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DRIVING ROLE OF INSTITUTIONAL INVESTORS IN THE INDIAN STOCK MARKET IN SHORT AND LONG-RUN – AN EMPIRICAL STUDY

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ABSTRACT

The process of liberalization leads to stock price appreciation followed by inflows from foreign investors in Indian stock markets. Post-1992, the FIIs become one of the prime forces to drive up or down Indian stock markets and their indices. MFs, being the most influential DIIs have alsoplayed their part. This study is endeavoured to find out the impact of and relationships between FIIs net flows, MFs net flows and the Indian stock markets as proxied by the BSE SENSEX Index, both in the long-run and short-run, by using tabular results, correlation test results, ADF and PP tests, Johansen and Juselius's cointegration test and Granger causality test results. Monthly data are used from April, 2007 to March, 2012 for all the variables, i.e., FIIs net flows, MFs net flows and the BSE SENSEX Index. ADF and PP results show that all the variables are not integrated of the same order. Johansen and Juselius's cointegration test is conducted based on ADF and PP results with FIIs net flows and MFs net flows with the revised long-run model. It points out at least two cointegration vectors and negative long-run relationships between FIIs net flows with MFs net flows. Then, it employs Granger causality test. The Granger causality test finds no short-run unilateral or bilateral causal relationships between the BSE SENSEX Index, and FIIs and MFs net flows and neither in between FIIs net flows with the MFs net flows. Therefore, it is concluded that, Indian stock markets have no informational efficiency. However, future studies should incorporate critical Indian and global macroeconomic variables' impact on the FIIs net flows and MFs net flows and their short and long-run interrelationships to make the study results more conclusive and reliable.

Keywords: FIIs, MFs, BSE SENSEX, ADF tests, PP tests, JJ cointegration test, Granger causality test, Long-run, Short-run relationships.

1. INTRODUCTION

The continuous transition and development that is going on in international stock markets especially in the emerging markets including India has been one of the most prominent reasons to drive the foreign institutional investors (FII) to invest in the hope of gaining maximum benefits from portfolio diversification process. Until the 1980s, there was a general reluctance towards

foreign investment or private commercial flows as the Government of India's (GOI's) development strategy was focused primarily on self-reliance and import substitution, and current account deficits were largely financed through debt flows and official development assistance.

The liberalization policies initiated by the GOI in early 1990s brought about radical changes in the behaviour of stock markets. The process of liberalization leads to stock price appreciation followed by inflows from foreign investors (Henry, 1997; Bekaert and Harvey, 1998a). As a result, the foreign investments regime was also liberalized to a great extent (Gordon and Gupta, 2003).

A pioneering effort in this regard was taken on September 14th, 1992 when the Foreign Institutional Investors (FIIs) were allowed to invest in all the securities traded on the Indian primary and secondary markets, including shares, debentures and warrants issued by companies which were listed or were to be listed on the Indian stock exchanges and in the schemes floated by domestic Mutual Funds (MFs).

Table-1. Registration Information of FIIs

Year	Number of FIIs Registered in the Year	Total Number of FIIs Registered
2007	160	1,219
2008	375	1,594
2009	112	1,706
2010	12	1,718
2011	49	1,767
2012	(10)	1,757*

* Number is as on July 31st, 2012

Note: Total Number of FIIs registered as on Jan. 1st, 2007 was 1059.

The impact of FIIs on Indian stock markets all these years has been enormous as the figure has shown that FIIs net investment has risen from Rs.2,595.10 crores in 1993 to Rs.10,40,547 crores till May, 2012 (SEBI, 2012).The number of FIIs registered with SEBI has also increased from 18 in 1993 to 1757 by July, 2012 (see Table 1). This also indicates the interest shown by FIIs in Indian stock markets. However, data suggests that FIIs flows are tremendously volatile in nature. For example, after pumping in a record $29 billion in Indian equities in 2010, FIIs largely shied away in 2011, pulling out $511 million. Thus, the benchmark Bombay Stock Exchange (BSE) Sensex Index was among the worst-performing indices globally, falling 24.6% in 2011 owing to deteriorating fundamentals (Bhattacharya and Ramarathinam, 2012).

Rise in global risk aversion due to sovereign debt problems in the euro zone contributed to the slump, but it was also the weak domestic macroeconomic environment that largely led to India's under performance. Low Index of Industrial Production (IIP) numbers, less than expected Gross Domestic Product (GDP), high inflation, rising interest rates, depreciating Indian rupee in terms of US$ and a lack of effective policies to spur investments led to a slowdown in economic growth and earnings, thereby spooking investors.

However, from the beginning of 2012, they have invested $9 billion, net of selling. Out of the 30 Sensex firms, FIIs raised their holdings in 25 in the March, 2012 quarter compared with the December, 2011 quarter (Ramarathinam, 2012).

Thus, the FIIs are rightly considered as positive feedback traders, i.e., they buy with increasing market and sell in the declining market. This is viewed as destabilizing because the sales lead the stock market to fall further and their buys increase the stock market indices (Dornbusch and Park, 1995; Radelet and Sachs, 1998; Richards, 2002). However, Kumar (2001) highlighted that FIIs are more driven by fundamentals and they do not respond to short-term changes or technical positions in the market.

Various Latin American and Asian countries had opened their capital account in the past. Thereby, large capital inflows impact different countries in different ways under different situations.

Various Latin American countries have experienced large appreciation of domestic currency and resulting deficit in the current account due to large capital inflows and flexible exchange rate. They also have positively influenced in the monetary expansion in the economy and resulting rise in inflation, rise in bank lending and effects upon savings and investment.

Indian stock markets have been one of the most attractive investment destinations for the FIIs. India being an emerging economy attracts the most FIIs inflows after China among BRICs for its strong macroeconomic fundamentals and future growth potentials. The FIIs contribute a major chunk of turnover volumes on the Indian bourses and this in turn impacts the stock market moves.

So, the pertinent question is in what way and how far the FIIs flows impact Indian stock markets in comparison to domestic institutional investors. In this study, I have investigated these questions by using monthly data of the selected variables from April, 2007 to March, 2012. I have selected the BSE SENSEX Index as the representative of Indian stock markets. Also, I have chosen FIIs net flows and MFs net flows to do my study. More specifically, this study has attempted to investigate both long-run and short-run causal relationships of Indian stock markets with FIIs and MFs by using correlation results, Augmented Dickey and Fuller (1979) and Phillips and Perron (1988) tests, Johansen and Juselius (1990) Cointegration test and Granger (1969) test. Multiple regression analysis is not used in this study by looking at the above objectives.

The results would be very useful for the policy makers, traders, investors and others concerned along with the future researchers for reference purposes and for judging the present-day impact of FIIs in comparison to MFs in driving Indian stock markets and its indices. Also, it will highlight the need for continuous monitoring of the FII flows in Indian market by the SEBI, and thereby raising the level of transparency/disclosure and improved corporate governance standards in the system. The organization of the rest of the paper is as follows. A survey of the existing literature including empirical evidences on the nature of the long-run and short-run causal relationships between FIIs, MFs and stock prices is conducted in Section 2. Section 3 presents the data descriptions, variables undertaken for this study and discusses the research methodology to be employed for investigation and analysis purposes. Section 4 reports the empirical results and

discussions including tabular results, correlation results, ADF and PP tests, JJ cointegration test and Granger causality test followed by conclusion in Section 5.

2. LITERATURE SURVEY

Considering the beneficial role played by foreign capital flows, early research interest was mainly focused on the determinants of such flows. For instance, studies by Brennan and Cao (1997); Lagoarde and Lucey (2007); Mody and Murshid (2005); Taylor and Sarno (1997); etc. concentrated on the determinants of portfolio investments and their impact on the receiving economies. The empirical findings of these studies, though not unanimous, generally point towards growth in productivity and efficiency in allocation of the capital flows. In Indian context, many empirical studies have been conducted all these years on the impact of FIIs flows on Indian stock markets and their causal relationships. However, there are only a few studies pointing out the impact of MFs on Indian stock markets. Here, I have highlighted some of the most influential studies in this regard.

Chakrabarti (2001) found that FII net inflows were more likely the effect than the cause of equity market returns, with the FIIs not having informational disadvantages compared to domestic investors. On similar grounds, Mukherjee *et al.* (2002) found that FII activities had a strong demonstration effect and was driving the domestic market suggesting that the FII flows tend to be caused by return in the domestic market. Whether the returns determine the inflows or inflows affect the returns, Rai and Bhanumurthy (2003) explored such relationship in India by using the monthly data during the period of 1994-2002 and found that equity returns is the main driving force for FII investment and is significant at all levels.

Gordon and Gupta (2003) found causation running from FII inflow to return in BSE. They observed that FIIs act as market makers and book profits by investing when prices are low and selling when prices are high. Singh (2004) analyzed the determinants of FII flows and examined the policy towards foreign institutional investment. The study concluded that FII flows were positively related with BSE (SENSEX). Babu and Prabheesh (2008) as well as Karimullah (2009) examined the impact of FIIs equity investment behaviour in the Indian stock market and found bi-directional causality between FII and stock return. Dasgupta and Dutta (2011) by using monthly data from April, 2000 to September, 2010, pointed out that MFs total trading value has been the most significant contributor in improvement or decline in total trading value of NSE Cash Segment rather than the FIIs. Thus, it is quite clear that there is a lack of empirical studies investigating FIIs impact on Indian stock markets in comparison to the domestic institutional investors including MFs both in short and long-run. So, this study is unique in its investigation objectives and so would be in its findings.

3. MATERIAL AND METHODS

3.1. Data Source

I have used monthly data from April, 2007 to March, 2012 to examine the relationships between FIIs net flows (i.e., FIINF), MFs net flows (i.e., MFNF) and BSE SENSEX (i.e., B-SENSEX) (used as a proxy to Indian stock markets) Index. The data are obtained from Annual Reports of BSE, monthly bulletins of Securities and Exchange Board of India (SEBI) and Reserve Bank of India (RBI).

3.2. Selected Variables

3.2.1. Bse Sensex Index (B-SENSEX)

Though the BSE was established in 1875, till the decade of 1980s there was no scale to measure the ups and downs in the Indian stock markets. The BSE in 1986 developed the benchmark stock index (i.e., the SENSEX) that subsequently became the barometer of the Indian stock markets. Also, due to its wide acceptance amongst the Indian investors including the MFs and the FIIs, today, the SENSEX is regarded to be the pulse of Indian stock markets. BSE SENSEX is a value weighted stock average. It uses the free float market capitalization methodology of 30 largest and most actively traded stocks of the Indian stock markets from divergent sectors as being the most quoted Index. So, B-SENSEX has been selected for this study as the representative of Indian stock markets.

3.2.2. FIIsNet Flows (FIINF)

In India as per Schedule 2 of the Regulation 5(2) of Notification No. 20/RB-2000 dated May 3rd, 2003, 'FIIs' include "Overseas pension funds, mutual funds, investment trust, asset management company, nominee company, bank, institutional portfolio manager, university funds, endowments, foundations, charitable trusts, charitable societies, a trustee or power of attorney holder incorporated or established outside India proposing to make proprietary investments or investments on behalf of a broad-based fund". This variable is selected in this study as is evident in Tables 2-4 that their flows have been one of the most significant factors in upward or otherwise movement of the BSE SENSEX Index.

3.2.3. MFs Net Flows (MFNF)

MFs are the most critical of DIIs in Indian stock markets. They provide transparency and specialized investment services to the unit-holders. This variable is also selected in this study as is evident in Tables 2-4 that their flows have been one of the most influential factors in the movement of the BSE SENSEX Index.

3.3. Tools Used

3.3.1. Stationary Tests

I have tested the stationarity of the time series data of the above mentioned variables most systematically to rule out the likely spurious results. Since the testing of the unit roots of a data series is a precondition to the existence of cointegration relationship, originally, the Augmented Dickey and Fuller (1979) tests are widely used to test for stationarity (Dickey and Fuller, 1979; 1981). Thus, to verify the stationarity issue I have employed the ADF tests.

In order to test for unit root through ADF tests, the following equation is used:

$$\Delta y_t = \alpha_0 + \lambda y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + u_t$$

In the above equation, I have tested the null hypothesis of $\lambda = 0$ against the alternative hypothesis of $\lambda < 0$.So, the null hypothesis of non-stationarity would be rejected if λ is negative and significantly different from zero.

Phillips and Perron (1988) used non-parametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. The test regression for the PP test is the AR (1) process in which the following equation is used:

$$\Delta Y_t = b_0 + \beta Y_{t-1} + e_t$$

3.3.2.1. Johansen and Juselius's (JJ) Cointegration Test

Determination of the proper multivariate time series analysis technique is to be done irrespective of whether the data is stationary at levels or non-stationary at levels but stationary when differenced, i.e., I(1). Here, to explore long-run relationships between the FIIs net flows, MFs net flows and the BSE SENSEX Index, Johansen and Juselius (1990) cointegration technique has been used. It resolves most of the problems attached with Engle and Granger technique. It also gives maximum Eigen Value and Trace Value test statistics for determining the number of cointegrating vectors.

In order to fulfill the above objective, the following VECM-specific equation is used:

$$\Delta x_t = A_0 + \sum_{j=1}^{k-1} \Gamma_j \Delta x_{t-j} + \Pi x_{t-k} + \varepsilon_t$$

Where:

$$\Gamma_j = -\sum_{i=j+1}^{k} A_j \quad \text{and} \quad \Pi = -I + \sum_{i=j+1}^{k} A_j$$

(Sohail and Hussain, 2011)

The Trace and the Maximum Eigen Value test could be used to find the number of cointegrating vectors. As the Trace [Likelihood Ratio (LR)] statistic is more robust than the

Maximum Eigenvalue statistic (Cheung and Lai, 1993), therefore, this study has used the former method in order to establish the long-run relationships among the variables.

Also, if the test statistic is greater than the critical value from the Johansens's tables, I would reject the null hypothesis that there are r cointegrating vectors in favour of the alternative hypothesis under the said test in line with Brooks (2002).

3.3.2.2. Model Specification

To explore long-run relationships between the FIIs net flows, MFs net flows and the BSE SENSEX Index, I have employed the following econometric model:

$$\textbf{BSE SENSEX} = \beta_1 \textbf{ FIINF} + \beta_2 \textbf{ MFNF} + \varepsilon_t$$

3.3.3. Pairwise Granger Causality Test

Granger (1969) causality test establishes short-run relationships between stock prices and investors variables. It also measures the precedence and information content but does not itself has causality in the more common use of the term. Under the Granger causality test, the null hypothesis is $\Sigma \alpha_i = 0$ for all values of i. This study uses the F-test to test this hypothesis, as shown below:

$$F = \frac{(RSS_R - RSS_{UR}) / m}{RSS_{UR} / (n - k)}$$

(Gujarati, 2004)

The null hypothesis is rejected if the computed *F*-value exceeds the critical *F*-value at the chosen level of significance. This would imply that investors' variable 'Granger cause' or improve the prediction in stock prices and vice versa.

4. EMPIRICAL RESULTS AND DISCUSSIONS

4.1. Tabular Results

I have prepared the following tables to point out the role of FIIs in comparison to domestic institutional investors (as represented by the MFs) in driving up or down the Indian stock markets namely the BSE SENSEX Index.

Table 2 points out that in all (except October 18th, 2007) the biggest fall days in the BSE SENSEX Index, the FIIs were the net sellers. Also, it is found that in half of these days the most influential domestic institutional investors, i.e., the MFs were buying in Indian stock markets.

Thus, it is quite conclusive that the FIIs are one of the most critical factors in influencing Indian stock markets on day-to-day basis. It also justifies the objective of this study to find out the relationships of FIIs net flows with the Indian stock markets during this period.

Table-2. FIIs and MFs Net Flows in the 10 Biggest Fall Days in BSE SENSEX Index

Date	BSE SENSEX Index Point Falls	FIIs Net Flows (in Rs.Crores)	MFs Net Flows (in Rs.Crores)
21/01/2008	1408	(2425.60)	2001.70
22/01/2008	875	(2256.30)	1195.10
18/05/2006	826	(810.60)	762.67
17/12/2007	769	(1098.70)	(199.00)
18/10/2007	717	125.60	(265.50)
18/01/2008	687	(1356.10)	(271.20)
21/11/2007	678	(2222.40)	(151.10)
16/08/2007	643	(2849.90)	239.20
02/04/2007	617	(473.50)	70.50
01/08/2007	615	(982.70)	(147.50)

Table 2 also points out that nine of the ten biggest fall days in Indian stock markets are taken place within the study period of this paper. Thus, this study is also aimed at finding out the impact of FIIs and MFs net flows on volatile Indian stock markets.

Table 3 points out the role and impact of FIIs and MFs net flows on the BSE SENSEX Index in short-to-medium runs, i.e., in quarterly manners. The Table has also indicated that in the positive quarters for the BSE SENSEX Index, the FIIs net flows are also positive and vice versa with a few exceptions. However, the MFs net flows are generally showing the opposite trends. Thus, in the short-to-medium investment horizons also, the FIIs net flows are much more influential than the MFs net flows.

Table-3. FIIs, MFs and Indian Stock Markets Information (Quarterly)

Quarter	BSE SENSEX Index Value	% Change (over the previous Quarter)	FIIs Net Flows (in Rs.Crores)**	% Change (over the previous Quarter)	MFs Net Flows (in Rs.Crores)**	% Change (over the previous Quarter)
April-June, 2007*	14,650.51	12.08%	12,282.00	84.69%	4,152.00	225.97%
July-Sep., 2007	17,291.10	18.02%	32,234.00	162.45%	2,429.00	–41.50%
Oct.-Dec., 2007	20,286.99	17.33%	20,320.00	–36.96%	3,479.00	43.23%
Jan.-March, 2008	15,644.44	–22.88%	–11,433.00	–156.26%	6,246.00	79.53%
April-June, 2008	13,461.60	–13.95%	–14,032.50	–22.74%	3,131.70	–49.86%
July-Sep., 2008	12,860.43	–4.47%	–11,326.60	19.28%	3,335.70	6.51%
Oct.-Dec.,	9,647.31	–24.98%	–16,195.50	–42.99%	1,399.80	–58.04%

2008						
Jan.-March, 2009	9,708.50	0.63%	–6,151.60	62.02%	–882.60	–163.05%
April-June, 2009	14,493.84	49.29%	30,455.00	595.07%	3,169.00	459.05%
July-Sep., 2009	17,126.84	18.17%	34,313.00	12.67%	61.00	–98.08%
Oct.-Dec., 2009	17,464.81	1.97%	24,807.00	–27.70%	–7,652.00	–12644.26%
Jan.-March, 2010	17,527.77	0.36%	20,645.00	–16.78%	–6,090.00	20.41%
April-June, 2010	17,700.90	0.99%	10,432.00	–49.47%	–2,404.00	60.53%
July-Sep., 2010	20,069.10	13.38%	53,284.00	410.77%	–14,637.00	–508.86%
Oct.-Dec., 2010	20,509.10	2.19%	48,906.00	–8.22%	–4,524.00	69.09%
Jan.-March, 2011	19,445.20	–5.19%	–2,501.00	–105.11%	1,765.00	139.01%
April-June, 2011	18,845.90	–3.08%	5,171.00	306.76%	794.00	–55.01%
July-Sep., 2011	16,453.80	–12.69%	–2,962.00	–157.28%	2,399.00	202.14%
Oct.-Dec., 2011	15,454.90	–6.07%	–2,679.00	9.55%	1,028.00	–57.15%
Jan.-March, 2012	17,404.20	12.61%	43,951.00	1740.57%	–5,578.00	–642.61%

* BSE SENSEX Index Value was at 13,072 points as on April 1st, 2007.

** FIIs and MFs Net Flows (in Rs.Crores) for Jan.-March, 2007 Quarter was 6650 and –3296 respectively.

Table 4 points out that in the long-run (i.e., one year here) though the FIIs net flows are directly influencing the BSE SENSEX Index, but, MFs net flows trends are not very conclusive.

Thus, it is evident that the FIIs net flows are much more important and influential in comparison to MFs net flows in day-to-day, short-to-medium runs and long-run for the BSE SENSEX Index.

Table-4. FIIs, MFs and Indian Stock Markets Information (Annual)

Year	BSE SENSEX Index Value	% Change in BSE SENSEX Index Value	FIIs Net Flows (in Rs.Crores)	% Change in FIIs Net Flows	MFs Net Flows (in Rs.Crores)	% Change in MFs Net Flows
2006-2007	13072.10	-	25,236.00	-	8,990.00	-
2007-2008	15644.44	19.68%	53,403.50	111.62%	16,306.00	81.38%
2008-2009	9708.50	–37.94%	–47,706.20	–189.33%	6,984.60	–57.17%
2009-2010	17527.77	80.54%	1,10,220.60	331.04%	–10,512.00	–250.50%
2010-2011	19445.22	10.94%	1,10,121.00	–0.09%	–19,800.00	–88.36%
2011-2012	17404.20	–10.50%	43,737.00	–60.28%	–1,357.00	93.15%

4.2. Descriptive Statistics Results

Table-5. Descriptive Statistics

	B-SENSEX	FIINF	MFNF
Mean	16164.89	4496.247	–139.6400
Median	16935.41	2940.000	–30.50000
Maximum	20509.10	28563.00	7703.000
Minimum	8891.610	–15347.30	–7236.000
Standard Deviation	2949.858	10199.14	2381.415
Skewness	–1.001446	0.420077	–0.183079
Kurtosis	3.464303	2.629149	5.067451
Jarque-Bera	10.56789	2.108476	11.02107
Probability	0.005072	0.348458	0.004044
Observations	60	60	60

Table 5 represents the summary statistics of the variables under this study. The average monthly index for BSE SENSEX is 16164.89 during the study period (April, 2007 – March, 2012) with a high standard deviation (i.e., 2949.858) implying a volatile stock market. The average FIINF is 4496.247 crores with a maximum of 28,563 crores and minimum of –15,347.30 crores. The average MFNF during the study period is negative (i.e., –139.64 crores) with volatile investment nature. The wide difference between maximum and minimum in both FIINF and MFNF (high S.D. measure also indicates volatility) had been also one of the root causes of Indian stock market's enormous volatility.

The value of skewness of the above variables has pointed out that except MFNF (may be), the other variables had extreme values during the study period. It indicates a deviation from normal distribution of the data and volatility in those parameters. The value of kurtosis has pointed out that

B-SENSEX and MFNF had leptokurtic distribution (i.e., >3) with values concentrated around the mean and thicker tails. This means high probability for extreme values which is observed from the above table. The kurtosis value of FIINF indicated platykurtic distribution (i.e., <3) and the values are wider spread around the mean. Jarque-Bera test statistic measures the difference of the skewness and kurtosis of the data series with those from the normal distribution.

4.3. Correlations Results

Table 6 points out that B-SENSEX is positively influenced by the FIIs net flows. However, MFs net flows negatively influence the BSE SENSEX Index. It is also observed that the FIIs net flows have a significant negative relationship with the MFs net flows. This fact has been also evident in Tables 2-4.

Table-6. Correlations Results

		B-SENSEX	FIINF	MFNF
B-SENSEX	Pearson Correlation	1	.387(**)	-.201
	Sig. (2-tailed)	.	.002	.124
	N	60	60	60
FIINF	Pearson Correlation	.387(**)	1	-.652(**)
	Sig. (2-tailed)	.002	.	.000
	N	60	60	60
MFNF	Pearson Correlation	-.201	-.652(**)	1
	Sig. (2-tailed)	.124	.000	.
	N	60	60	60

** Correlation is significant at the 0.01 level (2-tailed).

4.4. ADF and PP Tests Results

In order to check the unit roots in the above data series, the ADF and PP tests have been applied at levels and first difference. Table 6 has indicated the results of ADF and PP tests, i.e., stationary level of all non-stationery variables with intercept and no trend. We know that, all non-stationary variables should have the same level of integrating factor for cointegration analysis. According to my results, all variables of this study don't have the same order [i.e., I(0) or I(1)]. The ADF and PP results are same in this regard.

4.5.1. (Johansen and Juselius, 1990)(JJ) Cointegration Test Results

As I could not employ the JJ cointegration technique in between B-SENSEX, FIINF and MFNF, so, no long-run relationship can be found in between the BSE SENSEX Index and the FIIs & MFs net flows. However, JJ cointegration technique has been used in between FIINF and MFNF as both have the same order [i.e., I(0)]. In order to explore long-run relationships between the FIIs net flows and MFs net flows, I have revised the above econometric model (see 3.3.2.2) into the following model:

$FIINF = \beta\ MFNF + \varepsilon_t$

In multivariate cointegration analysis using JJ technique, the first step is the appropriate lag selection for the variables. The Akaike Information Criteria (AIC) (Maddala and Kim, 2000) and Schwarz Information Criteria (SIC) have been widely used in the time series analysis to determine appreciative length of the distributed lag. This criterion is used to determine the lag length - the smaller the value of the information criteria, the 'better' the model is. Thus, One lag length has been selected equal in this study on the basis of both AIC and SIC (see Table 8).

Table-7. Augmented (Dickey and Fuller, 1979) & (Phillips and Perron, 1988) Tests with Intercept and no Trend

Variables	ADF Test Results			PP Test Results		
	Level	1st Difference	Conclusion	Level	1st Difference	Conclusion
B-SENSEX	–1.770648	–5.380437		–1.897720	–7.351659	
	(–3.5457)	(–3.5478)*		(–3.5437)	(–3.5457)*	
	–1.770648	–5.380437		–1.897720	–7.351659	
	(–2.9118)	(–2.9127)	I(1)	(–2.9109)	(–2.9118)	I(1)
	–1.770648	–5.380437		–1.897720	–7.351659	
	(–2.5932)	(–2.5937)		(–2.5928)	(–2.5932)	
FIINF	–3.891665	–9.194839		–5.536692	–13.50016	
	(–3.5457)*	(–3.5478)		(–3.5437)*	(–3.5457)	
	–3.891665	–9.194839		–5.536692	–13.50016	
	(–2.9118)	(–2.9127)	I(0)	(–2.9109)	(–2.9118)	I(0)
	–3.891665	–9.194839		–5.536692	–13.50016	
	(–2.5932)	(–2.5937)		(–2.5928)	(–2.5932)	
MFNF	–4.019730	–7.630514		–4.542443	–10.60416	
	(–3.5457)*	(–3.5478)		(–3.5437)*	(–3.5457)	
	–4.019730	–7.630514		–4.542443	–10.60416	
	(–2.9118)	(–2.9127)	I(0)	(–2.9109)	(–2.9118)	I(0)
	–4.019730	–7.630514		–4.542443	–10.60416	
	(–2.5932)	(–2.5937)		(–2.5928)	(–2.5932)	

Table-8. Akaike Information Criteria (AIC) & Schwarz Information Criteria (SIC)

AIC Value	SIC Value	Lag
–1625.503	–1625.080	(1 1)
–1595.279	–1594.533	(1 2)
–1558.648	–1557.572	(1 3)
–1525.983	–1524.572	(1 4)

Test statistics are calculated allowing for an intercept and no trend term in the cointegrating equation (CE) and no intercept in VAR.

Table-9.1. Results of JJ Cointegration Test Likelihood Ratio (Trace) Test for Cointegrating Rank

Variable	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value	Hypothesized No. of CE(s)
FIINF	0.231245	29.31723	19.96	24.60	None**
MFNF	0.215325	14.06419	9.24	12.97	At most 1**

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

LR (Trace) test indicates 2 cointegrating equation(s) at 5% significance level.

Table-9.2. Results of JJ Cointegration Test Max-Eigenvalue Test for Cointegrating Rank

Variable	Eigenvalue	Max-Eigen Statistic	5% Critical Value	1% Critical Value	Hypothesized No. of CE(s)
FIINF	0.231245	15.25304	15.67	20.20	None
MFNF	0.215325	14.06419	9.24	12.97	At most 1**

*(**) denotes rejection of the hypothesis at 5% (1%) significance level.

Max-Eigenvalue test indicates 1 cointegrating equation(s) at 5% significance level.

The results of the Johansen and Juselius's Trace test and Max-Eigenvalue Test are shown in Table 9.1 and 9.2. At the 1% significance level the Trace test suggests that the variables are cointegrated with $r \neq 1$. It indicates that there are at least two cointegration vectors, i.e., two CE in order to establish the long-run relationships among the above variables. However, the Max-Eigenvalue Test statistic indicates that there is at least one CE. Based on the above results, I presume one CE would be justified in this study, i.e., there exists a long-run relationship in between the above variables. Bivariate cointegration could not be possible in between B-SENSEX and FIINF, and also in between B-SENSEX and MFNF, because, they are not integrated of the same order. However, in case of FIINF and MFNF, both bivariate and multivariate cointegration results are the same (see Table 9.1 and 9.2).

4.5.2. Model (Long-Run Relationships) Results

After the normalization of the first cointegrating vector on FIINF, normalized cointegrating coefficients are estimated as reported in Table 10.

Table-10. Normalized Cointegrating Coefficients (statistically significant results at $\alpha = 0.05$)

FIINF	MFNF
1.000000	21.55788
S.E.	(29.3763)
t-value	(6.541)

The first normalized equation is estimated as below:

FIINF = –21.55788 MFNF

According to the first normalized equation, FIIs net flows (i.e., FIINF) have shown significantly negative relation with the MFs net flows in the long-run. This finding is also in line with earlier correlation results (see Table 6) as found under this study.

4.6. Granger Causality Test Results

Table-11. Granger Causality Test Results

Null Hypothesis:	Observations	F-statistic	Probability
FIINF does not Granger Cause B-SENSEX	59	0.79055	0.37774
B-SENSEX does not Granger Cause FIINF		0.02837	0.86686
MFNF does not Granger Cause B-SENSEX	59	0.64701	0.42458
B-SENSEX does not Granger Cause MFNF		0.06300	0.80274
MFNF does not Granger Cause FIINF	59	2.18755	0.14473
FIINF does not Granger Cause MFNF		1.02310	0.31614

This study has applied Granger causality test as proposed by Granger (1969) with 1 lag. Granger proposed that if causal relationship exists between selected variables, they can be used to predict each other. Results from Granger causality test are given in Table 11.

Table 11 has shown no short-run causal relationship in between B-SENSEX and FIINF and also in between B-SENSEX and MFNF. The results in Table 11 have also showed no Granger causality between FIIs net flows (i.e., FIINF) and the MFs net flows (i.e., MFNF) in any direction.

Overall, this study has found no unidirectional or bi-directional Granger causality between the selected investors indicators and Indian stock markets.

Thus, the overall Granger causality test reveals no significant short-run causal relationships between BSE SENSEX Index, FIIs net flows and MFs net flows which ultimately is the evidence of an informationally inefficient market.

5. CONCLUSION

To conclude, as Johansen and Juselius (1990) cointegration test could not be applied to all the variables, this study does not reveal any kind of significant long-run relationships between Indian stock markets as proxied by the BSE SENSEX Index with the FIIs and MFs net flows. However, a significant negative correlation and long-run relationship is found in between the FIIs net flows with that of MFs net flows. This study has also found no short-run relationships between the BSE SENSEX Index and the FIIs and MFs net flows by applying Granger causality test.

The results are significant to future investors - both domestic and foreign (when to invest in), policy-makers (what to look into) and future researchers (what are the implications) to investigate in Indian stock markets.

The results themselves point out to the limitations of this kind of study, because, both of the selected investors variables in general do have significant price-volume impact on Indian stock markets.

Similarly, FIIs net flows and MFs net flows (a little) also have direct influence and significant relationships by and with the critical Indian macroeconomic variables, such as, the GDP numbers, inflation rate, interest rate, exchange rate, call money rate (CMR), etc. The investor's variables in this study are also dependent on some global macroeconomic factors, situations and events. For example, capital inflows and outflows by the FIIs and others are not determined by domestic interest rate only, but, also by the changes in the interest rate by major economies in the world, e.g., the US. Also, the exchange rate is dependent on the inflows in the route of FIIs and FDI and the export-import disparity which is also influenced by external factors and situations.

Future studies should investigate short and long-run relationships in between FIIs net flows, MFs net flows and these macroeconomic variables. Future studies should also take the global macroeconomic factors within this framework for investigation and analysis.

Thus, inclusion of more macroeconomic variables keeping in mind the domestic and international factors with a longer time-frame may improve the results of this kind of future studies.

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