An Analysis of Trading Behaviour of Foreign and Domestic Institutional Investors in the Indian Stock Market : An Empirical Study

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Abstract

India is an attractive investment destination for foreign portfolio investors in order to earn higher returns and risk diversification. FPI investments have predominantly been increasing in the Indian stock market since 1992. In the past two years, domestic institutions have been strong players in the Indian equity markets. The systematic monthly inflows into mutual funds have been impressive, and hence, they have a lot of surplus cash to accumulate some good-quality stocks. This buying by DIIs has saved the market from steep falls during the periods when FIIs resorted to basket-selling. Hence, investment patterns and the behaviour of FPIs and DIIs are dissimilar in the Indian stock market. There is a need to study the presence of feedback trading and causality between institutional investments (FPIs and DIIs) in the Indian stock market. To analyze this, the study took 2440 daily observations (short run) from April 1, 2007 to November 31, 2017 and 128 monthly observations (long run) from April 30, 2007 to November 30, 2017. The total reference period for this study is 10 years and 8 months. The study applied Granger causality test and vector autoregressive model to check the causality and presence of feedback trading between the institutional investments and Nifty returns. The study found that FPIs are positive feedback traders, while DIIs are negative feedback traders in the short run. However, the feedback trading does not exist in the long run. Also, the study proved the existence of bidirectional causality between the institutional investments and the Indian stock market in the short run.

Keywords : **FPIs, DIIs, Nifty return, feedback trading, Granger causality, VAR model**

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The Government of India faced the balance of payments crisis in 1990. To overcome this issue, the Government of India framed the liberalization policy on June 21, 1991. In India, the FIIs are allowed to invest in the financial instruments of the stock market since September 14, 1992. Subsequently, their investments increased in the equity segment of the Indian capital market. After allowing them, there was a huge variation in the behaviour of the stock market indices. Through these reforms, there was an increase in the stock prices, and as a result, there was a huge inflow of foreign investments into the stock market (Bekaert & Harvey, 1997). FIIs' investment in the stock market creates stock price bubbles, which raised the movement of particular stock markets after liberalization (Grabel, 1995). Capital from overseas countries to emerging markets has greatly increased in the last two decades. The emerging stock markets like India, Brazil, and Korea have a good track record of foreign portfolio investment in the stock market (Dhingra, Gandhi, & Bulsara, 2016). Particularly, foreign capital plays an important role and contributes to the economic growth of the nation (Kumar & Devi, 2012). Along with FPIs, the net inflow of DIIs also resulted in a large of amount of investments in the Indian equity market.

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Table 1. Investment Pattern of Institutional Investors (in ₹ crs)

Month	Net Investment by FIIs	DIIs' Net Inflow
Jan–19	127.67	2,146.87
Dec–18	–1,103.37	375.55
Nov–18	4,934.11	1,309.47
Oct–18	–29,201.20	26,033.90
Sep–18	–9,468.68	12,504.04
Aug–18	–2,228.53	2,822.72

Source : Centre for Monitoring Indian Economy

In the past two years, domestic institutions have been strong players in the Indian equity markets. The systematic monthly inflows into mutual funds have been impressive, and hence, they have a lot of surplus cash to accumulate some good quality stocks. This buying by DIIs saved the market from steep falls during the periods when FIIs resorted to basket-selling. The trading behaviour of both FIIs and DIIs is relatively dissimilar (Mukherjee & Roy, 2011). The foreign investors buy more shares when the market goes up and sell less when the market falls ; whereas, the domestic investors buy less shares when the market increases and vice versa, which shows an inverse relationship between FIIs and DIIs (Garg & Chawla, 2015). Foreign portfolio investors are taking efficient decisions in trading over domestic institutional investors due to perceived superiority in investment experience and analytical skills (De & Ghosh, 2019). The institutional investors (FIIs and DIIs) have significantly influenced the Indian equity market since 2008 (Mukherjee & Roy, 2011). The foreign portfolio investors especially contributed significantly to the Indian capital market volatility (Dadhich, Chotia, & Chaudhry, 2015).

Table 1 shows the investment pattern of institutional investors in the Indian capital market. It is observed that foreign institutional investors were the net buyers in the months of November 2018 and January 2019, which indicates that FPIs' purchases were more than the sales during these two months in the Indian stock market, while they were the net sellers in the market, which means FPIs' sales were more than the purchases during August, September, October, and December 2018. On the other side, domestic institutional investors were the net buyers in the Indian equity market during August 2018 – January 2019. Hence, it can be inferred that the investment dominance of domestic institutional investors has been increasing with respect to foreign institutional investors in the Indian capital market.

In this regard, the influence of institutional investors (FPIs and DIIs) has been studied with respect to two theories, that is, base broadening hypothesis and feedback trading hypothesis. According to the base broadening theory, when a market becomes complete, its information flow increases, and also, there is no influence on volatility and returns increase as the cost of investment is low. On the other side, the feedback trading hypothesis states that FPIs are feedback traders, that is, their investments completely depend on the previous day's investment patterns and market returns. FPIs buy the stocks when a market moves towards the positive direction, while they sell the stocks when the market moves towards the negative direction. In order to find which hypothesis holds true, in reality, several studies have been executed regarding the impact of FPIs on the Indian stock market. Hence, the present study makes an attempt to analyze the influence of institutional investors on the Nifty returns and also how the Nifty returns impact the FPIs and DIIs in the short run as well as in the long run scenario. In addition, the study examines the causality between institutional investors and the Indian stock market.

Theoretical Background

The following theories and existing literatures are discussed with regard to the linkages between institutional

investments and the Indian stock market. In this line, the arbitrage pricing theory (APT) model is an extension of the capital asset pricing model (CAPM), which was developed by Stephen Ross in 1976. The basic assumption of this theory states that the movement of asset price does get influenced by various factors but does not get influenced by a single factor. According to finance theory, a portfolio in the host country's stock market contains less risk than a portfolio in the home country's stock markets. If the world stock markets are correlated with other stock markets, then the foreign investors gain a higher rate of return, and risk can be diminished in their portfolio through diversification (Divecha, Drach, & Stefek, 1992).

According to the portfolio balance model, a wealthy stock market will attract huge capital flows from overseas investors ; particularly, emerging markets like India provide a greater investment opportunity for foreign portfolio investors (Chatrath, Ramchander, & Song, 1996). There is a huge variation in the behaviour of the stock market after the entry of FPIs into India (Grabel, 1995). Foreign portfolio investors try to buy more stocks whenever the stock markets increase (Bekaert & Harvey, 1997). Based on this aspect, foreign portfolio investors have followed positive feedback trading in the Indian capital market, which indicates that they buy more stocks when the market increases and sell when the market decreases (Radelet & Sachs, 1998).

On the other side, Srinivasan and Kalaivani (2013) argued that foreign investors followed the positive and negative feedback trading hypothesis during pre and post global financial crisis, respectively. Their investments play a significant role in contributing to the growth of the economy in the country (Kumar & Devi, 2012). The emerging stock markets attract more capital from international investors, which leads to an increase in the demand for the home currency as an outcome of appreciation of the currency. On the other hand, foreign portfolio investors try to sell their stocks when the stock market declines in order avoid risk, which causes the depreciation of the home currency (Frankel & Wei, 1994). An investment decision of FIIs (inflow/outflow) depends on several factors in the host country such as appreciation of exchange rate, gross domestic product, government policies, industrial growth rate, inflation rate, interest rate difference, sentiment of the stock market, and risk and return factors (Agarwal, 1997). Following that, Prasuna (2000) proved that market return is a significant factor to attract more foreign investment into the emerging markets.

Presently, the participation of institutional investors (FIIs and mutual funds) is greater, and their investment activities are playing a crucial role in the Indian equity market since the year 2000. For instance, Kumar (2007) proved that the trading activities of institutional investors had a positive and significant relationship with the stock market as well as with the advance decline ratio. The author also observed that there was a negative relationship between FIIs and MFs. Bidirectional causality was observed between institutional investors and the stock market. On the other hand, according to Thiripalraju and Acharya (2011), mutual fund investments were significantly influenced by the market returns.

Saha (2009) stated that the contribution of FIIs in the equity segment was more than the debt component, while investments made by MFs in the equity component were lesser than the debt component. Similarly, SENSEX negatively correlated with MF inflow while it positively correlated with FIIs' inflow. Kotishwar and Alekhya (2015) stated that Nifty positively correlated with FIIs, DIIs, and MF outflows ; whereas, an inverse relationship with MF inflow was observed. After that, divergent results obtained by Garg and Chawla (2015) revealed that the Indian equity market had a negative and significant relationship with FIIs and DIIs. Later, taking the individual segment of FIIs and MFs, Bhagwat and Marinusdebruine (2016) documented that FIIs' and MFs' purchases had a positive and significant relationship with SENSEX, while FIIs' and MFs' sales had an inverse relationship with the market index. Kumar (2007) observed that the foreign institutional investors followed the investment decisions of mutual funds in the host country. Recently, Venkataraman, Srinidhi, and Chandramouli (2017) pointed out that market returns had a positive and significant relationship with FIIs' gross purchases and MFs' gross sales, while there was an inverse relationship with FIIs' gross sales and MFs' gross purchases. Recently, Salar (2017) documented that DIIs had a negative relationship with SENSEX and also observed that market return Granger caused DIIs' investments (unidirectional). A similar result was obtained by Sathish and Srinivasan

(2018) – the trading patterns of FPIs and DIIs were opposite to each other in the Indian capital market.

Research Questions

- **RQ1 :** Is there an influence of previous investing pattern of FPIs and DIIs on market return or is there an influence of previous market return on investments of FPIs and DIIs ?
- **RQ2 :** Do FPIs and DIIs follow the feedback trading hypothesis in the Indian stock market ?
- **RQ3 :** Is there any cause and effect between the institutional investors and the Indian stock market ?

Objectives

(1) To understand the investment pattern of foreign and domestic institutions' investments in the Indian stock market.

(2) To examine the cause and effect that might exist between the institutional investors and the Indian stock market.

(3) To probe the lead–lag relationship between the institutional investors (FPIs and DIIs) and Nifty returns as well as to analyze the existence of feedback trading between them.

Hypotheses

- **H_1 :** There is causality between the institutional investors and the Indian stock market.
- **H_2 :** Feedback trading does not exist in institutional investment pattern.

Data and Methodology

The study is secondary in nature and the influence of institutional investors (FPIs and DIIs) on the market return in India has been studied by using daily and monthly observations. The study took 2440 daily observations from April 1, 2007 through November 31, 2017 and 128 monthly observations from April 30, 2007 – November 30, 2017. The total reference period for this study is 10 years and 8 months. The data accessibility of selected variables is varied over the period. However, the data on domestic institutional investments (DIIs) in the equity segment were available from April 4, 2007. By considering the DII investments, this study has chosen the above mentioned period. Data on net investment in equity segment by FPIs and DIIs were collected from the Centre or Monitoring Indian Economy (CMIE) and S&P CNX Nifty closing index values were taken from the National Stock Exchange (NSE). Further, the Nifty closing index values were converted into return by using the following formula :

$$Ret_t = \log (P_t / P_t - 1)$$

where,

Ret_t : Market return at different time intervals,

P_t : Closing index points at the end period,

P_{t-1} : Closing index points of previous period.

The study uses two data files because daily data (short run pattern) gives a microscopic view and monthly data (long run pattern) provides a broader view. Before making the analysis, the Phillips – Perron test was applied to remove the trend in the data. Further, the descriptive statistics are analyzed to describe the nature and characteristics of each data. Granger causality test is adopted to check the cause and effect between the chosen variables. Vector autoregressive (VAR) model has been used to probe the lead – lag relationship between the institutional investors (FPIs and DIIs) and Nifty returns as well as to analyze the existence of feedback trading.

Analysis and Results

Unit Root Test

- **H_0 :** There is presence of unit root in the data (i.e $\delta = 0$).
- **H_1 :** There is no presence of unit root in the data (i.e $\delta < 0$).

The following equation is utilized for the Phillips – Perron test.

$$\Delta Y_t = \alpha + \Upsilon Y_{t-1} + \omega_t \quad \text{.....(1)}$$

Table 2 demonstrates the results of the Phillips – Perron test. The results confirm that the null hypothesis is rejected at the 1% level ($p > 0.01$) as the test statistics are more negative, thus proving that the selected series are found to be stationary in the same order $I(0)$.

The descriptive statistics are used to capture the character of each data by using daily and monthly observations.

Table 3 presents the information about the descriptive statistics of the selected variables. Row 1 shows the mean values of all variables, which shows that average FPI net inflow (gross purchase less gross sales) is greater than DII net inflow (gross purchase less gross sales) during the study period. It can be seen that overseas investors are predominantly investing more capital in the Indian stock market, particularly in the equity component. The daily and monthly average movement of S&P CNX Nifty index is 5193.892 and 6176.446, respectively. The maximum FPI net investment in the Indian equity market is ₹ 163577.5 cr with minimum of –51421.70 cr on one day and the maximum is ₹ 337819.6 cr with minimum of –177369.5 cr in one month. On the other side, the maximum DII net inflow is ₹ 51966.00 cr with minimum of –56319.90 cr on one day and the maximum is ₹ 182770.3 cr with minimum of ₹ –175416.1 cr in one month. The market index of S&P CNX Nifty points touch the maximum of 10153.10 and minimum of 2553.150 in a single day, while the maximum index points touch

Table 2. Results of Phillips – Perron Test

Variables	At Level (With Trend and Intercept) (Daily)		At Level (With Trend and Intercept) (Monthly)		Inference
	t-Statistics	Probability	*t*-Statistics	Probability	
Foreign Portfolio Net Investors' Investment (*FPINI*)	–46.98408*	0.0000	–7.6727*	0.0000	Stationary
Domestic Institutional Investors' Net Investment (*DIINI*)	–36.09685*	0.0000	–7.2443*	0.0000	Stationary
S&P CNX Nifty Return	–46.35852*	0.0000	–10.5252*	0.0000	Stationary

Table 3. Descriptive Statistics

	Daily Observations			Monthly Observations		
Frequencies	***FPINI***	***DIINI***	***S&P CNX Nifty***	***FPINI***	***DIINI***	***S&P CNX Nifty***
Mean	2428.592	569.4042	5193.892	51882.63	9160.037	6176.446
Median	1870.000	329.5000	5742.300	51748.00	9352.600	5742.000
Maximum	163577.5	51966.00	10153.10	337819.6	182770.3	10077.10
Minimum	–51421.70	–56319.90	2553.150	–177369.5	–175416.1	2755.100
Std. Dev	10454.52	5683.572	1757.366	103791.8	70309.06	1740.213
Skeweness	2.411955	0.320038	0.333510	0.1611	–0.116046	0.3047
Kurtosis	32.25207	11.82775	2.283025	2.7092	2.9034	2.2746
Jarque – Bera	88371.46	7876.324	96.41640	0.9812	0.3290	4.6753
Probability	0.00000	0.00000	0.00000	0.6122	0.8482	0.0965

10077.10 and minimum points touch 2755.100 in one month.

In order to build any econometric model, it is essential to check whether the time series data have unit root or not. According to Gujarati and Porter (2004), if the time series has unit root, then the results may be spurious. Hence, the study uses the Phillips – Perron test to find the stationarity or non - stationarity in the time series data.

Relationship of Institutional Investors (FPIs and DIIs) and Nifty Returns in the Short Run

Based on the unit root results, the study employs the VAR model to check the relationship between the institutional investors (FPIs and DIIs) and Nifty returns in the short run (daily) as well as the long run (monthly). It is also used to check whether the institutional investors follow feedback trading in the Indian stock market or not.

The first step to estimate the VAR model is lag selection criteria as shown in Table 4. Lag selection criteria is used to determine the number of lagged variables included in the VAR model.

Table 4 presents the information criteria for lag selection, where the first column represents the number

Table 4. Lag Length Criteria (Daily Observations)

Endogenous Variables : ***FPINI DIINI Nifty_Ret***

Exogenous Variables : ***C***

	Daily			Monthly		
Lag	**AIC**	**SC**	**HQ**	**AIC**	**SC**	**HQ**
0	35.66236	35.66950	35.66495	47.0361	47.1073	47.0650
1	35.01229	35.04086	35.02267	46.7749	47.0597	46.8905
2	34.93857	34.98857	34.95675	**46.6388***	47.1373	46.8412
3	34.89839	34.96982	34.92436	46.7247	47.4369	47.0138
4	34.89097	34.99890	34.92473	46.6651	47.5909	47.0409
5	**34.88550***	34.99890	34.92616	46.7320	47.8714	47.1946
6	34.88550	35.02122	34.93484	46.7357	48.0888	47.2850
7	34.88553	35.04267	34.94266	46.8273	48.3940	47.4633
8	34.89008	35.06865	34.95500	46.8865	48.6668	47.6092

Note. * denotes lag order selected by the criterion ; AIC : Akaike Information Criterion ; SC : Schwarz Information Criterion ; HQ : Hannan – Quinn Information Criterion.

of lags selected by default. Column 2 presents Akaike information criterion (AIC), column 3 shows the Schwarz information criterion (SC), and the fourth column replicates Hannan – Quinn information criterion (HQ). The * appearing next to the first column indicates the selection of optimal lag length. In this process, we have selected the lag order on the criteria given by AIC, which is the least value in the column 2 (daily) and column 5 (monthly). Hence, the study chooses lag 5 for daily and lag 2 for monthly observations to estimate the VAR model.

Block Exogenity Granger Causality Test

On the basis of lag selection, Granger causality test is conducted to identify the direction of causality between the selected variables in short as well as long run. The study has framed Granger causality model for three variables.

VAR Granger Causality/ Block Exogeneity Wald tests

(i) ***FPINI*** **Result**

DIINI ->FPINI =>DIINI Granger causes *FPINI*
NIFTYRET ->FPINI =>NIFTYRET Granger causes *FPINI*
DIINI, NIFTYRET ->FPINI => DIINI & NIFTYRET jointly Granger cause *FPINI*

(ii) ***DIINI Result***

FPINI ->DIINI =>FPINI Granger causes *DIINI*
NIFTYRET ->DIINI =>NIFTYRET Granger causes *DIINI*
FPINI, NIFTYRET ->DIINI => FPINI & NIFTYRET jointly Granger cause *DIINI*

(iii) ***NIFTYRET*** **Results**

FPINI ->NFITYRET=>FPINI Granger causes *NIFTYRET*
DIINI->NIFTYRET =>DIINI Granger causes *NIFTYRET*
FPINI, DIINI => FPINI & DIINI jointly Granger cause *NIFTYRET*

Table 5 shows the VAR based Granger causality test to check the direction of causality between the variables. On the basis of the lag length five, the results show that bidirectional causality exists between the institutional investments (FPIs and DIIs) and market index of S&P CNX Nifty in the short run. The selected time series are mutually emphasizing to each other. The FPI and DII trading activities (inflow and outflow) significantly influence the movement of market index at the 1% level ; also, Nifty return does significantly influence the FPI and DII net investments, which points out that attractive FPI and DII flows are substantially determined by performance of the Indian stock market at all five lags. Hence, H_1 is accepted.

However, on the basis of lag length two, there is no causality between the institutional investors (FPIs and DIIs) and market index in the long run. From the monthly observations, it is observed that there is there is bidirectional causality between the FPI net inflow and DII net inflow, which indicates that any changes in the FPI net investment or any changes in DII net investment in the Indian stock market will have an impact on each other in the long run.

Table 5. VAR Granger Causality/Block Exogeneity Wald Tests

Excluded	Dependent Variable : *FPINI* (Daily)			Dependent Variable : *FPINI* (Monthly)		
	χ^2	*Df*	Probability	χ^2	*Df*	Probability
DIINI	376.1483	5	0.0000*	5.6729	2	0.0586**
NIFTYRET	147.0784	5	0.0000*	0.4079	2	0.8155
All	623.5754	10	0.0000*	6.0826	4	0.1931
	Dependent Variable : *DIINI*			**Dependent Variable : *DIINI***		
FPINI	16.94033	5	0.0046*	5.1945	2	0.0745***
NIFTYRET	96.63396	5	0.0000*	2.3836	2	0.3037
All	133.7448	10	0.0000*	12.5542	4	0.0137**
	Dependent Variable : *NIFTYRET*			**Dependent Variable : *NIFTYRET***		
FPINI	10.09912	5	0.0725***	1.3142	2	0.5183
DIINI	44.12515	5	0.0000*	0.7199	2	0.6977
All	56.57033	10	0.0000*	1.4724	4	0.8315

Note. * and *** significant at 1% and 10 % levels, respectively.

Estimation of Vector Autoregressive Model (VAR)

The following VAR models 1, 2, and 3 are employed to analyze the relationship between the institutional investors (both FPIs and DIIs) and Nifty returns in the short run. The first model explains that the net investment of FPIs is dependent on its own 5 days lagged values along with the last 5 days lagged values of DIIs' net investment as well as S&P CNX Nifty returns. Correspondingly, the second model describes DIIs' net investment dependence on its own 5 days lagged values and lagged values of previous days of FPI and S&P CNX Nifty returns. Likewise, the third model demonstrates that the Nifty return is dependent on its own 5 days lagged values and the past days lagged values of FPIs' and DIIs' net investment.

The estimation of VAR model is defined as equation :

$$FIINI_t=\alpha_0+\sum\beta_1 FIINI_{t-1}+\sum\beta_2 FIINI_{t-2}+\sum\beta_3 FIINI_{t-3}+\sum\beta_4 FIINI_{t-4}+\sum\beta_5 FIINI_{t-5}+\sum\beta_6 IINI_{t-1}+\sum\beta_7 DIINI_{t-2}+\sum\beta_8 DIINI_{t-3}+\sum\beta_9 DIINI_{t-4}+\sum\beta_{10} DIINI_{t-5}+\sum\beta_{11} NIFTYRET_{t-1}+\sum\beta_{12} NIFTYRET_{t-2}+\sum\beta_{13} NIFTYRET_{t-3}+\sum\beta_{14} NIFTYRET_{t-4}+\sum\beta_{15} NIFTYRET_{t-5}+\varepsilon_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$DIINI_t=\alpha_0+\sum\delta_1 FIINI_{t-1}+\sum\delta_2 FIINI_{t-2}+\sum\delta_3 FIINI_{t-3}+\sum\delta_4 FIINI_{t-4}+\sum\delta_5 FIINI_{t-5}+\sum\delta_6 DIINI_{t-1}+\sum\delta_7 DIINI_{t-2}+\sum\delta_8 DIINI_{t-3}+\sum\delta_9 DIINI_{t-4}+\sum\delta_{10} DIINI_{t-5}+\sum\delta_{11} NIFTYRET_{t-1}+\sum\delta_{12} NIFTYRET_{t-2}+\sum\delta_{13} NIFTYRET_{t-3}+\sum\delta_{14} NIFTYRET_{t-4}+\sum\delta_{15} NIFTYRET_{t-5}+\varepsilon_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$NIFTYRET_t=\alpha_0+\sum\Upsilon_1 FIINI_{t-1}+\sum\Upsilon_2 FIINI_{t-2}+\sum\Upsilon_3 FIINI_{t-3}+\sum\Upsilon_4 FIINI_{t-4}+\sum\Upsilon_5 FIINI_{t-5}+\sum\Upsilon_6 DIINI_{t-1}+\sum\Upsilon_7 DIINI_{t-2}+\sum\Upsilon_8 DIINI_{t-3}+\sum\Upsilon_9 DIINI_{t-4}+\sum\Upsilon_{10} DIINI_{t-5}+\sum\Upsilon_{11} NIFTYRET_{t-1}+\sum\Upsilon_{12} NIFTYRET_{t-2}+\sum\Upsilon_{13} NIFTYRET_{t-3}+\sum\Upsilon_{14} NIFTYRET_{t-4}+\sum\Upsilon_{15} NIFTYRET_{t-5}+\varepsilon_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

where,

α_0 = Intercept,

t = Notation of time series,

β, Υ, δ = Beta coefficient,

ε = Error term.

The results of fitting bivariate VAR models are provided in Table 6. According to the daily observations, FPI net investments are positively and significantly impacted by market return at lags 1 and 2. In addition, the changes in FPI net inflow are positive and statistically significant with its own five previous days, while a negative

Table 6. Relationship Between Daily Institutional Investments (FPIs & DIIs) and Nifty Returns

Explicated Variables	*FPINI*	*DIINI*	*S&P CNX Nifty Returns*
Explanatory Variables	**Coefficients**	**Coefficients**	**Coefficients**
C	2285.116*	319.8940*	0.0001
	(10.69)	(3.10)	(0.52)
Nifty Return (–1)	136545.0*	–54672.71*	0.0353***
	(11.02)	(–9.16)	(1.69)
Nifty Return (–2)	62201.02*	–22218.68*	–0.0460**
	(4.85)	(–3.59)	(–2.13)
Nifty Return (–3)	11963.23	–5910.087	–0.0464**
	(0.93)	(–0.95)	(–2.15)
Nifty Return (–4)	–9502.771	–10975.78***	–0.0249
	(–0.75)	(–1.79)	(–1.17)
Nifty Return (–5)	–10991.44	–1629.717	–0.0384***
	(–0.87)	(–0.26)	(–1.82)
FPINI(–1)	0.0634*	–0.0262*	0.0000000362
	(3.09)	(–2.65)	(1.04)
FPINI(–2)	0.0516**	–0.0178***	0.0000000646***
	(2.51)	(–1.80)	(1.87)
FPINI(–3)	0.0532*	–0.0039	0.0000000009***
	(2.60)	(–0.39)	(–1.77)
FPINI(–4)	0.0371***	–0.0109	0.000000000783
	(1.82)	(1.11)	(0.22)
FPINI(–5)	0.0377**	–0.0172**	0.0000000485
	(1.99)	(–1.89)	(1.52)
DIINI(–1)	–0.7197*	0.3189*	0.000000057*
	(–16.89)	(15.52)	(–6.37)
DIINI(–2)	0.1189**	0.1067*	0.000000199**
	(2.54)	(4.73)	(2.53)
DIINI(–3)	–0.0845***	0.1121*	0.0000000737
	(–1.80)	(4.95)	(0.93)
DIINI(–4)	–0.0877***	0.0302	0.000000158**
	(–1.86)	(1.33)	(1.99)
DIINI(–5)	–0.0614	0.0895	0.0000000093
	(–1.36)	(4.12)	(–0.38)
R^2	0.33	0.409	0.029

Adjusted R^2	0.33	0.405	0.023
F - Statistics	81.79	111.84	4.936
Probability	0.0000	0.0000	0.0000
Durbin –Watson Statistics	2.00	2.00	1.99
Homoscedasticity	Yes	Yes	Yes
Autocorrelation	No	No	No

Note. * ,** , and *** is significant at 1%, 5%, and 10% levels, respectively.

Figures in brackets indicate '*t*' statistics value.

relationship with the domestic institutional investors at lags 1, 3, and 4 is observed. This clearly highlights that foreign portfolio investors follow the momentum trading strategy or positive feedback trading in the Indian capital market (hence, H_2 is accepted). Their investment decisions in the Indian stock market are based on the previous days' market returns and investment pattern of past five days of FPIs, which confirms the presence of herding behaviour followed by the overseas portfolio investors. The overall first model explains about R^2 is 0.33%, which indicates 33% changes in FPI net investment is explained by the variation in the lagged market return and lagged FPI and DII net investments. The high *F* - statistics value and its probability value are jointly significant, which exposes the strong model fit. It signifies that lagged market return and lagged institutional flows are statistically significant in predicting the future FPI flows into the market.

In Model 2, DII net investment has a negative and statistically significant relationship with S&P CNX Nifty return at lags 1, 2, and 4. Also, an inverse relationship is found with past FPI net inflows at lags 1, 2, and 5, while a positive relationship is observed with its own lagged value till three previous days. The results observed in the preceding model are entirely dissimilar in this model, which point out that DIIs follow negative feedback trading or contrarian investment strategy (hence, H_2 is accepted). The second observation reveals that trading behaviour of FPIs and DIIs is quite opposite to each other in the Indian stock market. However, their portfolio investment decisions depend on the previous days' investment pattern of DIIs due to the presence of herding behaviour among the domestic institutional investors. The explanatory power of the second model is higher as compared to the previous model, and it can be observed from the value of R^2 that a 40% change in DII net investments is explained by the variations in its own past values, lagged FPI net inflows, and S&P CNX Nifty returns. The *F* - statistics results show that DIIs have an ability of predicting the stock return and its flows in the future.

The last model reveals that the movement in the S&P CNX Nifty returns is significantly impacted by its own previous days' positive returns at lag 1 and negative returns at lags 2, 3, and 5. On the other hand, variations in the S&P CNX Nifty returns have been substantially determined by the previous days' positive returns at lag 1 and negative returns at lag 2. Following that, S&P CNX Nifty returns have an inverse relationship with one day lagged DII net inflows, while a positive relationship is observed with lagged DII flows at lags 2 and 4. As compared to the previous two models, degree of determination values are very less, which means that this model shows low explanatory power represented by R^2. Even though the problem of weak explanatory power is present, the probability value of *F* - statistics shows statistical significance.

R^2 < DW test in all three VAR equations indicates that the constructed model does not suffer from spurious results, and it is fit for further interpretation. Finally, the study tests the residual diagnostics check separately for each model. Similar results found for all the models show that there is no autocorrelation and no heteroscedasticity between the residuals.

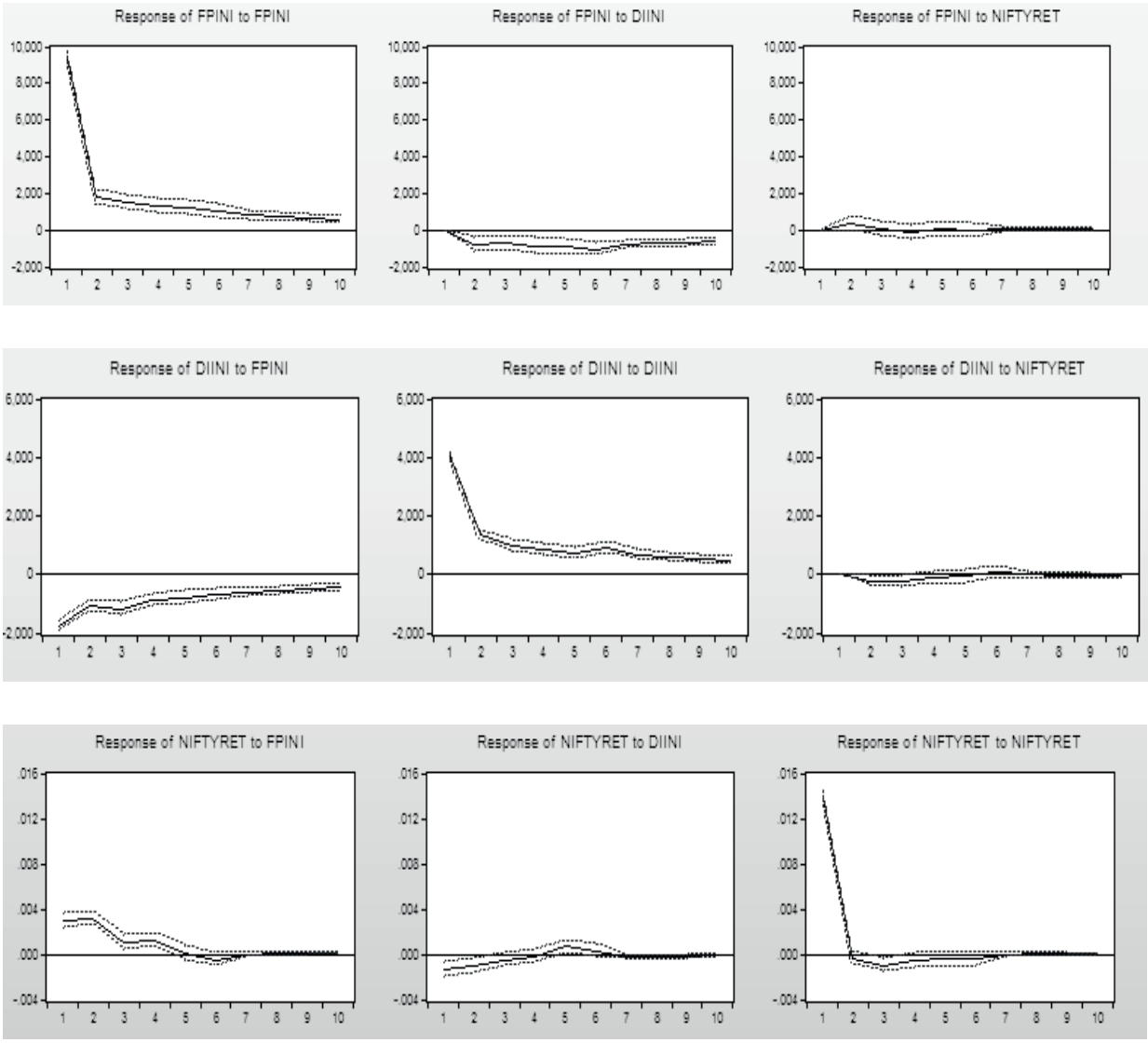
Figure 1 shows the impact of an innovation or error in one variable on all other variables included in the VAR system. The Cholesky decomposition method has been employed to check the shocks in one on other variables, which are presented by multi graphs.

The first row of Figure 1 indicates the impulse response of FPI net investments to FPI net investments.

It implies that the response of FPI net inflow change is positive for each time of the responsive period. However, it has been observed that the change is more volatile for the first two days and its pattern moves consistently for the remaining days. The second graph shows the response to a shock in FPI net investments to DII net investments, which explains that the response is negative, with it being erratic on the second day and gradually moving for the next eight days. The last graph in the same row demonstrates that the response of innovation in FPI net investments on S&P CNX Nifty returns is positive, with small peak on the second day and slowly moving towards the fourth day.

The first graph in the second row shows the response to a shock in DII net investments to FPI net investments. It is captured that DII net inflow shocks to FPI net inflow change is negative for 10 days, and its pattern fluctuates steadily in the same direction. The second graph indicates that the response to a shock in DII net

Figure 1. Impulse Response Function of Daily FPI and DII Net Inflows and Nifty Returns



inflows to DII net inflow variation fluctuates more on the second day, and after that, its pattern continuously decreases for the remaining days. The last graph shows that the response of DII net investments to S&P CNX Nifty returns is negative, with huge volatility in the first two days and gradually moving up in the same line for the next eight days.

The first graph in the third row shows that the response of innovation in S&P CNX Nifty returns to FPI net inflow change is positive upto the third day ; after that, negative shock is witnessed on the fourth day, and it recovers on the next day itself. The shock of S&P CNX Nifty returns on DII net investments is negative on the third day and gradually moves towards the origin line. It can be seen that there is no response in DII net investments when shock or innovation is introduced in the Nifty returns from third day to fourth day. Suddenly, there is a positive change with a small peak on the fifth day and it moves down towards the origin line. The last graph presents that the response of innovation in S&P CNX Nifty returns itself is unpredictable on the second day, and a shock in the Nifty returns is negative from the third day to the seventh day, and recovers on the next day itself and lays on the origin line.

Relationship of Institutional Investors (FPIs and DIIs) and Nifty Returns in the Long Run

As stated in the daily data, the study focuses on the monthly points of institutional investors and market return to ensure whether institutional investors (FPIs and DIIs) and CNX Nifty returns follow a similar strategy in the long run period. The following (5) and (6) VAR equations explain that the institutional investors depend on their own two month lagged values as well as two months lagged return. The equation (7) describes that CNX Nifty return is dependent on lagged two months institutional flows as well as its own lag values.

$$FIINI_t = \alpha_0 + \sum\beta_1 FIINI_{t-1} + \sum\beta_2 FIINI_{t-2} + \sum\beta_3 DIINI_{t-1} + \sum\beta_6 NIFTYRET_{t-2} + \varepsilon_{1t} \quad \text{.....(5)}$$

$$DIINI_t = \alpha_0 + \beta_1 FIINI_{t-1} + \sum\beta_2 FIINI_{t-2} + \sum\beta_3 DIINI_{t-1} + \sum\beta_4 DIINI_{t-2} + \sum\beta_5 NIFTYRET_{t-1} + \sum\beta_6 NIFTYRET_{t-2} + \varepsilon_1 \quad \text{.....(6)}$$

$$NIFTYRET_t = \alpha_0 + \beta_1 FIINI_{t-1} + \sum\beta_2 FIINI_{t-2} + \sum\beta_3 DIINI_{t-1} + \sum\beta_4 DIINI_{t-2} + \sum\beta_5 NIFTYRET_{t-1} + \sum\beta_6 NIFTYRET_{t-2} + \varepsilon_1 \quad \text{.....(7)}$$

where,

α_0 = Intercept,

t = time,

β, Υ, δ = Beta coefficient,

ε = Error term.

The study presents VAR results in Table 7. The Model 1 outcome depicts that FPI net investments are negatively and significantly influenced by the previous months' DII net investments in the Indian equity market. It seems that FPIs do not follow the previous months' investment of other foreign portfolio investors as well as the lagged market return. Therefore, it can be inferred from this model that FPIs do not follow the feedback trading or momentum trading in the Indian equity market in the long run. The explanatory power of the model is only about 15% as indicated by R^2.

Similarly, the second VAR model (Model 2) explains that DII net investments are dependent on their own lagged two month investment pattern and not on the lagged FPI net investment as well as lagged monthly market return. In other words, the past investment pattern of domestic institutional investors tends to be chased by the other domestic institutional investors' inflows, which indicates that DIIs are long term investors. As compared to

Table 7. Relationship Between Monthly Institutional Investments (FPIs & DIIs) and Nifty Returns

Explicated Variables	*FPINI*	*DIINI*	*Nifty Returns*
Explanatory Variables	Coefficients	Coefficients	Coefficients
C	53572.14*	–16224.27***	0.0039
	(3.43)	(–1.66)	(0.36)
Nifty Return (–1)	104475.8	–2452.72	0.0597
	(0.62)	(–0.02)	(0.51)
Nifty Return (–2)	–21602.94	157824.1	–0.0811
	(–0.13)	(1.54)	(–0.70)
FPINI(–1)	–0.0370	0.1428	0.0000000075
	(–0.20)	(1.28)	(0.62)
FPINI(–2)	0.0766	0.1660	0.000000133
	(0.43)	(1.51)	(1.08)
DIINI(–1)	–0.5236**	0.4916*	0.000000127
	(–2.08)	(2.88)	(–0.71)
DIINI(–2)	–0.0601	0.4632*	0.000000126
	(–0.23)	(2.88)	(0.69)
R^2	0.15	0.27	0.01
Adjusted R^2	0.11	0.24	0.01
F - Statistics	3.57	7.39	0.30
Probability	0.0027	0.0000	0.93
Durbin –Watson Statistics	1.97	1.94	1.97
Homoscedasticity	Yes	Yes	Yes
Autocorrelation	No	No	No

Note. * ,** , and *** are significant at 1% ,5%, and 10%, respectively.

Figures in brackets indicate '*t*' statistics value.

the other VAR equation, R^2 is high, which means together, lagged DII net inflow explains about 27% variation in the DII net investments.

The results observed from the Model 3 show that S&P CNX Nifty returns are not dependent on lagged institutional investors' flows and also is found to have very weak explanatory power. The diagnostic results show that there is no problem of autocorrelation and heteroscedasticity between the error term in all the three equations. The overall VAR model shows that both institutional investors do not follow momentum feedback trading or contrarian feedback trading in the Indian capital market. However, their investment decisions are based on current market information and performance of macroeconomic indicators in India.

Conclusion and Implications

This study empirically examines the relationship between institutional investments and the Indian stock market by using daily as well as monthly observations starting from April 1, 2007 through November 31, 2017 and April 30, 2007 to November 30, 2017, respectively. Vector autoregressive model is used to analyze the relation between institutional investments (FPIs and DIIs) and Nifty returns along with their lagged terms. The study concludes that FPIs pursue positive feedback trading (buy more stocks whenever the stock markets increase) in the short

run. Especially, their investment decisions are based on the investment pattern of previous days of other foreign portfolio investors as well as market returns. It is also evidenced that herding behaviour is followed by the overseas portfolio investors in the Indian stock market, a finding which is similar to the study results of Kumar, Gupta, and Sharma (2017).

On the other hand, domestic institutional investors follow negative feedback trading (buy the stocks whenever the market index decreases) in the Indian equity market. It is also confirmed that domestic investors are always looking at the previous days' investment patterns of other domestic investors before making an investment in the Indian equity market. In other words, presence of herding behaviour has been identified among the domestic institutional investors in the short run. Hence, the study accepts the second hypothesis (H_2). However, both FPIs and DIIs do not follow the feedback trading hypothesis in the long run. Therefore, the investment decisions of both foreign and domestic institutional investors depend on current market information and performance of macroeconomic indicators in India. Similarly, there is bidirectional causality existing between the institutional investments and the Indian stock market in the short run, while there is no causality found between the same in the long run. The FPIs' and DIIs' trading activities significantly influence the movement of the market index ; also, Nifty returns do significantly influence the FPI net investments, which points out that attractive FPI and DII flows are substantially determined by performance of the Indian stock market at all five lags during the study period. Therefore, the study has proven the first hypothesis (H_1). This outcome is similar to the study results of Sathish and Srinivasan (2018).

The participation of foreign and domestic institutional investments has been increasing in the financial markets every year. FPIs' and DIIs' investments in the stock market are mainly influenced by various factors (like gross domestic product, inflation, index of industrial production, exchange rate, interest rate, etc.) in the economy. In order to promote more investments and retain them, the government has to maintain the smooth functions of the economy. The trading behaviour of both FPIs and DIIs are quite opposite to each other in the Indian capital market. Therefore, the individual and retail investors can take signals from the trading actions of foreign and domestic institutional investors while taking investment decisions.

Limitations of the Study and Scope for Further Research

The present study is limited to 10 years and 8 months. The study is restricted to only the net investments of FPIs and DIIs, which may not completely represent the movement of individual components of FIIs and DIIs trading in the Indian stock market. In future, research can be carried out with respect to inclusion of individual components of FPIs and DIIs (gross purchase and gross sales) in order to know the influence level of individual components of FPIs and DIIs on the Indian stock market. The study is limited to only one market index, that is, S&P CNX Nifty, which is represented by the Indian stock market. Further, the study can be extended to find the influence of FPIs' and DIIs' investments on various sectoral indices of the National Stock Exchange (NSE).

Author's Contribution

Dr. P. Sathish conceived the idea and developed the qualitative and quantitative design to undertake the empirical study. He extracted research papers of high repute, filtered these based on keywords, and generated concepts and codes relevant to the study design. Also, time series data were gathered from authenticated websites for analysis. Econometric model is framed and analysis for the study has been done with the help of E-Views 8. The necessary interpretation and inferences are given by the author based on the output.

Conflict of Interest

The author certifies that he has no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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