

FPI in It Sector: Navigating Investment Flows and Market Volatility

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Abstract

Purpose of the study:

Examining and evaluating the short- and long-term linkages and correlations between foreign portfolio investment flows in the Indian IT sector and the performance of IT companies in the Indian equities market is the aim of this study. This study looks into the effects of foreign portfolio investments in the IT industry on sectoral returns and the volatility of pertinent sector stock indices.

Design/Methodology/Approach:

For an eleven-year period, from April 2012 to March 2023, the current study employs weekly time series data of the FPI, VIX, interest rate, CPI, and exchange rate USD-INR for the IT sector. In order to accomplish the stated goal of the study, this work applies the Granger causality test and the Johansen Cointegration test. After stationarity has been established, the next step is to search for autoregressive conditional heteroscedasticity (ARCH). GARCH (2,1) is the most acceptable predictor for determining the level of volatility in the IT industry because weekly data was used in this study.

Findings:

The results determined that there is a bidirectional Granger Causality between FII-IT movements and Nifty-IT movements. The IT sector's long-term FPI movements were positively correlated with returns, as demonstrated by the findings of Johansen's Co-integration Test. The results also show that as FPIs increase, stock values decrease because stock prices are increasingly susceptible to their selling pressure. A study showed a connection between FII inflows and outflows and surges in the volatility of the IT industry.

Implications and Recommendations:

The study provides policymakers with a number of recommendations for bolstering the Indian stock market. First, given the current state of the economy, India has embraced a policy to encourage Foreign Portfolio Investors (FPIs) in its capital markets. This is because FPIs boost capital inflows into the nation while maintaining the nation's low level of foreign debt. Second, increased financial stability and efficiency are needed by small-cap companies, particularly those that are still developing. Due to this fact, the government must create appropriate rules for their sustainable financial development.

Keywords: FPI, IT, FII NIFTY-IT, RETURNS, RELATIONSHIP, STOCK, VOLATILITY

Introduction

India's IT sector has become one of the main engines of economic expansion, significantly boosting the country's GDP and improving the welfare of its citizens. The IT sector is expected to increase from 7.5% of India's GDP in the fiscal year 2023–2024 to 10% by 2025. Industry after industry is embracing state-of-the-art digital applications, positioning India for

the next phase of its IT revolution. India is regarded by the rest of the world as having one of the largest Internet user bases and the lowest Internet rates, with 76 crore people having access to the Internet at present. As a result of the Digital India Programme's enhanced digital access and solid digital infrastructure base, the production of significant economic value and citizen empowerment are currently the main priorities. India is one of the countries where the fastest rate of digital adoption is occurring. This was made possible by a combination of new digital applications that are already improving and permeating a variety of activities and occupations, improving people's daily lives, and public policy, as well as innovation and investment from the private sector.

Increased foreign investment in the Information Technology sector implies that IT companies can obtain more funding. R&D, expansion, and technological advancement with this money could lead to more sales and profitability. Foreign investors often bring best practices and cutting edge technologies from their own countries. In the IT sector, higher output and efficiency could lead to higher returns. With foreign investment, IT companies can expand into new areas and increase their customer base and possible revenue streams. Increased demand for IT sector equities typically follows the entrance of foreign investors, which can boost stock prices and the sector's total market valuation.

Although foreign investment may boost returns, it may also raise volatility. The IT industry is particularly vulnerable to changes in the global economy and investor sentiment when there is a significant amount of foreign investment. Geopolitical tensions, global economic downturns, and changes in foreign policy are some of the factors that might cause increased volatility. Foreign investments are impacted by changes in exchange rates. Significant variations in exchange rates can have a substantial influence on the returns received by foreign investors, thereby leading to more volatile investing behavior. Foreign investors' speculative investments may increase volatility in the near term. Unexpected capital inflows and withdrawals may cause sharp swings in stock values. Changes to the legislation governing foreign investments, such as restrictions on or increases in compliances.

Generally speaking, industries with high levels of foreign investment are more volatile. This is particularly true for developing economies, where foreign exchange inflows may be less predictable. The Indian IT sector has benefited greatly from foreign investment, as seen by the noteworthy development that companies like Infosys and TCS have achieved. Nonetheless, the business has also seen periods of tremendous volatility due to the status of the global market. Foreign investment in the IT sector may lead to increased capital, technological transfer, and market expansion, all of which could result in higher profitability. It also increases volatility because to its sensitivity to global events, fluctuations in exchange rates, speculative investments, and regulatory difficulties. Professionals in investing can manage the impacts by comprehending these dynamics and using appropriate risk management measures.

Foreign portfolio investments, inflation, interest rates, sectoral performance, and expected volatility all appear to be closely related. The evolution of different economic sectors is greatly influenced by FPIs, and their preferences are frequently influenced by development prospects, regulatory frameworks, and market conditions. Moreover, variations in FII behavior may result from shifts in predicted volatility, which may modify the way money is distributed among various markets and sectors. It is also commonly known that interest rates and exchange rates are related, and that changes in central bank policies have an impact on FPI inflows and outflows, which in turn affects exchange rate movements.

Overall, this analysis provides important insights into the behavior of foreign portfolio investors (FPIs) and how it affects sectoral dynamics and macroeconomic stability by highlighting the intricate and intimate linkages between various financial and economic factors.

Literature Review

Foreign Portfolio Investments (FPIs) are closely monitored due to their potential impact on market dynamics, including volatility. FIIs often invest in Indian equities and debt instruments, influencing market liquidity and asset prices. Studies have shown that their buying or selling behaviors can lead to significant movements in stock prices (Singh & Neog, 2017). FIIs are major participants in the Indian equity market, often influencing price movements through their trading activities. Studies suggest that their investment decisions are driven by numerous causes including global economic conditions, domestic policy changes, and sector-specific developments (Rathore & Sharma, 2021).

FIIs show preferences for certain sectors over others based on growth prospects and regulatory environments. For instance, they tend to favor sectors such as information technology, pharmaceuticals, and financial services, impacting sectoral volatility (Khan & Qureshi, 2019). FIIs contribute to market liquidity and efficiency by providing liquidity during volatile periods and enhancing price discovery mechanisms (Anand & Singhal, 2020). FIIs have shown significant interest in the

Indian IT sector due to its growth potential, technological advancements, and global competitiveness. Their investments often reflect confidence in the sector's ability to capitalize on digital transformation trends worldwide (Singh & Dhir, 2022). Studies suggest that FIIs' investments in the IT sector contribute to its market capitalization and liquidity. Their buying or selling activities can influence stock prices of IT companies, thereby affecting sectoral volatility (Jain & Kumar, 2020). FIIs are attracted to IT firms known for innovation and market leadership in emerging technologies like artificial intelligence, cloud computing, and cybersecurity. Their investments often signal expectations of continued growth and profitability (Mishra & Sahu, 2021).

The regulatory environment governing FIIs in India has evolved to ensure transparency and stability. Changes in regulations, such as investment limits and taxation policies, can affect FII behavior and subsequently market volatility (Subramanian & Arockiasamy, 2018). Policymakers often consider the role of FIIs in market volatility when formulating regulatory policies. Measures such as circuit breakers, position limits, and transparency requirements aim to mitigate excessive volatility caused by FII activities (Singh & Goyal, 2017). Policymakers and market regulators often consider FII impact on volatility when designing market regulations and interventions aimed at maintaining stability (Batra & Yadav, 2020). Regulatory measures and policy decisions can influence FII behavior and their impact on sectoral volatility. Policymakers consider sector-specific risks and opportunities when designing market regulations to ensure stability and investor protection (Pandey & Bhatt, 2018).

FIIs' participation has also been linked to the integration of Indian markets with global financial markets. Their actions can transmit global shocks to the Indian market, impacting volatility levels (Sivaraman & Mahalakshmi, 2016). FIIs can influence volatility through their trading activities, risk perceptions, and responses to global economic conditions. FIIs' trading behaviors can lead to increased volatility, especially during periods of economic uncertainty or geopolitical tensions. Their large-scale transactions can amplify market movements, affecting investor sentiment and risk perceptions (Bhandari & Shukla, 2018). FIIs' trading activities in the IT sector can lead to heightened volatility, particularly during earnings announcements, macroeconomic changes, or global tech sector trends. Their actions amplify price movements, affecting investor sentiment and market stability (Jain & Jha, 2019).

Research indicates that FIIs can amplify stock market volatility during periods of economic uncertainty or financial crises (Mishra & Swain, 2019). Research indicates mixed findings regarding the direct impact of FIIs on volatility. While some studies highlight a positive correlation between FII inflows/outflows and volatility spikes, others suggest that FIIs can also stabilize markets by providing liquidity during turbulent times (Kumar & Singh, 2020). Research indicates that FII inflows into the IT sector can both increase and stabilize volatility, depending on market conditions and investor perceptions. Studies often analyze how changes in FII ownership impact stock price volatility and market efficiency (Srivastava & Sharma, 2020). Behavioral factors, such as herd behavior among FIIs, can exacerbate volatility by triggering mass buying or selling activities based on perceived market sentiment (Gupta & Saikia, 2018).

FPIs play a crucial role in the Indian IT sector due to its global competitiveness and growth potential. Their investments are driven by sector-specific factors such as technological innovation, market leadership, and outsourcing trends (Chakrabarti & Majumdar, 2021). FPI inflows into the IT sector contribute to market liquidity and valuation. Studies indicate that higher FPI participation often correlates with increased trading volumes and market capitalization of IT firms (Bhattacharya & Kumar, 2019). FPI activities in the IT sector reflect investor sentiment and risk perceptions. Their buying or selling decisions can influence stock prices and sectoral volatility, especially during global economic uncertainties or sector-specific events (Chatterjee & Banerjee, 2020).

Research suggests that FPI inflows into the IT sector can exacerbate volatility, particularly during periods of heightened market sensitivity. Their large-scale transactions and sudden exits can trigger price fluctuations and affect market stability (Mukherjee & Mukherjee, 2018). Studies analyze the relationship between FPI ownership and sectoral volatility using statistical models and econometric techniques. They often find a significant impact of FPI flows on stock price volatility and market efficiency within the IT sector (Ghosh & Das, 2021). Policymakers monitor FPI activities closely to manage sectoral risks and maintain market stability. Regulatory interventions, such as position limits and disclosure requirements, aim to mitigate excessive volatility caused by FPI behavior (Sengupta & Saha, 2019).

Research on the relationship between Foreign Institutional Investors (FIIs) and market volatility reveals several key gaps. Firstly, there's ambiguity regarding the causal direction: whether FIIs drive volatility or react to it. Understanding different types of FII behavior and their specific impacts on volatility remains underexplored. Furthermore, studies often overlook variations across regions, market conditions, and the impact of evolving financial instruments used by FIIs. Addressing

these gaps would provide deeper insights into how FIIs influence market volatility, crucial for effective risk management and policy formulation.

Objectives of the Study

Taking into consideration the Nifty IT returns over an eleven-year period, this study aims to investigate and assess the short- and long-term relationships and associations between flows of foreign portfolio investment in the Indian IT industry and the returns of IT businesses in the Indian stocks market. Additionally, an attempt has been made to investigate the impact of foreign portfolio investments in the IT sector on sectoral returns and the volatility of the IT sector stock index.

Methodology & Data Analysis

The current research uses weekly time series data from the IT sector's FPI and the sectoral index from the NSE, or Nifty IT, as well as data from the VIX, interest rate, CPI, and exchange rate USD-INR for an eleven-year period, from April 2012 to March 2023.

The National Stock Exchange website is used for obtaining the Nifty-IT data, and the official NSDL website is used for collecting the fortnightly time series figures on FPI in the IT industry.

Descriptive Statistics of the main two series under consideration is given below:

TABLE 1: DESCRIPTIVE STATISTICS		
STATISTIC	FPI- IT	Nifty-IT
MEAN	-482.3902	15502.14
ST. DEV.	2103.102	8404.672
SKEWNESS	-1.994483	1.144131
KURTOSIS	11.65444	3.160885
JARQUE-BERA	2171.902	125.8502
SUM	-276892.0	8898226.
SUM SQ. DEV	2.53E+09	4.05E+10
OBSERVATIONS	574	574

Table 1 presents statistical instants of the weekly time series data of the FPI in the IT industry as well as the sectoral index of the IT sector, also known as the Nifty IT Index. The investigation found that, during the whole study period (April 2012 to March 2023), Nifty IT had higher mean values than FPIs in the IT sector. The skewness and kurtosis readings revealed information about the two series' underlying distributions. The results showed that the variables for the study period exhibited negative skewness and positive kurtosis. The same shape and contour of the distribution are indicated by skewness and kurtosis. It is likely that each variable's series differ significantly from the normal distribution because both seem to have high Jarque-Bera values.

Every econometric model operates under the fundamental premise that data are stationary. We look for a unit root in the series to verify stationarity. The existence of a unit root indicates that the data are non-stationary. Utilizing the Augmented Dickey-Fuller (ADF) test, data stationarity is verified. The ADF test result, which is displayed in Table 2, verifies that the FPI in the IT sector series and the Nifty IT return series are stationary at level. Rest three series of exchange rate, Inflation and Interest rates are stationary at first difference.

TABLE 2: AUGMENTED DICKEY FULLER TEST(ADF)		
Variables	t-statistics	Probability
FPI-IT at Level	-9.050281	0.0000
Nifty-IT Returns at Level	-23.65695	0.0000
USD/INR Rate at 1 st difference	-22.16254	0.0000
CPI at 1 st difference	-26.05023	0.0000
Interest Rate at 1 st difference	-23.90475	0.0000

In the context of studying the relationship between Foreign Portfolio Investors (FPIs) in the Information Technology (IT) sector and stock market volatility, we applied the Granger causality test to analyze if FPIs' activities Granger-cause changes in volatility levels within the IT sector. A statistical hypothesis test called the Granger causality test is used to assess whether one time series (or variable) can predict another.

Furthermore, the Granger causality test results shown in Table 3 is used to examine the lead-lag relationship between FPI in the IT sector and Nifty-IT returns. The study's conclusions unequivocally refute the theory that Nifty-IT does not produce FPI-Auto, and that vice versa. It was found that Nifty IT granger causes FPI flows in the industry after looking at the causal relationship between Nifty-IT and FPI movement in the IT sector. This demonstrates how the industry's short-term FPI movements may be predicted using Nifty IT values and how FPI flows within the IT sector affect sector returns. The test also showed how interest rates, inflation rates, and currency rates affect the mobility of FPI in the IT industry.

TABLE 3: GRANGER CAUSALITY TEST

Null Hypothesis	F-statistics	Probability
Nifty-IT does not granger cause FPI-IT	33.1127	3.E-14
FPI-IT does not granger cause Nifty-IT	4.65325	0.0099
INT_RATE does not Granger Cause USD_INR	0.6315	0.5321
USD_INR does not Granger Cause INT_RATE	0.0260	0.9743
FPIIT does not Granger Cause USD_INR	0.97913	0.3763
USD_INR does not Granger Cause FPIIT	6.48695	0.0016
INT_RATE does not Granger Cause NIFTY_IT	3.11065	0.0453
NIFTY_IT does not Granger Cause INT_RATE	0.94726	0.3884
CPI does not Granger Cause NIFTY_IT	1.70322	0.1830
NIFTY_IT does not Granger Cause CPI	0.48627	0.6152
FPIIT does not Granger Cause INT_RATE	0.80569	0.4473
INT_RATE does not Granger Cause FPIIT	6.34572	0.0019
CPI does not Granger Cause INT_RATE	0.02849	0.9719
INT_RATE does not Granger Cause CPI	0.38668	0.6795
CPI does not Granger Cause FPIIT	7.69817	0.0005
FPIIT does not Granger Cause CPI	0.52704	0.5906

The Johansen cointegration test is employed to determine the number of cointegrating relationships among a set of time series variables. This test is used to study the long-term relationships and equilibrium between variables, Foreign Portfolio Investors (FPIs) in the Information Technology (IT) sector and stock market volatility. The Johansen Cointegration test findings, shown in Table 3, show that there is some cointegrating vector between FII in the IT sector and Nifty-IT. The fundamental premise of the test is disproved because the Eigen value and Trace value for both series are greater than their tabular values at the 5% level of significance. The null hypothesis was rejected, indicating the presence of a long-term relationship and at least one co-integrating vector between the FPI in the IT sector and the study's Nifty-IT values. This demonstrates that there are certain long-term informational similarities between the IT industry's Nifty-IT and FPI.

TABLE 4: JOHANSEN COINTEGRATION TEST

VARIABLES		Number of Hypothesised Equations	Maximum EIGEN Value	Critical Value at 0.05 Level	TRACE Statistic	Critical Value at 0.05 Level	Probability
FPI- IT	Nifty-IT	None	125.6910	40.07757	199.4651	95.75366	0.000

FPI- IT	Nifty-IT	Atmost 1	41.23703	33.87687	73.77415	69.81889	0.0055
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The GARCH model is employed to capture the volatility of market returns as well as the effect of unforeseen shocks to the FPI-flow on volatility. The stylized fact that asset return volatility responds asymmetrically to return shocks is widely established. In response, volatility is higher with a negative shock than with a positive shock of the same size. Numerous GARCH model variations have been proposed in the literature to account for this asymmetric volatility reaction. To capture this behavior, we employ a GARCH (2,1) model. Initially, we use the AR (1) process to simulate the conditional mean of the return.

The results of GARCH (1,1) volatility forecasting are the most accurate, according to Hansen and Lunde (2001). In this case, GARCH (2,1) is utilized because Hansen and Lunde (2001) also claim that GARCH (p,q) will be used when daily data spans several decades or hourly data spans numerous years. Since this study uses weekly data, GARCH (2,1) is the best predictor to employ for estimating the level of volatility in the IT industry because it reacts swiftly to shocks.

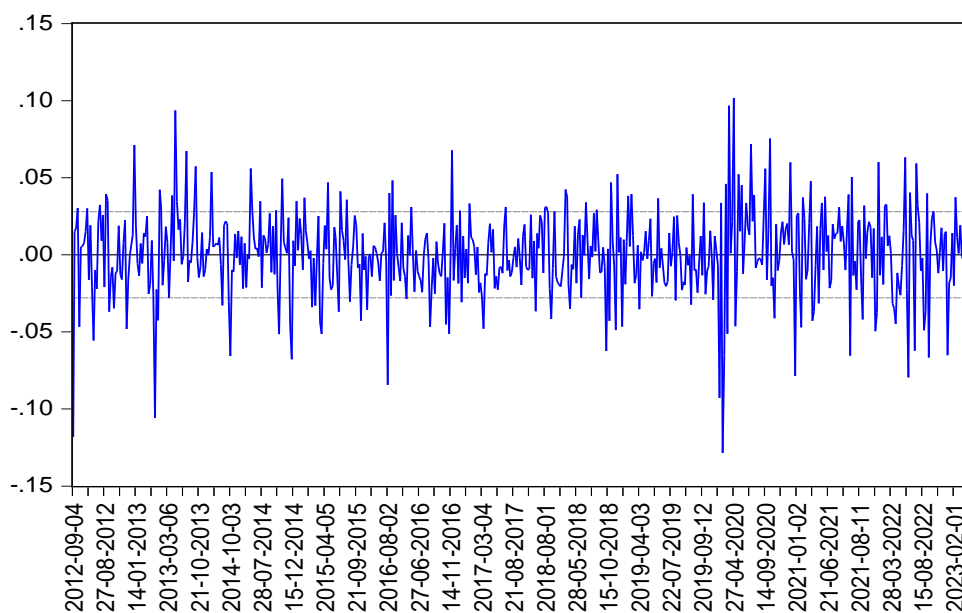


FIGURE 1: VOLATILITY CLUSTERING OF NIFTY IT RETURNS DURING STUDY PERIOD

Table 5 - Model: GARCH (2, 1) [Bollerslev] (Normal)*		
Mean Equation		
Variable	Coefficient	p-value
C	0.021671	0.3691
FPIIT	2.50E-06	0.0000
INT_RATE	-0.000938	0.5151
USD_INR	-0.000272	0.6799
VIX	-0.000419	0.0513
CPI	0.000123	0.7027
Variance Equation		
C(7)	-1.704006	0.0123
C(8)	0.109938	0.2800
C(9)	0.064160	0.5361
C(10)	-0.054027	0.1544
C(11)	0.782515	0.0000

The term " $C(7)=\omega$, $C(8)=$ term starting with α (ARCH term)" describes how much the size of a shock to the variance influences the volatility of the asset's future returns. The p-value for it is 0.0123. As a result, the magnitude of the shock greatly affects the return volatility. The fact that $C(8)$ is positive indicates that the absolute value of the variance in the past and the variance in the present are positively correlated. This implies that the volatility will increase with the size of the shock to the variance.

The term $C(10)$, which starts with γ (leverage effect term), provides information about how the sign of the shock affects the volatility of an asset's returns in the future. We are unable to prove that the sign of shock affects return volatility because the value is negligible. Given that $C(10)$ is negative, there is evidence of the leverage effect and a greater tendency for negative news to enhance volatility than positive news of the same amount.

$C(11)=$ term that starts with β the GARCH term sheds light on the persistence of historical volatility and how historical volatility influences future volatility predictions. The p-value for $C(11)$ is 0.000. As a result, historical volatility aids in forecasting future volatility.

We can infer that the volatility is very persistent and clustering because the GARCH coefficient value is higher than the ARCH coefficient value.

Conclusion and Implications

FPIs play a crucial role in the Indian IT sector, attracted by its global competitiveness, technological innovation, and growth prospects. Their investments often reflect sector-specific trends and market sentiments. FPI activities in the IT sector have a notable impact on stock market volatility. Their trading behaviors, influenced by global economic conditions and sector-specific events, can lead to fluctuations in stock prices and market stability. Study demonstrated a link between FII inflows/outflows and volatility spikes within the IT sector. Study employed econometric models to analyze this relationship, highlighting how FPI activities amplify price movements and affect investor risk perceptions.

FPI participation contributes to enhancing market liquidity and valuation metrics of IT firms. However, their sudden exits or large-scale transactions during volatile periods can intensify market uncertainties. Policymakers and regulators should monitor FPI activities closely to manage sectoral risks and maintain market stability. Measures such as position limits, disclosure requirements, and market surveillance are required to mitigate excessive volatility caused by FPI behavior.

FPI activities reflect broader investor sentiments and risk perceptions towards the IT sector. Their decisions influence market dynamics and investor confidence, impacting overall market sentiment. Effective regulatory frameworks are crucial in managing FPI-induced volatility. Proactive measures can help in balancing market efficiency with stability, ensuring sustainable growth in the IT sector. Future studies could explore the dynamics of FPI impact across different sub-sectors within IT, considering varying technological trends and market responses. Continual assessment of regulatory policies to adapt to evolving market conditions and investor behaviors, ensuring resilience against volatility shocks. While FPIs contribute significantly to the growth and liquidity of the Indian IT sector, their impact on sectoral volatility underscores the importance of robust regulatory oversight and strategic policy interventions. Understanding these dynamics is essential for fostering a stable and resilient market environment conducive to sustainable economic growth.

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