

A Study on Factors Influencing the FII's Capital Flows in Indian Stock Market

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Abstract - The Foreign Institutional Investors (FIIs) have emerged as important players in the Indian equity market in the recent past. FIIs acquisition of shares through stock market has much implication in stock markets especially in the market return, volatility and overall development of the markets. FIIs have strengthened the market, reduced the risk and increased return through wider diversification. The objective of the present study is to identify the factors influencing the FIIs capital flows in Indian stock market. The period of the study is from 1998 to 2019. Secondary data is used for the study. The data analysis was done using Augmented Dickey Fuller Unit Root test, Augmented Engle-Granger Test of Co-Integration, Bi-variate Analysis, Regression Coefficient, Multiple Regression and Granger Causality test. The findings of the study are that the set of factors affecting FII Sales and purchases were not the same. It appeared that some factors would affect purchase or sale decision of foreign investors, but not the corresponding net FII flows.

Keywords: [1], Exchange rate, [2], Foreign Institutional Investments, [3], Foreign Institutional Investors, [4], Gross Domestic Product (GDP), [5], Home Country, [6], Host Country [7], Indian Stock Market and [8], National Stock Market.

I. INTRODUCTION

Investment is the most important pre-requisite for the economic development of a nation. However, many of the developing countries, including India are capital scarce. Hence, these countries rely on funds from other economies to meet their capital requirements. Based on the risk involved, the funds from outside the nation can be basically classified into two: debt creating funds and non-debt creating funds. The debt creating funds are borrowed funds and it should be repaid with interest. The non-debt creating funds are the acquisition of ownership in the productive assets in a country by the foreigners. The important non-debt creating sources of foreign capital are Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI). Foreign Direct Investment is the investment made by an entity based in one country in the business of another country with the objective to obtain control in the business. On the other hand, Foreign Portfolio Investment is the mechanism in which a foreign entity acquires the stocks, bonds and financial assets in another country through stock exchanges, without the objective to obtain control in the business. Hence, such investment is generally short term and volatile in nature. In India, foreign portfolio investment is mainly made by the foreign entities registered with SEBI and they are known as Foreign Institutional Investors (FIIs).

This study analyses the factors influencing FII flow in the Indian market that consider six dependent variables namely: FIIs sales (FIIS), FIIs purchases (FIIP), FIIs total investment

(FIIN) and 7 days moving averages of each of them denoted as FIIS_MA, and FIIN_MA respectively and the following independent variables; Stock return in the host country, Stock return on the major investing country i.e., US, Stock return in emerging countries represented by Morgan Stanley Capital International World Index (MSCI), One day Lag return of host country and investing country markets, Moving average of 7 days return of all index (host and Investing countries), Risk at host country and home country markets, Exchange rate of US \$ v/s Indian Rupee, Federal Bank 3 months treasury bills interest rates, Growth rate of Indian economy represented by the index of industrial production(IIP), One day lag investment of foreign institutional investors, Differential return between host country and investing country markets: and Link relation of host country and investing country market represented by their Beta. Using the descriptive statistics and econometric tools namely ADF Test and Granger Causality Test the results are obtained and interpreted.

II. REVIEW OF LITERATURE

Shrimal and Jhala (2016)² examined causality between FII flows in India and Indian stock market viz. BSE and NSE. They used Descriptive analysis, Correlation Analysis, ADF test, Granger causality test to find causality between FII and BSE, NSE. FII and BSE were found to be negatively associated. As expected, BSE and NSE had strong positive correlation. They found that FII flows are stationery at level but BSE and NSE averages are non-stationery at level but stationary at its first difference. Through Granger causality

test they found that FII granger causes both BSE and NSE; and both BSE and NSE granger causes each other.

Pavabut and Yan (2013)³ evaluated the relationship between foreign investment flow and market return based on the monthly time series data from January 1995 to December 2012. The study observed that the stocks which are preferred by FII are associated with lower required rate of return and vice versa. The price impact of unexpected flows was comparatively higher than the expected flows. The positive relationship between FII flow and market return was stronger in larger stocks than in smaller stocks.

Statement of the problem

The FIIs have emerged as important players in the Indian equity market in the recent past. The behavior of stock market is affected by the globalization of the world economy. The Foreign Investors are attracted by the Asian markets specially India due to many obvious reasons. First of all, growth potential in Asian Markets is higher, secondly its cheaper in countries like India to invest as the costs are low, thirdly there is a higher investor base and fourthly mostly the Asian economies are developing and hence the Governments are welcoming to foreign investors as they play a major role in boosting the growth of the country. The last two decades has led to growing participation of Institutional Investors which includes not only the foreign Institutional investments but also investments by domestic institutional investors. At the same time, there is unrest over the volatility in foreign institutional investment flows and its impact on the stock market and the Indian economy. Apart from the impact they create on the market, their holdings will influence individual firm's performance. The importance of FIIs in Indian equity market is inevitable. With the above settings, the following research questions are addressed:

- What are the factors influencing the FIIs capital flows in Indian stock market?

Objectives of the study

- To identify the factors influencing the FIIs capital flows in Indian stock market.

Hypothesis of the study

The following hypothesis has been framed in consonance with the objective of the study.

- There exists no bidirectional impact between the FIIs and the selected independent variables.

III. RESEARCH METHODOLOGY

Sources of Data

The study contained secondary sources of information. The data for this study obtained FII flows data which is collected from Money Control and Equity Master, the daily returns of SENSEX and NIFTY from BSE and NSE websites

respectively. The data to understand the trend in FII flows is collected from RBI website and information about FII from SEBI website.

Period of the study

The study covers a period of ten years from the financial year 2010-11 to 2018-2019.

Tools Used for Analysis

The data analysis is done through multiple regression, ordinary Least Squares (OLS), augmented Dickey-Fuller Test (ADF), augmented Engle-Granger Test of Co-Integration, bi-Variate Analysis.

IV. ANALYSIS AND DISCUSSION

Dependent Variables: The present study considers six dependent variables namely: FIIs sales (FIIS), FIIs purchases (FIIP), FIIs total investment (FIIN) and 7 days moving averages of each of them denoted as FIIS_MA, FIIP_MA and FIIN_MA respectively. The logic of taking these variables is as follows: Rationally, global investors would continuously adjust investment portfolio round the clock using available market information and thereby tracking the returns on all possible markets. The trading behaviour of these investors can be classified into two categories: (I) Momentum Trading and (II) Herding strategy. In the case of the Momentum Trading or Feedback Trading, the investors have a tendency to buy and sell stocks based on their observed return records i.e. to buy recent winners and sell recent losers. In case of Herding strategy all investors behave in a similar manner and take decision by observing the behaviour of other investors. To capture these behavioral patterns the investor's action may be aggregated and summarized into two basic measures: (I) Sale and (II) Purchase. Hence, we have chosen to examine the nature of FIIs flows to India in terms of three variables: FIIs sales, FII purchases and FIIs net investment. Further, as the time series data have been taken on the daily basis so to remove the effect of day-to-day variation 7 days moving average of the above-mentioned variables have also been taken as dependent variables. Thus, in total 6 dependent variables are taken.

Explanatory Variables: The independent variables considered for this study includes:

- (i) Stock return in the host country;
- (ii) Stock return on the major investing country i.e., US;
- (iii) Stock return in emerging countries represented by Morgan Stanley Capital International World Index (MSCI);
- (iv) One day Lag return of host country and investing country markets;
- (v) Moving average of 7 days return of all index (host and Investing countries);
- (vi) Risk at host country and home country markets;

- (vii) Exchange rate of US \$ v/s Indian Rupee;
- (viii) Federal Bank 3 months treasury bills interest rates;
- (ix) Growth rate of Indian economy represented by the index of industrial production (IIP);
- (x) One day lag investment of foreign institutional investors;
- (xi) Differential return between host country and investing country markets: and
- (xii) Link relation of host country and investing country market represented by their Beta.

V. RESULTS AND DISCUSSION

The result of ADF test in table 1 indicates clearly that all the dependent and independent variables are stationary at level except Federal Bank Interest rate and Industrial Production Index which are stationary at 1st difference and to make them integrated on the level the study used different technique. The different technique might result in loss of long run information which is otherwise essential to return. To deal with the problem Augmented Engle Granger Test was used. This test first estimates the co integration regression using variables having the same order integration.

The co-integration was estimated using OLS method. The stationarity of the residual of the co-integration regression was verified by the use of ADF unit root test. The result of AEG and ADF are given in table 2. It is obvious from this table that error term of the OLS regression explaining the net FII investments (FIIN) by selected major independent variable (such as NSE and MSCI return, risk, FBIR and IIP etc.) is significantly stationary. This implies that the various series are co-integrated.

Bi-Variate Analysis

In order to identify the independent variables, which deserve to be included in the multiple regression technique, the data mining technique was used. For this, bi-variate form of OLS is being used. The values of regression coefficients, coefficients of determination (R^2) and adjusted R^2 values, Standard deviation and Durbin-Watson value. The coefficient of determination (R^2) indicates the percentage of the total variance in the dependent variable, explained by the independent variables. It is noteworthy from the table that the values of the coefficients of determination (R^2) resulting from the various regression equations are very low irrespective of the nature of the variable. The highest explanatory power among the various independent variables, works out in case of BSE Return (61 per cent), followed by BSE Moving Average (48 per cent), NSE Nifty return (41 per cent), and volatility of BSE return (6.8 per cent). Though the above-mentioned values of R^2 are obtained when moving average of net investments by FIIs (i.e., FIIN_MA) is taken as the dependent variables for fitting the OLS equations, the aforesaid phenomenon holds good in case of all of the dependent variables with a few exceptions. Thus, the results

make indication of the dependency of FII flows primarily on past investments by FIIs and the stock market return and volatility.

The table 3 further shows that the regression coefficients concerning BSE Return, BSE_MA, Lagged BSE Return, NSE Return, NSE_MA, Lagged NSE Return and Differential Return 1 and 2 are positive and statistically significant at 5 percent level of significance, so far as the dependent variable FIIN and its seven days moving average (FIIN_MA) are concerned. The next revelation of the table is that both BSE_MA as well as NSE_MA have obtained positive and statistically significant regression coefficient in case of the regression equations having FIIN, FIIN_MA, FIIP and FIIP_MA as the dependent variables. Similarly, lagged BSE Return and Lagged NSE Return have established positive relation with three dependent variables namely FIIN, FIIN_MA and FIIP and FIIP_MA. Thus, net inflows as well as gross purchases of securities are dependent on both current and past information regarding stock returns in Indian capital market.

Regarding the relationship between the return in the foreign stock markets and FIIs flows to India, it may be seen from the table under reference that the return has a positive relationship with all of the dependent variables. However, the regression coefficients pertaining to the two variables MSCI return and S&P return are found insignificant irrespective of the dependent variable. It is also noteworthy that seven days moving average series of the MSCI and S&P 500 is found having positive and significant values of regression coefficient of all the dependent variables.

The volatility in return of both domestic as well as foreign stock markets affects negatively the FII flows to Indian stock market. To be precise, volatility in return of BSE, MSCI and S&P 500 have obtained negative values of regression coefficient against majority of the dependent variables.

Regarding the effect of the various macro-economic factors taken as determinants of FIIs, table shows that Exchange Rate of Indian Rupee with US Dollar has a significant negative relationship with each and every dependent variable representing foreign portfolio investment in India. In contrast, Federal Bank Interest Rate has significant positive relationship with all of the dependent variables. The Federal Interest Rate has a significant positive relationship with all the dependent variables. As expected, FII flows to India are found having positive relationship with growth of Indian economy represented by industrial production index.

Based on the above mentioned bi-variate analysis we established the following multiple regression models:

$$FIIN = f(\text{Constant, BSE, BSE_MA, L_BSE, R_BSE, NSE, NSE_MA, L_NSE, R_NSE, MSCI_MA, R_MSCI, S\&P_MA, R_S\&P, US_EX, FBIR, IIP, L_FIIN, D_RET1, D_RET2, BETA_MSCI, Error term})$$

$$FIIN_MA = f(\text{Constant}, BSE, BSE_MA, L_BSE, R_BSE, NSE, NSE_MA, L_NSE, R_NSE, MSCI_MA, R_MSCI, S\&P_MA, L_S\&P, R_S\&P, US_EX, FBIR, IIP, L_FIIN, D_RET1, D_RET2, BETA_MSCI, \text{Error term})$$

$$FIIS = f(\text{Constant}, MSCI_MA, R_MSCI, R_S\&P, US_EX, FBIR, IIP, L_FIIN, BETA_MSCI, \text{Error term})$$

$$FIIS_MA = f(\text{Constant}, MSCI_MA, R_MSCI, R_S\&P, US_EX, FBIR, IIP, L_FIIN, BETA_MSCI, BETA_S\&P, \text{Error term})$$

$$FIIP = f(\text{Constant}, BSE_MA, L_BSE, R_BSE, NSE_MA, L_NSE, R_NSE, MSCI_MA, R_MSCI, S\&P_MA, R_S\&P, US_EX, FBIR, IIP, L_FIIN, BETA_MSCI, BETA_S\&P, \text{Error term})$$

$$FIIP_MA = f(\text{Constant}, BSE_MA, R_BSE, NSE_MA, R_NSE, MSCI_MA, R_MSCI, S\&P_MA, R_S\&P, US_EX, FBIR, IIP, L_FIIN, BETA_MSCI, BETA_S\&P, \text{Error term})$$

Multiple Regression Model

This analysis has carried out in two stages. In the first stage we took only those variables as regressors, which are selected by data mining technique (as specified in the equations above). In the second stage to improve R² and to make the data free from the autocorrelation we introduced one more independent variable in each model. That is FIIN_MA, FIIS_MA and FIIP_MA in case of FIIN, FIIS and FIIP respectively while in case of other three variables it was their own one-day lag values. The results of (both the stages) multivariate form of OLS applied to examine the significance of various independent variables as determinants of the FII investments in India.

Stage I

The coefficients of determination (R²), and adjusted value of R² in case of stage I of the model vary from 0.32 in case of FIIN to as high as 0.52 when the moving average of the purchase is taken as dependent variable. It means the finally selected explanatory variables explain 32 to 52 per cent of the variation in various dependent variables. Hence, these variables are the important determinants of foreign portfolio investment on the Indian bourses. The values of Durbin-Watson statistics pointed out absence of auto correlation in various models. Regarding the relationship between the independent and dependent variables, most of them are positive except between BSE Return volatility and FIIN_MA, FIIP and FIIP_MA, Beta MSCI and all the dependent variables,

As stated previously, the multiple regression analysis was also conducted in stage two where in the moving average of the basic variables was an additional independent variable and for seven days moving average their one-day lag was taken as additional variable. The results of second stage model.

Stage II

The value R² has raised considerably in case of each of the six models under appreciation. While R² is found the lowest (0.45) in case of FIIN, it was the highest in case of 0.99. Hence, the explanatory power of the models has increased significantly. Similarly, to stage one results, lagged BSE Return, NSE Return, FIIN_MA turned significance in case of model one (i.e. FIIN as dependent variable). The regression coefficient of BSE return, NSE_MA, lagged FIIN_MA turned as significant. Hence, these are the determinants of FIIN_MA. While FIIS is dependent only on FIIS_MA, MSCI's volatility and its beta are found determinants of FIIS_MA. FIIP is caused by lagged BSE return, Beta_S&P 500 and FIIP_MA.

The first stage of daily FII flows indicated that these were stationary in nature (i.e., contained no significant time trend but were auto-correlated). Except the first equation this auto-correlation got reflected in all the regression equation estimated to find out statistically significant covariates of several of the measures of FII flows. This means none of the covariate it related to equity market performance or to the performance of Indian economy could explain lonely or jointly observed auto-correlation of the FII flows. Use of lagged values of the concerned FII flow variable as a regressor, however, removed the auto-correlation altogether. But inclusion of the lagged value of FII flow variable in most of the cases caused the erstwhile significant determinants to turn non-significant. As a result, the only statistically satisfactory regression results turned out to be the ones having market return and lagged value of the concerned FII flow. Such regression results would have economic explanation in terms some kind of dynamic adjustment mechanism being involved in the determination of current daily values a given FII flow. In other words, these results may be taken to mean that for individual FII flow there is a desired level determined solely by BSE return or some variant of it and the actual value constantly tries to reach this desired level.

Causal Relationship

In the last section of this chapter, the results of Granger causality test are given. This test was used to determine causal relationship among the dependent and independent variables under reference. Granger Causality Test is a bi-variate analysis and involves estimates X (Y to X) and Y (X to Y) by using pair of regressions.

H₀₁: There exists no bidirectional impact between the FIIs and the selected independent variables.

The determinants of FIIs purchases, sales and net investments and the moving average of their values, we made an attempt to investigate whether there is any causal relationship between various dependent and independent variables under reference of the study. The table 5 indicates that the hypothesis "FIIN does not Granger causes BSE returns" is accepted. In contrast, its corresponding

hypothesis “BSE return does not Granger causes FIIN” gets rejected at 5 percent level of significance. It refers that net foreign portfolio investment are influenced by the stock market return of the host country. But the vice-versa is not found true. Lagged return (one day lag) is also found causing net foreign investment significantly. Thus, the host country return is the strongest force that attracts foreign institutional investors to India.

The table further reveals that seven days moving average of the NSE return showed bi-directional causality with FIIN which implies that net investment is attracted by current and past information about the return. Risk in the host country is also caused by the foreign institutional investments. Further, risk in the investing country (US Market) affects the quantum of foreign investment in host country. Index of industrial production has a bi-directional causality with net foreign institutional investments. It implies that the industrial growth of a country attracts the foreign investments and later on these investments lead to further development in the host country economy. It is clear that there found no causal relation between exchange rate and foreign portfolio investments.

Further the results of Granger Casualty test with reference to the net investment by the FIIs; let us now present the results of this test in case of gross sales. Table 6 reveals that sale of securities by FIIs has turned as a cause of seven days moving average of return of BSE as well as NSE. FIIS shows a bi-directional relationship with interest rate of three months Treasury bills issued by Federal Bank (FBIR) and Beta of MSCI with BSE, which implies the co-movement in both markets. Sale has also been found as a cause of index of industrial production.

Table 7 states that besides net investments and gross sales, the bi-variate Granger Causality Test was also applied to the gross purchase done by FIIs in the Indian stock market. The results of the same are shown in table 7. It is clearly shown by the table that purchases done by the foreign institutional investors in Indian stock market are having cause and effect relationship with Federal Bank Interest Rate (FBIR), Index of Industrial Production (IIP), one day lagged investment made by the FIIs in Indian market and Beta of MSCI with Indian Stock Market (BSE). But gross purchases by FIIs were found a cause of Beta of S&P and exchange rate of Indian rupees v/s US dollar.

VI. FINDINGS

- All the dependent and independent variables are stationary at level except Federal Bank Interest rate and Industrial Production Index which are stationary at 1st difference and to make them integrated on the level the study used differencing technique.
- The OLS regression explaining the net FII invest-

ments (FIIN) by selected major independent variable (such as NSE and MSCI return, risk, FBIR and IIP etc.) is significantly stationary. This implies that the various series are co-integrated.

- The highest explanatory power amongst the various independent variables, works out in case of BSE Return (61 per cent), followed by BSE Moving Average (48 per cent), NSE Nifty return (41 per cent), and volatility of BSE return (6.8%).
- The regression coefficients concerning BSE Return, BSE_MA, Lagged BSE Return, NSE Return, NSE_MA, Lagged NSE Return and Differential Return 1 and 2 are positive and statistically significant at 5 percent level of significance, insofar as the dependent variable FIIN and its seven days moving average (FIIN_MA) are concerned.
- Both BSE_MA as well as NSE_MA have obtained positive and statistically significant regression coefficient in case of the regression equations having FIIN, FIIN_MA, FIIP and FIIP_MA as the dependent variables. Similarly, lagged BSE Return and Lagged NSE Return have established positive relation with three dependent variables namely FIIN, FIIN_MA and FIIP and FIIP_MA.

VII. SUGGESTIONS

- It is observed that FII's investment activities have led to the mispricing of securities and they behave aggressively in the bull and bear market. Hence, it is necessary that FII's activities should be monitored carefully. Moreover, there is a need to increase the depth of the market by providing proper awareness and investment education.
- Regulatory authority should contain the incidences of secondary market manipulations, which have been rampant during the two decades. Satyam scandal and LIC home loan scandal have affected the perception of foreign investors about the corporate governance practices in India. The regulatory framework should be in line with the international practices. The improvement in regulatory framework is must to regain the confidence of foreign investors towards stock market of India.
- In order to know the real cost of FII investment, the Government must disclose detailed data for the same. Current data pattern only indicates the direction of FIIs selling or buying in the market. It does not disclose the organizational structure and trading strategies of FIIs which are must to estimate the sustainability of FII investment in stock market of India.

VIII. CONCLUSION

The role of investment in promoting economic growth has conventional considerable concentration in India since independence. But the role of foreign institutional investment in the economic development of India is a recent topic of discussion among economists and development planners. FII plays very important role in building up India's Forex reserves, which enabled a host of economic reforms. FIIs are now important investors in the country's economic growth despite sluggish domestic sentiment. The Morgan

Stanley report notes that FII strongly influence short-term market movements during bear markets. The results indicate that the FIIs in India are on growing trend and have been increasing the varied economic patterns. The results state that the various independent variables that the study chooses have significant impact on the dependent variables. Recently, FIIs have become the movers and shakers of the market. Given this growing importance of FIIs for the Indian economy, it is necessary that the energetic of such cross-border portfolio investment in the context of economic growth of the country be examined.

ANNEXURE

Table 1 Augmented Dickey Fuller Unit Root Test

Variable	Constant, Without Trend	Constant, With Trend
BSE	-29.31*, Level	-28.52*, Level
FIIN	-18.20*, Level	-18.05*, Level
FBIR	-22.65*, Ist Difference	-22.14*, Ist Difference
MSCI	-23.65*, Level	-23.08*, Level
NSE	-26.87*, Level	-25.72*, Level
S & P	-29.81*, Level	-27.80*, Level
US_EX	-3.52*, Level	-3.11*, Level
IIP	-31.28*, Ist Difference	-30.77*, Ist Difference
FIIS	-6.87* Level	-6.16* Level
FIIP	-6.54* Level	-9.42* Level

*Hypothesis rejected at 1 per cent significance level

Table 2 Results of Augmented Engle-Granger Test of Co-Integration

ADF Test Statistic	-17.58	1% Critical Value*	-3.52
		5% Critical Value	-3.14
	10% Critical Value		-2.85

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAG(-1)	-0.97	0.042010	-21.92628	0.00
D(LAG(-1))	-0.22	0.034278	-5.568990	0.00
D(LAG(-2))	-0.16	0.022979	-6.148240	0.00
C	-0.18	6.233266	-0.022164	0.81
R-squared	0.58	Mean dependent var		-0.28

Adjusted R-squared	0.57	S.D. dependent var	35.54
S.E. of regression	187.52	Akaike info criterion	11.84
Sum squared resid	1.36	Schwarz criterion	12.55
Log likelihood	-17452.20	F-statistic	52.84
Durbin-Watson stat	2.22	Prob (F-statistic)	0.00

Bi-Variate Analysis

Table 3: Regression Coefficient and other Statistics

Variables	FIIN	FIIN_MA	FIIS	FIIS_MA	FIIP	FIIP_MA
BSE Return Coefficient (P-Value)	428.08* (.016)	114.01* (.00)	174.37 (.73)	127.06 (.74)	1326.32 (.23)	1489.63 (.05)
R ²	.04	.01	.12	.00	.01	.01
Adjusted R ²	.03	.03	.06	.01	.04	.03
S.D	326.76	143.23	712.73	.04	723.34	564.46
DW	2.346	.17	.37	.26	.361	.18
F Value	4.521	27.129	436.43	.17	3.46	1.61
BSE_MA Coefficient (P-Value)	112.08* (.00)	472.14* (.00)	596.70 (.74)	821.22 (.72)	143.47* (.00)	694.11* (.00)
R ²	.26	.48	.00	.09	.08	.05
Adjusted R ²	.16	.54	.02	.13	.05	.07
S.D	361.46	179.78	613.07	542.53	713.26	626.41
DW	2.14	.14	.36	.09	.34	.13
F Value	76.29	183.31	.64	.28	11.86	12.48
Lagged BSE Return Coefficient (P-Value)	340.78* (.00)	730.71* (.00)	30.26 (.86)	57.46 (.97)	220.08* (.01)	1642.31* (.03)
R ²	.28	.20	.00	.04	.03	.03
Adjusted R ²	.36	.18	-.01	-.02	.13	.02
S.D	293.48	173.38	635.78	546.32	682.71	627.56
DW	3.21	.13	.30	.26	.37	.17
F Value	64.04	26.76	.02	.06	4.23	2.24
BSE Return Volatility Coefficient (P-Value)	-227.08* (.00)	-150.04* (.00)	119.24 (.96)	-864.46 (.67)	-708.92* (.00)	-1412.62* (.00)
R ²	.35	.61	.00	.03	.03	.19
Adjusted R ²	.18	.47	-.02	-.01	.01	.12
S.D	318.26	138.33	618.48	546.23	681.09	541.57
DW	2.24	.12	.30	.19	.36	.03
F Value	41.18	148.89	.03	.65	19.14	31.348
NSE Return Coefficient (P-Value)	187.39* (.03)	634.00* (.00)	431.27 (.63)	231.52 (.86)	1345.74 (.29)	1697.40 (.13)
R ²	.02	.28	.00	.03	.01	.01
Adjusted R ²	.04	.17	.04	-.01	.00	.02
S.D	253.39	232.02	667.17	451.80	693.29	566.54
DW	1.15	.14	.39	.19	.42	.05
F Value	46.94	356.11	.251	.20	1.51	3.53
NSE_MA Coefficient (P-Value)	541.60* (.00)	332.10* (.00)	730.60 (.46)	649.13 (.46)	669.08* (.00)	1032.05* (.00)

R ²	.46	.08	.00	.12	.07	.04
Adjusted R ²	.35	.05	.03	.13	.11	.07
S.D	248.38	146.15	583.08	563.57	711.30	644.36
DW	3.35	.13	.24	.07	.30	.45
F Value	81.89	230.37	.06	.10	12.14	16.98
Lagged NSE Return Coefficient (P-Value)	311.07* (.00)	144.28* (.00)	-13.24 (.86)	89.81 (.45)	343.28* (.01)	1649.35* (.07)
R ²	.34	.21	.00	.11	.003	.011
Adjusted R ²	.24	.22	-.02	-.09	.002	.010
S.D	345.56	212.16	537.87	642.55	702.9189	634.3131
DW	3.08	.10	.30	.19	.374	.013
F Value	76.46	60.14	.00	.04	702.9189	20.405
NSE Return Volatility Coefficient (P-Value)	-261.08* (.00)	-968.78* (.00)	281.40 (.23)	143.15 (.23)	172.08* (.00)	9464.03* (.00)
R ²	.02	.41	.01	.05	.07	.11
Adjusted R ²	.04	.46	.12	.02	.09	.10
S.D	213.75	219.04	468.68	364.16	643.64	576.31
DW	1.02	.09	.09	.10	.73	.01
F Value	2.36	154.71	2.50	.46	15.32	21.40
MSCI Return Coefficient (P-Value)	-898.14 (.24)	467.21 (.24)	1432.64 (.35)	1369.13 (.21)	525.44 (.649)	1469.29 (.23)
R ²	.01	.01	.00	.04	.03	.01
Adjusted R ²	.02	.00	.01	.02	.04	.02
S.D	316.1867	214.01	587.02	476.57	643.89	546.78
DW	3.28	.11	.10	.08	.30	.04
F Value	1.16	2.45	.92	1.13	.12	1.53
Lagged MSCI Return Coefficient (P-Value)	265.13 (.62)	562.07 (.35)	1502.82 (.32)	1612.91 (.55)	3186.80 (.20)	2649.65 (.29)
R ²	.00	.03	.08	.00	.01	.01
Adjusted R ²	.01	.02	.07	.01	.00	.00
S.D	331.39	244.72	637.61	461.93	730.60	566.71
DW	1.59	.03	.30	.10	.37	.04
F Value	.161	1.70	.97	.57	1.50	1.59
MSCI_MA Coefficient (P-Value)	1774.18* (.04)	1765.66* (.02)	1987.28* (.00)	1948.47* (.00)	1430.11* (.00)	1709.79* (.00)
R ²	.02	.03	.04	.04	.06	.05
Adjusted R ²	.03	.02	.03	.02	.05	.04
S.D	255.23	144.38	632.74	532.34	673.73	545.49
DW	1.26	.92	.16	.04	.38	.04
F Value	4.81	4.37	7.09	6.07	10.82	9.51
MSCI Return Volatility Coefficient (P-Value)	-882.93* (.00)	-984.07* (.00)	-124.42* (.00)	-622.08* (.00)	-762.68* (.00)	-763.16* (.00)
R ²	.13	.08	.14	.12	.16	.15
Adjusted R ²	.15	.10	.16	.14	.16	.16
S.D	415.13	261.29	641.72	435.29	461.78	484.39
DW	1.17	.37	.17	.45	.04	.28
F Value	31.12	413.76	37.79	467.98	489.05	368.05
S & P 500 Return Coefficient (P-Value)	298.19 (.66)	642.52 (.41)	689.11 (.46)	653.69 (.54)	648.79 (.64)	1325.41 (.55)
R ²	.00	.02	.00	.00	.11	.00
Adjusted R ²	.02	.01	.01	.00	.10	.01
S.D	415.21	186.44	727.85	463.44	653.73	726.57
DW	3.28	.09	.30	.09	.21	.03
F Value	.31	2.56	.22	.32	.24	.56

S & P_MA 500 Return Coefficient (P-Value)	418.65* (.00)	435.18* (.00)	563.11* (.03)	945.54* (.04)	124.09* (.00)	710.07* (.01)
R ²	.08	.02	.00	.11	.01	.03
Adjusted R ²	.07	.02	.01	.10	.00	.02
S.D	296.72	185.37	621.81	561.86	698.75	693.84
DW	3.22	.09	.39	.01	.37	.04
F Value	1.05	3.81	.25	.29	.99	.40
Lagged S & P Return Coefficient (P-Value)	646.20 (.35)	811.32* (.02)	543.42 (.61)	611.51 (.63)	1548.32 (.33)	1462.23 (.32)
R ²	.06	.09	.02	.02	.04	.03
Adjusted R ²	.05	.08	.01	.01	.03	.02
S.D	284.58	190.39	631.57	571.07	706.61	643.86
DW	1.22	.05	.15	.01	.35	.01
F Value	12.51	16.18	2.27	3.95	6.81	5.60
S & P Return Volatility Coefficient (P-Value)	-14722.10* (.00)	-14282.08* (.00)	-82129.07* (.00)	-67120.19* (.00)	-91515.08* (.00)	-18164.44* (.00)
R ²	.26	.31	.24	.20	.26	.30
Adjusted R ²	.24	.34	.23	.21	.24	.32
S.D	325.19	186.98	623.49	502.34	610.07	525.43
DW	1.29	.10	.43	.24	.48	.03
F Value	41.80	159.77	486.17	540.71	464.35	815.26
Exchange Rate Coefficient (P-Value)	-11.58* (.00)	-71.08* (.00)	-68.11* (.00)	-44.88* (.00)	-71.70* (.00)	-89.17* (.00)
R ²	.04	.21	.18	.02	.05	.07
Adjusted R ²	.03	.41	.17	.01	.04	.06
S.D	298.05	196.05	610.89	541.91	658.01	611.65
DW	3.20	.07	.34	.06	.45	.04
F Value	13.30	46.23	1128.42	138.02	164.01	190.97
FBIR Coefficient (3MTB) (P-Value)	09.81* (.09)	08.17* (.00)	41.87* (.00)	72.47* (.00)	63.87* (.00)	41.87* (.00)
R ²	.03	.09	.05	.40	.21	.04
Adjusted R ²	.02	.08	.06	.39	.20	.03
S.D	314.72	213.45	341.24	551.92	715.52	631.93
DW	1.23	.02	.31	.10	.37	.03
F Value	5.84	14.99	49.84	75.02	30.05	58.32
IIP Coefficient (P-Value)	04.21* (.00)	06.82* (.00)	07.07* (.00)	11.87* (.00)	17.87* (.00)	15.87* (.00)
R ²	.07	.18	.05	.16	.11	.06
Adjusted R ²	.06	.17	.04	.17	.12	.05
S.D	325.37	165.41	403.36	364.28	437.23	315.45
DW	5.30	.12	.72	.05	1.08	.01
F Value	65.16	164.10	2116.83	4647.08	4379.49	6369.73
Lagged Investment Coefficient (P-Value)	0.78* (.00)	0.17* (.00)	0.46* (.00)	0.66* (.00)	0.79* (.00)	0.55* (.00)
R ²	.18	.14	.07	.06	.4	.14
Adjusted R ²	.17	.13	.06	.05	.03	.13
S.D	276.65	169.51	634.20	580.33	711.39	625.95
DW	.22	1.30	.33	.01	.59	.10
F Value	554.91	1461.32	13.50	13.17	128.93	156.26
Deferential Return 1 Coefficient (BSE- S & P500) (P-Value)	663.1* (.020)	52.21* (.00)	-136.58 (.82)	-146.75 (.83)	646.14 (.49)	672.22 (.400)
R ²	.03	.08	.00	.00	.03	.06
Adjusted R ²	.02	.07	-.01	.01	.02	.05
S.D	331.86	205.83	646.67	586.57	734.50	641.82
DW	1.74	.18	.39	.09	.30	.03
F Value	4.49	13.59	.06	.05	.74	.78

Deferential Return 2 Coefficient (BSE- MSCI) (P-Value)	66.33* (.00)	11.01* (.00)	-212.01 (.78)	-312.89 (.63)	766.72 (.54)	656.39 (.49)
R ²	.01	.01	.01	.08	.05	.03
Adjusted R ²	.00	.02	.02	.07	.04	.02
S.D	326.02	211.64	336.68	580.48	715.62	646.81
DW	2.22	.13	.39	.01	.30	.01
F Value	1.18	31.28	.07	.17	.83	.65
Beta_MSCI Coefficient (P-Value)	02.87* (.00)	07.88* (.00)	09.85* (.00)	09.87* (.00)	70.19* (.00)	06.87* (.00)
R ²	.07	.23	.25	.08	.22	.30
Adjusted R ²	.06	.22	.24	.07	.21	.29
S.D	323.31	191.46	567.35	486.52	613.87	536.41
DW	4.68	.04	.42	.04	.55	.01
F Value	12.42	34.89	726.06	766.75	716.06	861.25
Beta_S&P 500 Coefficient (P-Value)	3.96 (.20)	1.74 (.30)	8.44 (.07)	04.44* (.00)	03.15* (.00)	07.87* (.00)
R ²	.01	.01	.02	.04	.09	.04
Adjusted R ²	.00	.00	.01	.03	.08	.03
S.D	310.012	184.13	637.84	593.35	726.67	648.71
DW	2.22	.03	.39	.08	.32	.01
F Value	1.18	1.06	3.41	8.02	16.04	7.01

*Note: Figures in brackets are P values that show the significance of value of t- test. * Significant at a level of 5 percent. DW is the Durbin-Watson Value*

Multiple Regression Model

Table 4 Regression Coefficients and other Statistics of Multivariate Analysis (I stage)

	FIIN	FIIN_MA	FIIS	FIIS_MA	FIIP	FIIP_MA
Constant	35.14* (.02)	152.35** (.00)	0.522* (.02)	523.14** (.00)	52.44** (.00)	1414.65** (.00)
BSE Return	44.14* (.04)	84.29** (.00)				
BSE_MA					482.25** (.00)	-4544.7* (.04)
Lagged BSE Return	555.52** (.00)				104.51* (.02)	
BSE Return Volatility		-317.21** (.00)			-5130.83** (.00)	-5215.1** (.00)
NSE Return	511.58* (.06)					
NSE_MA	1823.32** (.01)	741.2** (.00)				
Lagged NSE Return		7.21* (.03)				

NSE Return Volatility	263.56** (.01)				72.03** (.00)	51.45** (.00)
MSCI Return						
Lagged MSCI Return						
MSCI_MA			1.82* (.04)	880.58* (.05)		
MSCI Return Volatility		370.72* (.01)	575.2* (.03)	11.54* (.04)	181.33* (.05)	422.04* (.04)
S & P 500 Return						
S & P_MA 500 Return	23.41* (.05)				86.13* (.03)	303.21* (.02)
Lagged S & P 500 Return		58.06* (.03)				
S & P 500 Return Volatility	48.11* (.02)	57.8* (.02)	44.50* (.04)	27.11* (.05)	894.88* (.03)	73.17* (.03)
Exchange Rate (Rs V/s US \$)	1.96* (.02)	3.98** (.01)	82.21** (.01)	74.15* (.05)	8.85* (.05)	8.16** (.00)
Federal Bank Interest Rate (3MTB)				396.06* (.02)		
Industrial Production Process	0.16** (.00)				0.70* (.04)	
Lagged Investment by FIIs	0.18** (.00)	0.33** (.00)		-582.31* (.03)	36.28** (.00)	369.01* (.04)
Deferential Return 1 (BSE- S & P500)		40.48* (.02)				
Deferential Return 2 (BSE- MSCI)						
Beta_MSCI	-58.00 (.02)	-25.85* (.04)	-2.12* (.02)	-142.01** (.00)	-1.02* (.03)	-8.20* (.05)

Beta_S&P 500				0.00* (.02)	0.00** (.00)	0.02* (.02)
R-Squared	.32	.48	.38	.41	.45	.52
Adjusted R-Squared	.26	.47	.36	.48	.42	.52
S.E.of Regression	182.54	852.14	396.12	412.25	821.94	871.51
Durbin-Watson Stat.	2.02	1.17	1.26	1.37	1.64	1.75

*Significant at 5%

** Significant as 1 %

Figure in parenthesis is p-value of the regression coefficients.

Table 5 Regression Coefficients and other Statistics of Multivariate Analysis (II Stage)

Variables	FIIN	FIIN_MA	FIIS	FIIS_MA	FIIP	FIIP_MA
Constant	-5.20 (.45)	-1.36 (.74)	6.05 (.72)	26.11 (.74)	14.12 (.96)	88.24 (.58)
BSE Return		625.11* (.00)				
BSE_MA						411.00* (.04)
Lagged BSE Return	4852.96* (.00)				11.78* (.03)	
NSE Return	8985.11* (.05)					
NSE_MA		186.89* (.00)				
MSCI Return Volatility				15.87** (.04)		
S & P 500 Return Volatility				4855.31* (.01)		
Deferential Return 1 (BSE-S & P500)		9877.30* (.00)				
Beta_MSCI				1.55* (.02)		2.84* (.04)

Beta_S&P 500					56.98* (.00)	
FIIN_MA	9.77* (.00)					
FIIS_MA			78.11* (.00)			
FIIP_MA					65.45* (.00)	
1 Lag FIIN_MA		5.81* (.00)				
1 Lag FIIS_MA				6.98* (.00)		
1 Lag FIIP_MA						8.84* (.00)
<i>R-Squared</i>	.45	.92	.81	.99	.86	.99
<i>Adjusted R-Squared</i>	.43	.90	.86	.99	.83	.98
<i>S.E. of Regression</i>	238.11	61.22	241.55	59.84	260.11	69.41
<i>Durbin-Watson</i>	6.98	4.12	3.54	6.32	5.54	4.49

*Significant at 5%

** Significant as 10 %

Figure in parenthesis is p-value of the regression coefficients

Causal Relationship

H02: There exists no bidirectional impact between the FIIs and the selected independent variables.

Table 6 Granger Causality Test (with FIIN)

H ₀ / Lags	2	3	4	5	6	7
BSE does not Granger Cause FIIN	21.32*	25.74*	36.14 *	54.44*	15.85*	13.55*
FIIN does not Granger Cause BSE	2.23	2.45	1.45	1.36	1.04	1.21
L_BSE does not Granger Cause FIIN	0.96*	8.91*	6.44*	5.84*	4.36*	3.78*
FIIN does not Granger Cause L_BSE	2.58	2.81*	1.30	1.12	1.09	1.36
NSE does not Granger Cause FIIN	5.80*	30.50*	22.99*	18.15*	15.46*	13.25*
FIIN does not Granger Cause NSE	2.82	1.84	0.90	0.04	0.82	0.80
NSE_MA does not Granger Cause FIIN	22.62*	16.03*	12.12*	12.18*	10.47*	9.90*
FIIN does not Granger Cause NSE_MA	5.18*	6.15*	5.70*	5.26*	4.46*	4.15*
R_NSE does not Granger Cause FIIN	6.10*	2.369	1.43	1.84	1523	0.75
FIIN does not Granger Cause R_NSE	7.69*	5.20*	4.34*	3.65*	3.11*	2.61*
R_S&P does not Granger Cause FIIN	7.84*	3.42*	2.15	1.50	1.71	1.35
FIIN does not Granger Cause R_S&P	1.37	2.26	2.86*	2.28*	1.21*	1.61
S&P_MA does not Granger Cause FIIN	1.75*	1.83*	1.36*	1.57*	1.67*	1.61*
FIIN does not Granger Cause S&P_MA	2.36*	2.58*	2.57*	1.62*	1.49*	1.42*
US_EX does not Granger Cause FIIN	1.66	0.74	0.33	0.87	0.79	0.30
FIIN does not Granger Cause US_EX	1.18	1.03	1.81	1.21	1.39	2.56
IIP does not Granger Cause FIIN	12.75*	6.52*	4.89*	3.77*	2.33*	2.18*
FIIN does not Granger Cause IIP	3.28*	3.52*	2.87*	2.35*	2.26*	2.29*
L_FIIN does not Granger Cause FIIN	21.83*	2.36*	3.47*	1.51*	3.75*	4.44*
FIIN does not Granger Cause L_FIIN	6.75*	5.56*	3.48*	6.49*	5.90*	7.16*

F-Values are given in table * H₀ Rejected at 5% Level of Significance

Table 7 Results of Granger Causality Test (with FIIS)

H ₀	Value of F-Static at lag 2
BSE_MA does not Granger Cause FIIS	10.10
FIIS does not Granger Cause BSE_MA	24.13*

NSE_MA does not Granger Cause FIIS FIIS does not Granger Cause NSE_MA	50.99 23.28*
R_NSE does not Granger Cause FIIS FIIS does not Granger Cause R_NSE	11.71 21.28
US_EX does not Granger Cause FIIS FIIS does not Granger Cause US_EX	28.85 11.54
FBIR does not Granger Cause FIIS FIIS does not Granger Cause FBIR	64.81* 5.39*
IIP does not Granger Cause FIIS FIIS does not Granger Cause IIP	87.41* 1.21
L_FIIN does not Granger Cause FIIS FIIS does not Granger Cause L_FIIN	0.78 0.46
BETA_MSCI does not Granger Cause FIIS FIIS does not Granger Cause BETA_MSCI	13.05* 14.54*

* Rejected at a significance level of 5 percent

Table 8
Results of Granger Causality Test (with FIIP)

H ₀	Value of F-Static at lag 2
L_BSE does not Granger Cause FIIP FIIP does not Granger Cause L_BSE	29.76 30.99
BSE_MA does not Granger Cause FIIP FIIP does not Granger Cause BSE_MA	71.02 81.79
NSE_MA does not Granger Cause FIIP FIIP does not Granger Cause NSE_MA	11.79 20.48
R_NSE does not Granger Cause FIIP FIIP does not Granger Cause R_NSE	42.04 31.42
FBIR does not Granger Cause FIIP FIIP does not Granger Cause FBIR	23.90* 97.85*
IIP does not Granger Cause FIIP FIIP does not Granger Cause IIP	110.94* 40.41*
L_FIIN does not Granger Cause FIIP FIIP does not Granger Cause L_FIIN	52.54* 35.67*
BETA_MSCI does not Granger Cause FIIP FIIP does not Granger Cause BETA_MSCI	20.20* 45.57*
BETA_SP does not Granger Cause FIIP FIIP does not Granger Cause BETA_SP	14.71* 41.84
US_EX does not Granger Cause FIIP FIIP does not Granger Cause US_EX	30.316* 22.36

* Rejected at a significance level of 5 percent

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