive relations with the growth rate of real non-oil GDP in Nigeria. Work concludes that the Government should adopt a number of policies to induce FPI flows to the country.

Sumanjeet (2009) this paper focus on composition, regulation, issue, challenges and policies of capital flows into Indian and the world market with segregation of Asia, Latin America and other emerging economies. He considered FDI, FPI, FII, ADR and ECB, its growth in Indian capital market since 1990-2008 with special consideration of inflation rate, exchange rate and foreign exchange reserves. This work concluded that large flows of capital will increase inflation, raises of exchange rates and decrease the current account deficit and short term flows of capital. But sometimes it makes opposite trend. Providing accurate support to

this capital flow is a major element in economic development. So, the Government will take the necessary steps in appropriate time for its fruitful utilisation.

Barna (2006) this work evaluates how the foreign investment flow influence the activities of the economy in Romanian capital market and the direct and indirect flow of FPI is another important choice of the country to aversion of their market risk. FPI make very positive impact on Romanian capital market, its presence make confidence in the mind of domestic investors.

Durham (2003) this work considered FPI and Other Foreign Investment (OFI) other than Non-FDI from 1977 to 2000 about 88 countries, data taken from data bank like OECD, IFS and TIC. OFI make negative influence on growth and FPI also make no impact on it. Empirical results explain non-FDI affect growth indirectly, for this they use OLS cross sectional regression equation, 2SLS regression equation for testing simultaneous bias.

Brink and Viviers (2003) the study mainly focused on the obstacles and difficulties in attracting portfolio investments into Southern Africa. Analyzing the composition of international financial flows, they reached the conclusions that the financial flows into and out of the Southern African region are dominated by flows from and into South Africa. South Africa accounted for 98.3 percent of the region's direct investment abroad, 99.9 percent of FPI abroad and 86.5 percent of total foreign investment assets in the region. The second largest category of investment into the region is FDI. However, the quantum of FDI is insufficient to compensate the shortfall in grants. The study found that the major obstacles for attracting FPI are the underdevelopment of financial markets, macro economic instability, interest rate structures, exchange rate risk, exchange control, tax structures, and inadequate availability of information, underdeveloped telecom infrastructure.

Kim and Shang-Jin (2002) study concentred in Korea, trading patterns of international investors in portfolios both prior to and during the financial crisis. They discovered that different types of investors have displayed distinct trading patterns, and that these variations in trading patterns are caused by different information. Compared to non-resident investors, Korean subsidiaries of international corporations and foreign individual investors were less likely to engage in herding behavior trading. The authors found that although the effect of foreign portfolio investors on Korean stock prices was not underestimated, its influence will become more apparent in emerging markets in the days ahead due to the growing liberalization of capital flows into these areas.

Evan (2002) this work uphold that FPI and FDI are different; we can't say one is "bad" and other is "good". Both are highly complex one and make huge risk in to our economy, but if the necessary regulations are carefully managed or implemented definitely it will bring more benefit to the country and can reduce the negative impact on it.

Froot, O'Connel and Seasholes (2001) this work goes on a basis of "capital flows are the causes of stock price movement," they found capital flows lead price changes from their analysis of daily data on 44 countries and study identified that due to one basis point change in portfolio will take place 40 basis point change in stock prices.

Shah and Thomas (1997) studied on stock market reforms in India. This study used VAR, Efficiency indexes and other econometric techniques on the various stock market indicators like market capitalization, volatility etc from 1991-1996. They conducted a comparative analysis of banks and stock markets and find out that in India, stock markets are more efficient than banks in the case of quality and transaction cost and also stock markets have more freedom to process information. The stock market development plays a key role in assisting the banking sector reforms. Efficient stock markets are the causes of long run growth of the real economy and FPI has the positive impact on real economy through the effect of asset and minimum cost of capital.

Objective of the Study

- To estimate the impact of FPI and DII flows on the Indian Capital Market Volatility.

3. Method

Research Design: The study used descriptive design. The study attempted to examine the impact of FPI and DII on the stock market.

Sources of Data: The study used secondary data (Time series) for the study, which were taken from the web sites of SEBI, RBI, NSDL, CSDL, NSE and BSE during the period from 2006 to 2024. And used Eviews 8 software for modelling and analysing the data.

Data Analysis: As per methodology, study need to learn about the impact of Foreign Portfolio Investment (FPI) and Domestic Institutional Investment (DII) in the Indian capital market. The study tests the volatility using the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) /ARCH model and converts non-stationary data into stationary using Unit Root Test (Dickey Fuller tests). Here, the most general form of the test, namely Augmented Dickey Fuller test is used. The form of the test is given as

$$\Delta y_t = \beta_1 + \beta_2 t + \gamma y_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta y_{t-i} + \varepsilon_t \qquad (1)$$

Where $\gamma = \phi_1 - 1$.

- **Granger Causality Test:** Granger causality test seeks to determine whether past values of a variable help to predict changes in another variable. The null hypothesis (Ho) in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X. The VAR model is used for implementing Granger causality test provided that the variables are stationary.
  The Granger Causality Test involves estimating the following pair of equations:

$$Xt = \sum_i^n = 1\ \alpha i\ Xt - i + \sum_j^n = 1\ \beta i\ Yt - i + \varepsilon it \quad (2)$$
$$Yt = \sum_i^n = 1\ \lambda i\ Yt - i + \sum_i^n = 1\ \theta j\ Xt - i + \varepsilon it \quad (3)$$

The causality between the two is determined by testing the significance of the coefficient of lagged variables in both equations by using the F statistics.

- **Measurement of Volatility:** The present study makes use of GARCH model. To develop the model, consider the model:

$$Yt = \alpha + \beta . Xt + Ut \quad (4)$$

Where Xt is a K*1 vector of explanatory variables and β is a k*1 vector of coefficients. Equation (9) is known as the mean equation. The variance equation modelling volatility, GARCH (p, q) is given as:

σ2t = α0 + α1U2t-1 +……..αpU2t-p + φ1 σ2t-1+……+φpσ2t-q (5)
whereα0 ……..αp, φ1 …… φp are unknown coefficients.

4. Results and Discussion

Table 4.1. Summary of Unit Root Test

Method	Statistic	P-Values
Null: Unit root (assumes a common unit root process)		
Levin, Lin & Chu t	-20.1649	0.0000
Null: Unit root (assumes an individual unit root process)		
Im, Pesaran and Shin W- stat	-22.5907	0.0000
ADF - Fisher Chi-square	385.431	0.0000
PP - Fisher Chi-square	346.250	0.0000

Summary of unit root in first difference is showing stationarity because the Null hypothesis related to unit roots (both common and individual process) is accepted with the probable value of 0.0000.

Table 4.2. DII Impact on Capital market

Null Hypothesis	F-Statistics	P- Values
DII does not Granger Cause NSE NIFTY	2.39981	0.0959
NSE NIFTY does not Granger Cause DII	1.60886	0.205
DII does not Granger Cause BSE SENSEX	0.52737	0.5918
BSE SENSEX does not Granger Cause DII	0.08955	0.9144

Here, null hypothesis that 'DII does not Granger Cause NSE' and BSE is accepted at the 5 % level of significance and there is no causality between DII and NSE Nifty and also FPI & BSE. Essentially, during the study period, these main market indexes neither forecast nor are predicted by DII fluctuations.

Table 4.3. Impact of FPI on capital market

Null Hypothesis	F-statistics	P-Values
FPI does not Granger Cause BSE SENSEX	1.01777	0.3651
BSE SENSEX does not Granger Cause FPI	0.21017	0.8108
FPI does not Granger Cause NSE NIFTY	6.20623	0.0029
NSE NIFTY does not Granger Cause FPI	1.53859	0.2197

* 5% level of significance

Here, 'FPI does not Granger Cause BSE' and 'BSE does not Granger Cause FPI' are accepted, i.e. there is no causality between FPI and BSE Sensex. But there is a unidirectional causality between FPI and NSE Nifty.

- **Result of Volatility**

Table 4.4. Testing FPI's ARCH effect

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1952.772	848.6503	2.301032	0.0214
Variance Equation				
C	5935816.	4553424.	1.303594	0.1924
RESID (-1)^2	-0.130523	0.038241	-3.413199	0.0006*
GARCH (-1)	1.058214	0.056510	18.72629	0.0000*

Table 4.5. Testing DII's ARCH effect

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	7.771282	148.2965	0.052404	0.9582
Variance Equation				
C	22461.05	8598.913	2.612080	0.0090
RESID (-1)^2	0.661087	0.171390	3.857204	0.0001*
GARCH (-1)	0.664438	0.040860	16.26135	0.0000 *

*5%levelof significance

The results show that there is significant ARCH effect in both the FPI and DII series. For both FPI and DII time series, the ARCH-GARCH models' results show a significant ARCH effect. The presence of volatility clustering is indicated by the statistically significant coefficients of the GARCH terms and the lagged squared residuals (RESID (-1)^2). This indicates that previous shocks, whether favorable or unfavorable, to both FPI and DII inflows still have an impact on the volatility of the Indian stock market today.

5. Conclusion

Researchers, regulators, policymakers, and investors are concerned about the behavior of stock prices. Scholars have differing views on stock market volatility and investment flow. This study offers a thorough understanding of stock market volatility and its causality. It can be expanded in a number of ways, such as by using secondary data, which provides additional insight into stock movements. FPI and DII are both important components of the Indian capital market and play an inevitable and crucial role in the market. These results demonstrate how foreign capital dominates the Indian equity market and emphasize the necessity of more DII involvement to reduce volatility. The findings suggest that, in order to lessen reliance on foreign investments, domestic institutions should receive more assistance and a more reliable capital flow monitoring system.

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