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An Empirical Study on the Dynamic Relationship between Foreign Institutional Investments and Indian Stock Market

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Abstract

Foreign investment is very important to strengthen the economy of any country and Foreign Institutional Investments (FII) have gained a significant role in Indian stock markets. This study investigates the dynamic relationships between FII and Indian stock market during 2000 to 2013. The Johansen's cointegration test results suggest that there exists a long term relationship between FII and stock indices. Further the error correction term of Vector Error Correction Model (VECM) shows a long-run causality moves from Indian stock market to FII but not the vice versa. The Granger Causality test under the VECM framework confirms the same unidirectional causal relationship runs from Indian stock market to FII in short-run. The Variance Decompositions analysis revealed that the Indian stock markets are strongly exogenous in comparison with FII in the sense that shocks to FII explained only a very small portion of the forecast variance error of the market index. Finally from the Impulse Response Functions analysis it was noticed that the responses generated from a positive shock on FII value are initially high but do not persist for a longer period of time. On the other hand the responses of a positive shock generated in stock prices have a persistence and growing effect on the value of FII.

Keywords: Foreign Institutional Investment, Stock Market, Cointegration, Granger Causality Test.

JEL Classification: C32, E22, E44, G23, O16

1. AN OVERVIEW

1.1. Introduction

In the era of globalization investment in international stock market is very common things now a day. The prices of stocks are changes regularly and the fluctuations in stock prices are based on several factors like - enterprise performance, dividends, gross domestic product, exchange rates, interest rates, foreign institutional investment (FII), money supply, employment rate, stock prices of other countries etc. Positive fundamentals combined with fast growing markets have made India an attractive destination for foreign institutional investors. Understanding the relationship between FIIs and Indian stock market is an important topic to study because the emerging economies continue to grow and prosper and they will exert a larger influence over the global economy. However the nature of interaction may vary according to the country examined and the prevailing economic condition etc.

The term foreign institutional investment denotes all those investors or investment companies that are not located within the territory of the country in which they are investing. Significant amounts of capital are flowing from developed world to emerging economies. India opened up to foreign investments gradually over the past two decades, especially since economic

liberalization of 1991. Despite a tough global financial scenario, Foreign Institutional Investors believes on Indian capital markets and they pumped in about US$ 25 billion in 2012. Over the last 15 years, the Indian markets have received almost a fifth of all FII equity flows to emerging markets. On the other hand India has attracted almost half of all FII equity flows to Asia in 2012. Foreign Institutional Investors have emerged as important players in the Indian capital market, although their investments are often called 'hot money' because they can be pulled out at anytime. The Government introduced different measures that would be helpful in attracting foreign investors towards Indian markets. But the only factor that determines the behavior of the foreign institutional investors is the opportunity for profit. If they feel that a market has potentiality for profit, they will invest. It is company specific success stories that have retained FIIs in the Indian market. It is the influence of FIIs which change the face of the Indian stock markets. Screen based trading and depository are realities today largely because of FIIs. FII act as a stimulator for the development of the country's economy because it helps to get lower cost of capital and provide access to cheap global credit. Moreover it acts as a complements of domestic savings and investments.

1.2. Evidence from Earlier Studies

We take into consideration a substantial academic and professional literature for acquiring some idea regarding the relationship between foreign institutional investment and Indian stock market from an empirical perspective. By surveying several past works on this topic we get different opinion from different researchers. Some researchers have looked for a direct evidence of a linkage between net flow of foreign institutional investment and Indian stock market. On the other hand few studies concluded that flow of foreign institutional investment doesn't have any effect on Indian stock market. The positive relationship between the FIIs and Indian stock market has been supported by Rajput and Thaker (2008). They measured the relationship and predictive power among exchange rate, FII and stock index in India for the period from January 2000 to December, 2005. Using simple correlation and regression analysis they found that FII and Indian stock market are positively correlated, but fails to predict the future value. Similarly Jain, Meena and Mathur (2012) examined the contribution of foreign institutional investment in the sensitivity of Indian stock market index (Sensex). Employing Karl Pearson' Coefficient of Correlation test they found that the FIIs are influence the movement of sensex to a greater extent. The Pearson correlation value also indicates a high positive correlation between the foreign institutional investments and the movement of sensex. Beside the above studies Karthikeyan and Mohanasundaram (2012) conducted a study and found a positive relationship between the FII flows and Indian equity market performance though the impact was not significant. The researchers concluded that Indian equity market performance was not only depending upon FIIs but also other unexplained factors like domestic investors, inflation, interest rate, government policy etc. In line with the previous studies Tayde and Rao (2011) and Shrivastav (2013) investigated whether the stock market movement can be explained by these foreign investments and their impact on the stock markets. Using the same statistical techniques mentioned in the earlier studies these studies also concluded that Sensex and Nifty are moderately correlated with FIIs and the relationship is positive. Hence both indices move in the same direction of FIIs investment.

Similarly the bidirectional effect of FIIs and Indian stock market has been explored by Chakraborty (2007). She investigated the causal relationship between FII flows and Indian stock market return. For this study she considered the monthly data of FII and BSE National Index over

the period April 1997 to March 2005. Using descriptive statistics and correlations between the two estimated variables the study found that there exists a positive relationship, though the relation is not very strong. Regression result indicated that both the regressors have same explanatory power. Finally the Granger causality test revealed the existence of bidirectional causality among FII flows and Indian stock market return. Further Gupta (2011) and Srikanth and Kishore (2012) made an attempt to explain the relationship between Indian stock market and FIIs investment in India. Their study also revealed the ame findings as concluded by Chakraborty (2007).

In an study, Sultana and Pardhasaradhi (2012) made an attempt to identify the relationship and impact of FDI & FII on Indian stock market using correlation and multiple regression techniques during the period starting from 2001 to 2011 and concluded that flow of FDIs and FIIs in India determines the trend of Indian stock market. Similarly Loomba (2012) and Walia, Walia and Jain (2012) concluded that the FIIs are influence the movement of sensex to a greater extent.

On the other hand Kaur and Dhillon (2010) investigated the determinants of Foreign Institutional investment in India and concluded that FIIs inflows in India are determined by both stock market characteristics and macroeconomic factors. Similarly the study of Rai and Bhanumurthy (2004) examined the determinants of foreign institutional investments in India but they didn't found any causal relationship running from FII inflow to stock returns. They further concluded that the stability of stock market would help to attract more FII, which has a positive impact on the real economy. Beside the above study Prasanna (2008) investigated the relationship between foreign institutional investment and firm specific factors like; ownership structure, financial performance and stock performance. Using time series regression he observed that volume of shares owned by the general public, stock returns and earnings per share are the significant factors which influence the investment decision of foreign investor. With the conformity of the earlier three studies Kumar (2011) made a study to examine the causal relationship between FIIs, stock market return and other macroeconomic variables during January 1993 to December 2009. For that purpose he had applied Granger Causality Test and found that stock market return, IIP and exchange rate are the main determinant of FIIs flows in Indian stock market. But Sharma and Mehta (2012) did not support the hypothesis that FIIs have a significant impact on the real stock returns. Their study concludes that there does not exists any significant relationship between flows of FII on Indian stock markets and movement in the stock market indices.

From the earlier studies we have observed that a large number of studies were made to determine the relationship between the foreign investment flow and stock price movement. Undoubtedly the above mentioned research studies have a great contribution in this field but most of them studied the relationship by employing the simple correlation and regression techniques. Furthermore, most of the earlier studies didn't check the data property before applying the time series econometrical tests. In India after the liberalization, the regulator of economy has presented a different economic environment under which the companies are performing now. In most of the cases, financial performance of the companies is largely depends on these economic factors. The investors should know how the stock return affected by the variables and the degree of influencing power of the variables. Thus, it is worth our efforts to carry out studies on emerging economies which have become increasingly attractive destinations for huge amounts of capital movement from major economies. These studies would enhance our understandings of the interaction between the flows of FII and emerging stock market performances.

In this backdrop, our present study attempts to investigate empirically the dynamic relationship between flows of FII and Indian stock market by employing the various state of the

art econometric techniques. The rest of the paper is organized into three sub sections- section 2 discusses the data and methodology used in the study i.e. the research design; while section 3 presents the findings of the study and finally, section 4 summarizes and concludes the study.

2. RESEARCH DESIGN

2.1. Data

Data set used in this study encompasses the period starting from April, 2000 to March, 2013 and analyses have been performed by using 3162 data on daily basis. Closing data pertaining to BSE Sensex and S&P CNX Nifty index have been obtained from the respective web site of Bombay Stock Exchange and National Stock Exchange of India, and FII data have been obtained from Capitaline Corporate Database, maintained and marketed by Capital Market Publishers Pvt. Ltd., Mumbai, Bloomberg database and from the websites of Security Exchange Board of India. Microsoft Office Excel 2007 and Eviews-7 package program have been used for arranging the data and implementation of econometric analyses.

2.2. Methodology

Given the nature of the problem and the quantum of data, we first study the data properties from an econometric perspective with the help of descriptive statistics and unit root test. This would help us applying Cointegration test, Vector Error Correction Model, Variance Decomposition test and Impulse Response analysis to establish the long-run equilibrium relationship and the short-run dynamics among the variables and Granger Causality test for evaluating the direction of causality.

Unit Root Test

A series, regarded as a stationary series which does not have any unit root property. In case of considering non-stationary time series, there is a possibility of encountering with fake regression problem. In this case, the result obtained by regression analysis will not reflect the real relationship. The commonly used augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are applied to determine the stationarity properties and integration order of the variables.

Johansen's Cointegration Test

The Johansen's cointegration approach has been used to identify the long-run equilibrium relationship among the variables. The concept of cointegration becomes more relevant when the time series being analysed are non-stationery in level and all the variables used in the study should be integrated in same order. In econometric terms, two variables will be cointegrated if they have a long-term or equilibrium relationship between them. Appropriately, the test provides us information on whether the variables, particularly the FII and the Indian stock market indices are tied together in the long run.

Vector Error Correction Model (VECM)

There often exists a long-run equilibrium relation between two or more variables but in the short run there may be disequilibrium. If the variables are found to be cointegrated then we employ VECM to identify the existence of any disequilibrium in short run and the rate of correction to attain the long term equilibrium relationship among them. According to Engle and Granger (1987) if a number of variables are found to be cointegrated, there always exists a corresponding error

correction representation in which the short-run dynamics of the variables in the system are influenced to deviate the equilibrium relationship. The VECM implies that change in the dependent variables are a function of the level of disequilibrium in the cointegrating relationship captured by the error correction term, as well as changes in other explanatory variables. With the error correction mechanism, a proportion of the disequilibrium in one period is corrected in the next period. The error correction procedure is hence a way to reconcile short-run and long-run behavior through a series of partial short-run adjustments.

Granger Causality Test

The study proceeded with a causality test in order to determine the direction of the relationship between the variables. The causality test can be conducted in two different ways depending on the results of the long-run analysis. The Granger test (Granger (1969)) is suitable for analyzing the short-run relationship if no cointegration exists among the variables. On the other hand, when the variables are cointegrated, the standard Granger test is misspecified and the error correction strategy suggested by Engle and Granger (1987) should be used to identify the long and short term causal relationship among the variables. The VECM implies that changes in one variable are a function of the level of disequilibrium in the cointegrating relationship (captured by the error correction term), as well as, changes in other explanatory variables. Thus, the VECM is useful for detecting the long-term and short-term causality when the variables are cointegrated. The VECM can distinguish between the short-run and long-run causality because it can capture both the short-run dynamics between the time series and their long-run equilibrium relation. The error correction terms capture the long run relationships among variables and the causality is tested through the significance of the t-test of the error correction term which contains the long-term information, as it is derived from the long-term cointegrating relationship. On the other hand, the short-run causality is tested by the joint significance of the coefficients of the differenced explanatory variables by using the F-statistics or Chi-square test statistics.

Variance Decompositions Test (VDC) and Analysis of Impulse Response Functions (IRF)

Despite the importance of conducting causality tests, the empirical inferences based on the causality test does not determine the strength of the causal relationships between the variables nor does it describe the relationship between these variables over time. Variance decomposition test is used to explore the degree of exogeneity of the variables involved in this study. It illustrates the share of the forecast error of one variable as a result of changes in the other variables. Moreover, the empirical inferences based on the Granger causality test helps to qualify the flow of influences but the estimates of the Impulse Response Analysis can give us a quantitative idea about the impacts for several periods in future. The estimated impulse response of the VAR system enables us to examine how each of the variables responds to innovations from other variables in the system. More specifically IRFs essentially map out the dynamic response path of a variable due to a one standard deviation shock to another variable.

3. FINDINGS OF THE STUDY

3.1. Findings from the Descriptive Statistics

The basic statistical values of the variables were calculated in the first phase of our study. From Table-1, it has been observed that the FIIs as well as the value of Sensex and Nifty are not stable

at all during the study period. In respect of FIIs the maximum value of 11334.80 crores and minimum value of -4118.20 crores are found with an average of 237.53, which justifies our interpretation on their instability. The value of standard deviation in this regard also shows the instability of daily FIIs. During the study period the value of Sensex and Nifty also varies significantly. The high differences between maximum value and minimum value reveal that the variables are highly unstable during this period. Again, the measures of skewness suggest that the variables are not distributed symmetrically. From Table-1 it is clear that stock market indices of India as well as the FIIs are positively skewed. The kurtosis indicates that the stock indices are less peaked than normal distribution i.e. they follow platykurtic distribution where as the FIIs follow leptokurtic distribution. Results obtained from Jarque-Bera statistic also confirms that none of the series are normally distributed.

3.2. Findings from Long-Run Analysis

As mentioned before, the long-run analysis is conducted using the Johansen cointegration test. Typically, the Johansen cointegration test consists of three general steps. First, examine whether all variables in the model are integrated of same order, which can be established by unit root tests. Second, determine the optimal lag length for the VAR model to verify that the estimated residuals are not autocorrelated. Third, estimate the VAR model to construct the cointegration vectors in order to determine the order of cointegration that is necessary to establish the trace and the max-eigen value statistics tests. The following subsections present the results for each step.

Results of Unit Root Test

Results of unit root test applied in the levels are presented in Table-2. It has been observed that all the variables are not stationary i.e. they have unit roots in both the separate models (constant and constant-trend) in ADF and PP tests as the test statistics of ADF and PP test can't reject the null hypothesis (the series contain unit root) at 5 per cent level of significance. As both the variables are not stationary after unit root tests performed in their levels, relevant variables are tested again by taking their first differences values. The results are shown in Table-3 and it is observed that all the variables are stationary in their first degree differences i.e. the variables are integrated of order one.

Selection of Optimum Lag Length

As the autoregressive model is sensitive to the selection of appropriate lag length, the study is to ascertain the appropriate lag length before conducting the cointegration analysis in line with Johansen. The study has determined the optimum lag length based on the Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC) or Hannan-Quinn Information Criteria (HQC). The results are provided in Table-4. The AIC criteria suggested a higher lag length i.e. 10 and SIC criteria suggested a lower lag length of 4. We could not take the risk of over parameterization or under parameterization by considering too higher lags or too lower lag. Therefore, the study chose HQC criteria for optimum lag length selection and the optimum lag length is 6, having the minimum HQC value.

Results of Johansen Cointegration Test

The study conducts a cointegration test suggested by Johansen's with the purpose of finding whether these variables have a long-term common stochastic trend. The calculated values of Trace

statistics (presented in Table-5A) for FII & Sensex and FII & Nifty, when the null hypothesis is r = 0 (i.e., no cointegration), are 281.4682 and 288.6734 respectively and Maximum Eigen statistics (presented in Table-5B) are 281.1048 and 288.2573 respectively. Here the null hypothesis of no cointegration when r = 0, is rejected at the 5 per cent level of significance, as the calculated value of Trace statistics and Maximum Eigen statistics are higher than the MacKinnon-Haug-Michelis critical value at 5 percent level of significance. This indicates that there exists one cointegrating vector for each case. So the Johansen's test result support the hypothesis that FIIs and stock indices (Sensex and Nifty) are cointegrated and there exist one cointegrating relationship between the relevant variables in each case, in other words there is a long term relationship between FIIs and stock indices. The long run cointegrating equations are:

$$SEN_t = 2632.826 + 33.7807\ FII_{t\ (18.3386)} + \mu_t$$
$$NIF_t = 886.9584 + 9.8285\ FII_{t\ (18.6204)} + \mu_t$$

Based on the above cointegrating equations, the study concludes that, the long-term relationship of Sensex and Nifty with FIIs are positive and significant (on the basis of t test statistics) i.e., they move together in the same direction.

3.3. Findings from Short-Run Analysis

Having established that both the stock indices and FIIs are cointegrated, the fundamental question that arises regarding the nature of the relationship between these variables in the short run can be answered by considering the error correction mechanism.

Result of the Vector Error Correction Mechanism

Table-6A and 6B presents the results of the vector error correction model. The t- values associated with the lag values of the FII are not significant when sensex or nifty used as a dependent variable, which demonstrate that the Indian stock market doesn't affected by the value of the FII in short run. Though the results exhibits the evidence that, in short run the inflow of FIIs depend on the movement of sensex and nifty.

Moreover the VECM results indicate that FII adjust the disturbances to restore long-run equilibrium significantly and in right direction, but the sensex and nifty does not react significantly. The coefficient of error correction term is -0.4732 and -0.4816 with 1 percent level of significance tells us the rate at which it correct the previous periods disequilibrium i.e., the speed of adjustment toward the long-run equilibrium is about 47 percent and 48 percent per day respectively.

3.4. Result of the Causality Test

As there exist cointegrating relationship between the variables, there must be at least one way causal relationship between the variables. The result of the long-run and the short-run causality test under VECM framework are reported bellow.

Long-run Causality Test

The t-values associated with the error correction terms of VECM, reported in the third column of Table-6A and 6B, indicate significant long-run causal effects from both the stock indices to FIIs as the

coefficient of the error correction term -0.4732 and -0.4816 are statistically significant at 1 percent level but the others are not significant. So we can conclude that in long-run the FIIs is influenced by the Indian stock market but the Indian stock market does not influenced by the FII flow.

Short-run Causality Test

The short-run causality among the variables based on Wald test presented in Table-7. According to the obtained results, it can be said that there exist a short-run causal relationship between each of the stock market indices and FIIs. The test also confirms that in short run causality runs from Indian stock market to the FIIs flow, as the Chi-square test statistics are significant at 1 percent level of significance when FII is represented as dependent variables.

3.5. Dynamic Relationship

The study has estimated the variance decompositions and impulse response functions under the VECM framework to investigate the dynamic relationship of Indian stock indices with FII.

Results of Variance Decompositions Test

Table-8A and 8B indicates that Sensex and Nifty are strongly exogenous because almost 99.57 percent and 99.32 percent of its own variance is explained by its own shock even after 30 days. The percentage of foreign explanatory power (represented by FII) to explain the variance of Indian stock markets, is insignificant, reaching in the best cases 0.68 per cent at time horizon 30. So a very small portion of the forecast error variance of stock indices movement has explained by the FII. This is due to the fact that, during the study period, stock prices are more dependent on lag value of themselves than the value of FII. The results also indicate that FII is comparatively less exogenous than the Indian stock market in the sense that the percentage of the error variance of FII accounted by its own is approximately 84 percent at time horizon of 30 days.

Results of Impulse Response Functions Analysis

Figure-2 summarizes the impulse responses of Sensex to one standard deviation shock in FII and vice versa for the next 30 days and the results of the Impulse Response Analysis of Nifty and FII are shown in Figure-3. The responses generated from a positive shock on FII value are initially high but do not persist for a longer period of time. On the other hand the responses of a positive shock generated in stock prices have a persistence and growing effect on FII.

4. CONCLUSION

In line with earlier findings made by Jain, Meena and Mathur (2012), Tayde and Rao (2011) and Shrivastav (2013) etc. our present study based on Johansen's cointegration test that confirms the existence of a significant positive long run relationship between FIIs and stock indices. The study also concludes the same findings as mentioned by Rai and Bhanumurthy (2004), Kaur and Dhillon (2010) and Kumar (2011) that in long-run as well as in short-run the foreign institutional investment is influenced by Indian stock market (represented by Sensex and Nifty) but the Indian stock market does not get impacted by the net flow of foreign institutional investment. It appears from the analysis that the foreign institutional investors are mainly chases trend of the stock market. So, they just follow the stock index that means they invest when the index is in rising path and they withdraw their investment when index falls down. The high stock index attracts foreign institutional investors

as the increasing trend of stock indices ensures good corporate governance, execution abilities and better corporate performance of the companies. It is also possible that domestic investors might assess the sentiment of the foreign investors beforehand from different formal and informal indicators and acts accordingly. Thus FIIs lags behind the changes in stock index.

The study would enhance our understandings of the interaction between net flow of foreign institutional investment and emerging stock market performances. Further, the study would enable foreign investors, who are interested in Indian stock market, to understand the conditional relationship between the variables. Finally the investors are suggested to take investment decision and invest their funds keeping in mind the other macroeconomic variables like interest rate, inflation rate, exchange rate, money supply, employment rate and growth rate of the country, as Indian stock market performance depend on these several other macroeconomic variables.

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TABLES

Table-1 : Descriptive Statistics

Statistics	SENSEX	NIFTY	FII
Mean	10654.34	3220.74	237.53
Median	10084.1	3018.83	88.6
Maximum	20932.48	6301.55	11334.8
Minimum	2600.12	854.2	-4118.2
Standard Deviation	6051.83	1782.16	904.06
Skewness	0.11	0.13	1.49
Kurtosis	1.41	1.44	26.51
Jarque-Bera Statistics	340.31	330.69	48617.97
Probability	0	0	0
No of Observations	3162	3162	3162

Table-2 : Result of ADF and PP Unit Root Test (In Level)

Variables	ADF Test		PP Test	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
BSE Sensex	-0.7326 [1] (0.8366)	-2.7147 [1] (0.2305)	-0.6236 [9] (0.8630)	-2.6409 [8] (0.2619)
Nifty	-0.7359 [1] (0.8358)	-2.8222 [1] (0.1892)	-0.6696 [3] (0.8523)	-2.7404 [0] (0.2202)
FII	-1.2681 [5] (0.6447)	-2.0933 [5] (0.5465)	-0.9291 [32] (0.7778)	-1.7328 [32] (0.7337)

Notes: ( ) MacKinnon (1996) one-sided p-values; [ ] Lag lengths for ADF and PP Test

Table-3 : Result of ADF and PP Unit Root Test (In First Difference)

Variables	ADF Test		PP Test	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
BSE Sensex	-52.2449 [0] (0.0001)	-52.2385 [0] (0.0000)	-52.1187 [13] (0.0001)	-52.1117 [13] (0.0000)
Nifty	-52.9220 [0] (0.0001)	-52.9156 [0] (0.0000)	-52.8382 [7] (0.0001)	-52.8314 [7] (0.0000)
FII	-23.4957 [13] (0.0000)	-23.4918 [13] (0.0000)	-707.4438 [281] (0.0001)	-707.1087 [281] (0.0001)

Notes: ( ) MacKinnon (1996) one-sided p-values; [ ] Lag lengths for ADF and PP Test

Table-4 : VAR Lag Order Selection Criteria

Lag	AIC		SIC		HQC	
	SEN & FII	NIF & FII	SEN & FII	NIF & FII	SEN & FII	NIF & FII
0	36.66123	34.21481	36.66508	34.21865	36.66261	34.21619
1	29.68255	27.28664	29.69408	27.29817	29.68669	27.29078
2	29.56171	27.16943	29.58094	27.18865	29.56861	27.17632
3	29.50438	27.11226	29.53129	27.13917	29.51404	27.12191
4	29.49350	27.10138	29.52810*	27.13598*	29.50591	27.11380
5	29.49404	27.10227	29.53633	27.14456	29.50921	27.11744
6	29.48372	27.09225	29.53370	27.14223	29.50166*	27.11019*
7	29.48470	27.09315	29.54237	27.15082	29.50539	27.11385
8	29.48319	27.09134	29.54855	27.15669	29.50664	27.11479
9	29.48183	27.08977	29.55487	27.16282	29.50804	27.11598
10	29.48010*	27.08878*	29.56084	27.16952	29.50907	27.11775
11	29.48240	27.09111	29.57083	27.17954	29.51413	27.12284
12	29.48257	27.09058	29.57869	27.18670	29.51706	27.12507

* indicates lag order selected by the criterion

AIC : Akaike informatin criterion, SIC : Scinformation criterion, HQC : Hannan-Quinn information criterion

Table-5A : Results of Cointegration Test (Trace Statistics)

Model	H_0	H_1	Trace Statistics	5% Critical Value
BSE Sensex & FII	r = 0	r = 1	281.4682*** (0.0001)	15.4947
	r ≤ 1	r = 2	0.3633 (0.5467)	3.8415
Nifty & FII	r = 0	r = 1	288.6734*** (0.0001)	15.4947
	r ≤ 1	r = 2	0.4161	3.8415

			(0.5189)	

*Notes: *** Indicate the statistical significance level of 1%; ( )MacKinnon-Haug-Michelis (1999) p-values*

Table-5B : Results of Cointegration Test (Maximum Eigen Statistics)

Model	H_0	H_1	Maximum Eigen Statistics	5% Critical Value
BSE Sensex & FII	r = 0	r = 1	281.1048*** (0.0001)	14.2646
	r ≤ 1	r = 2	0.3633 (0.5467)	3.8415
Nifty & FII	r = 0	r = 1	288.2573*** (0.0001)	14.2646
	r ≤ 1	r = 2	0.4161 (0.5189)	3.8415

*Notes: *** Indicate the statistical significance level of 1%; ( )MacKinnon-Haug-Michelis (1999) p-values*

Table-6A : Results of Vector Error Correction Model (Sensex & FII)

Independent Variables	Dependent Variables	
	D (SENSEX)	**D (FII)**
ECT (γ_1)	-0.0002 [-1.3821]	-0.4732*** [-17.0655]
D(SEN(-1))	0.0744*** [4.1799]	1.1955*** [16.5406]
D(SEN(-2))	-0.0374** [-2.0137]	0.9260*** [12.2642]
D(SEN(-3))	-0.0136 [-0.7190]	0.2414*** [3.1249]
D(SEN(-4))	-0.0188 [-0.9940]	-0.0006 [-0.0082]
D(SEN(-5))	-0.0317 [-1.6740]	-0.0015 [-0.0196]
D(FII(-1))	-0.0075 [-1.1077]	-0.4220*** [-15.3306]
D(FII(-2))	0.0005 [0.0885]	-0.2944*** [-11.0761]
D(FII(-3))	-0.0045 [-0.7473]	-0.1972*** [-8.0103]
D(FII(-4))	-0.0079 [-1.4815]	-0.1150*** [-5.2657]
D(FII(-5))	-0.0058 [-1.4128]	-0.0990*** [-5.9231]

*Notes: *** Indicate the statistical significance level of 1%; ** Indicate the statistical significance level of 5%*

Table-6B : Results of Vector Error Correction Model (Nifty & FII)

Independent Variables	Dependent Variables	
	D(NIFTY)	**D(FII)**
ECT (γ_1)	-0.0003 [-1.7365]	-0.4816*** [-17.2625]
D(NIFTY(-1))	0.0609*** [3.4195]	3.9344*** [16.4374]
D(NIFTY(-2))	-0.0260 [-1.3996]	3.0935*** [12.3865]
D(NIFTY(-3))	-0.0225 [-1.1842]	0.8123*** [3.1786]
D(NIFTY(-4))	-0.0058 [-0.3067]	0.0349 [0.1366]
D(NIFTY(-5))	-0.0354 [-1.8626]	-0.0107 [-0.0418]
D(FII(-1))	-0.0027 [-1.3108]	-0.4131*** [-14.9627]
D(FII(-2))	-0.0001 [-0.0696]	-0.2876*** [-10.8142]
D(FII(-3))	-0.0018 [-0.9962]	-0.1931*** [-7.8490]
D(FII(-4))	-0.0025 [-1.5399]	-0.1118*** [-5.1249]
D(FII(-5))	-0.0016 [-1.2850]	-0.0972*** [-5.8176]

*Notes: *** Indicate the statistical significance level of 1%*

Table-7 : VEC Granger Causality / Block Exogenety Wald Test Results

Model	Dependent Variables	Independent Variables	Chi-square Value	P-Value	Implication
1	FIIs Sensex	Sensex FIIs	465.1125 7.4359	0.0000 0.1902	Causality Exists No Causality
2	FIIs Nifty	Nifty FIIs	458.7198 7.852569	0.0000 0.1646	Causality Exists No Causality

Table- 8A : Variance Decomposition of Sensex and FII

Variance Decompositions of	Period	Percentage of Forecast Error Variance Explained by Innovation in:	
		Sensex	**FII**
Sensex	1	100.00	0.00
	5	99.94	0.06
	10	99.85	0.15
	15	99.74	0.26
	20	99.66	0.34
	25	99.61	0.22

	30	99.57	0.43
FII	1	0.00	100.00
	5	15.44	84.56
	10	16.07	83.93
	15	16.29	83.71
	20	16.37	83.63
	25	16.41	83.59
	30	16.44	83.56

Table- 8B : Variance Decomposition of Nifty and FII

Variance Decompositions of	**Period**	**Percentage of Forecast Error Variance Explained by Innovation in:**	
		Nifty	**FII**
Nifty	1	100.00	0.00
	5	99.92	0.08
	10	99.74	0.26
	15	99.58	0.42
	20	99.46	0.54
	25	99.38	0.62
	30	99.32	0.68
FII	1	0.00	100.00
	5	15.33	84.67
	10	16.00	84.00
	15	16.23	83.77
	20	16.32	83.68
	25	16.36	83.64
	30	16.39	83.61

FIGURES

Figure- 1: Graphical Representation of Variables

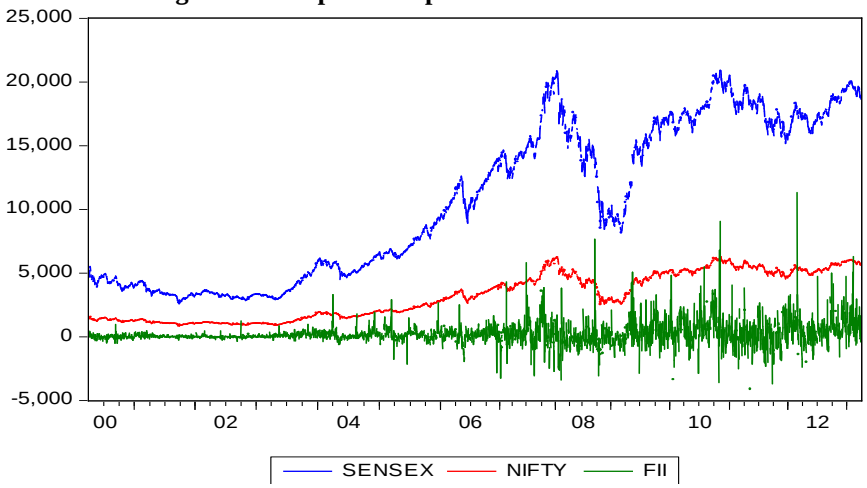

Figure-2: Impulse Responses of Sensex and FII to One Standard Deviation Shock in the Variables

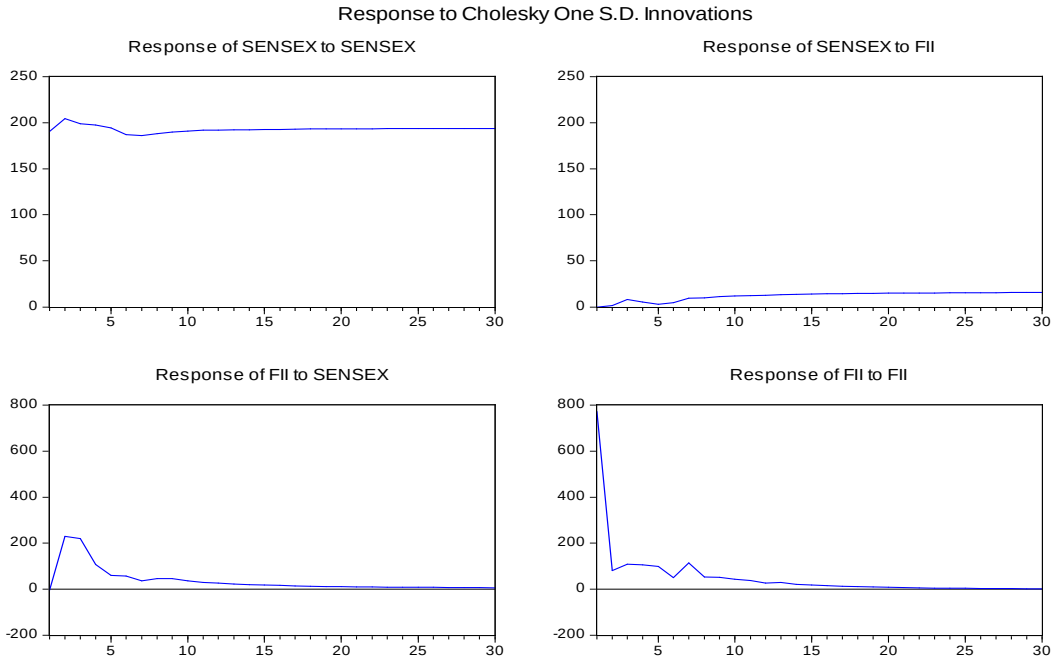

Figure-3: Impulse Responses of Nifty and FII to One Standard Deviation Shock in the Variables