Dynamics Of FII Investment And Stock Market Returns In India : An Empirical Analysis

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INTRODUCTION

The Indian stock market has recorded notable growth in the past fifteen years. In recent years especially, it has posted substantial development. Two decades back, capital scarcity was a major problem in most of the developing countries, including India. The developing countries had low levels of income generation and hence, the savings level was also low as compared to developed countries. Due to low capital formation, economic development was not remarkable. There were two alternatives to overcome this barrier; one was borrowings, which is inherently limited. The other alternative was allowing foreign investors with abundant resources to invest in the country. India decided to liberalize through its globalization policies, and implemented the same during the 1990s. From September 14, 1992, India allowed Foreign Institutional Investors' (FIIs) investments by which foreign investors could invest directly in the financial markets in India. The result of such policy change was that, India started gaining faster development of the financial market, and its impact is expected to be directly visible on the growth in its economy. Allowing foreign individuals and institutions to invest directly in the financial market has its own advantages and limitations. A developing country like India can attract FII only when it gives an attractive return on their investment. If it gives such a return, it will create a reputation for its financial market in terms of activities, and consequently, more foreign investors will be attracted to bring in funds into the financial market, as a result of which, the market would grow well. This would attract the domestic investors also to actively participate and the market's growth will be accentuated. The Indian stock market witnessed such a growth phenomenon during the past two decades. The market capitalization to GDP ratio was 106.5% in case of the Bombay Stock Exchange (BSE) and 103.8% in case of the National Stock Exchange (NSE) in 2009-2010 [1], indicating the growth pattern of the Indian stock market.

So, the FII flow is considered to be one among the major factors affecting the market behaviour. But it should be remembered that the FIIs invest the funds in the country where there are higher returns than that of the parent country and would stay invested as long as the returns are higher. In this paper, an attempt is made to find whether there is a positive relationship between FIIs inflow and the market behaviour in India.

REVIEW OF LITERATURE

Many studies have been undertaken on FII investment and the Indian stock market. Kishore C. Samal (1997) found that there was a gradual integration of the Indian stock market with the global market, and the study focused on the consequent problem due to the hot money movement by FIIs. Parthapratim Pal (1998) found inflow of FIIs has failed to strengthen the stock market, and his study did not support the view that FIIs inflows leads to economic development in India. K.S. Chalapati Rao et.al., (1999) found that net FII investments influence stock prices in India as it traces the relationship to the sectoral level and the heavy emphasis on computer software and consumer goods was observed in the Indian stock market for the period from 1994-99.

Rajesh Chakrabarti (2001) had made a study on FIIs flow and their relationship with other economic variables and found that FIIs flow and equity return in India are positively correlated. Paramida Mukherjee et al. (2002) found in their study that there was a general perception that FII activities exert a strong demonstration effect and thus, drive the Indian stock market. Parthapratim Pal (2005) studied the effect of FII flow in the Indian stock market in the post

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[1] RBI Monthly Bulletin, August, 2010.

election crash in 2004, and found that the FIIs influence the movement of Sensex. Krishna Prasanna (2008) found that FIIs invested more in companies with a higher volume of shares owned by the general public and the promoters' holdings, and the foreign investments are inversely related. Foreign investors choose the companies where family shareholding of promoters is not substantial. Suresh Babu and Prabheesh (2008) found that there was bidirectional causality between FII flows and stock returns during their study period from January 2003 to February 2007. Mohd. Aamirkhan et al. (2010) found a casual relationship between Nifty and FII investment and a positive relationship from January 1999 to February 2009. Ambuj Gupta's (2011) study supported the positive relationship between FIIs and the Indian stock market. He found that both FIIs and stock markets influence each other, but timing of the influence is different.

SCOPE OF THE STUDY

All the above studies considered different time periods with different dimensions by taking a shorter or a longer period. But no attempt was made to study the impact of FII investments on the Indian stock market returns comprehensively. This study attempts to take a look at the relationship between FIIs net investment and the Indian stock market in terms of returns on the index.

The impact of the flow of funds from FIIs may be many, chief among them being the strengthening of the stock market in terms of volume of trade and efficiency in price discovery, improving the efficiency of the institutions of capital markets, including the stock market and so on. From the point of view of investors in India, whether these flows have had a favourable impact on their interest, namely positive returns would be a main question to be answered. This study intends to assess the impact of FIIs in terms of overall changes in the stock prices, measured as return on index being the change in the index values.

OBJECTIVES

1. To study the trend in FIIs' investment in the Indian stock market during the study period; and

2. To test the impact of FIIs as a relationship between FII net investments and stock market returns during the study period.

PERIOD OF THE STUDY

A period of 11 years (2000-01 to 2010-11) had been taken up for the study and two sub-periods were identified, the first one consisting of the first five years (2000-01 to 2004-05), and the last six years (2005-06 to 2010-11) formed the second sub-period.

METHODOLOGY

The study required analysis of data relating to the inflow and outflow of FII investments during the study period and also required an analysis of the index data. Secondary data had been relied upon and the required data were obtained from the websites - bseindia.com , nseindia.com and sebi.gov.in. There are a number of indexes indicating and tracking the stock market. Nifty and Sensex were considered more appropriate for this study and hence, were considered for the analysis. Net investment has been calculated as gross purchases minus gross sales for the different periods considered. Return on Nifty and Sensex have been calculated as follows:

- **Return on Nifty**

$$R_{nt} = \frac{(N_t - N_{t-1})}{N_{t-1}}$$

- **Return on Sensex**

$$R_{st} = \frac{(S_t - S_{t-1})}{S_{t-1}}$$

R_{nt} refers to return on Nifty and N_t refers to the closing index of Nifty of a particular day and N_{t-1} refers to the closing index of Nifty of the previous trading day. R_{St} refers to return on Sensex, S_t refers to the closing index of Sensex of a particular day, and S_{t-1} refers to the closing index of the Sensex of a previous trading day.

In order to gain more insight into the nature of changes, the study period has been classified into two sub-periods, the first one consisting of the first five years (2000-01 to 2004-05) featured by a low level of FII investments, and the last six years (2005-06 to 2010-11) formed the second sub-period, which witnessed increased FII investments. The results are analyzed on an annual basis also.

❁**Tools Used :** For analyzing the data percentage, compounded annual growth rate (CAGR) and correlation techniques were used.

THE INDIAN STOCK MARKET – AN OUTLOOK

The Indian stock market had its beginning in the second half of the 19th century. The Bombay Stock Exchange was the first stock exchange to be established in India, and it is also one of the oldest stock exchanges in Asia. In the course of time, many stock exchanges were established, and their growth was substantial. In the year 1946, there were 7 registered stock exchanges in India, which went up to 14 in the year 1985, 20 in 1991, 22 in 1995 and presently, there are 23 recognized stock exchanges including *Over The Counter Exchange of India (OTCEI)* [2]. The number of listed companies also grew from 3585 in 1993-94, to 4929 in 2008-09, and it was 4975 in 2009-10 in the Bombay Stock Exchange; and the same was 422 in 1995-96, 1432 in 2008-09, and 1470 in 2009-10 in the National Stock Exchange [3]. Growth in the stock market may be substantiated by the value and volume of the securities traded. A study of the nature of changes in the stock indices would throw light on the growth of the stock market, since they are indicators of the market valuation of traded securities. In the year 2001-02, the number of share trading transactions was 1,82,196 lakh in BSE, and it increased to 11,36,513 lakh in the year 2009-10. It was 2,78,409 lakh in NSE in the year 2001-02, and 22,15,530 in the year 2009-10. The value of shares delivered in BSE in the year 2001-02 was ₹ 59,980 crore and it increased to ₹ 3,11,364 crore in the year 2009-10. The same in the NSE was ₹ 71,765 crore in 2001-02, and it increased to ₹ 9,16,460 crore in 2009-10 [4]. Major indicators of growth in value in the Indian stock market could be tracked through the market indices such as the Sensex of the Bombay Stock Exchange and Nifty of the National Stock Exchange, which shows the index of value of the traded securities in the market. Many studies have identified a favourable relationship between FIIs investment and stock market indices and in order to study the impact, two aspects - namely trend and returns are assessed. Initially, the trend in FIIs investment is discussed.

TRENDS IN FIIs NET INVESTMENT AND THAT OF THE INDIAN STOCK MARKET

Stock market behaviour depends on various factors such as economic fundamentals like Government policies, foreign capital inflows, market information, demand and supply and the like, and also the industry-related factors. Among them, the FII flows play a vital role. FIIs have emerged as the major investors in the Indian stock market during recent times. They bring huge investment into the market. The Indian financial market developed substantially after the advent of foreign investment [5].

FIIs are the largest institutional investors in India, with their cumulative net investments in India since November 1992 to 31st March, 2011, were ₹ 90,144.6 crore. The FIIs are the most successful portfolio investors in India, with more than 100% appreciation since September 30, 2003 [6]. The Table 1 shows the net investment of FIIs and that of the stock market indices from the year 1993-94 to 2010-11, as well as their trends in terms of % change over the previous year and the CAGR.

It can be seen from the Table 1 that the number of FIIs registered in India has been on the increase every year, except for a marginal fall during 1998-99 and 2001-02. It increased from 158 in 1993-94 to 1722 in 2010-11, a stupendous 11 times increase, which in itself is evidence of increased interest of FIIs in the Indian financial market. It is of interest to note that in spite of the global financial crisis during 2008-09, 316 new FIIs registered during that period. With increasing number of FIIs, their investment has also been increasing in the Indian stock market.

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[2] Source: RBI bulletin.

[3] Hand book of statistics of the Indian Securities market 2010, SEBI.

[4] Hand book of statistics of the Indian Securities market 2010, SEBI.

[5] www.sebi.gov.in

[6] www.sebi.gov.in

Table 1: Trends In FII Investments And The Indian Stock Market Indices During 1993-94 To 2010-11								
Year	**FII flow Units (₹ In crores)**	**% Change over the previous year**	**No. of FIIs registered with SEBI**	**Net additions over the previous year**	**Nifty**	**% Change over the previous year**	**Sensex**	**% Change over the previous year**
1993-1994	5127	-	158	-	1177.11	-	3778.99	-
1994-1995	4796	-6.46	308	150	990.24	-15.88	3260.96	-13.71
1995-1996	6942	44.75	367	59	985.30	-0.50	3366.61	3.24
1996-1997	8575	23.52	439	72	968.30	-1.73	3360.89	-0.17
1997-1998	5958	-30.52	496	57	1116.90	15.35	3892.75	15.82
1998-1999	-1584	-126.59	450	-46	1078.05	-3.48	3739.96	-3.92
1999-2000	10122	-739.02	506	56	1528.45	41.78	5001.28	33.73
2000-2001	9933	-1.87	527	21	1148.20	-24.88	3604.38	-27.93
2001-2002	8763	-11.78	490	-37	1129.55	-1.62	3469.35	-3.75
2002-2003	2689	-69.31	502	12	978.20	-13.40	3048.72	-12.12
2003-2004	45764	1601.90	540	38	1771.90	81.14	5590.60	83.38
2004-2005	45880	0.25	685	145	2035.65	14.89	6492.82	16.14
2005-2006	41467	-9.62	882	197	3402.55	67.15	11279.96	73.73
2006-2007	30841	-25.63	997	115	3821.55	12.31	13072.10	15.89
2007-2008	66179	114.58	1319	322	4734.50	23.89	15644.44	19.68
2008-2009	-45811	-169.22	1635	316	3020.95	-36.19	9708.50	-37.94
2009-2010	142658	411.41	1713	78	5249.10	73.76	17527.77	80.54
2010-2011	110530	-22.52	1722	9	5833.75	11.14	19445.22	10.94
CAGR %	**18.6**		**14.19**		**9.53**		**9.3**	
Source: www.bseindia.com, www.nseindia.com and www.sebi.gov.in and http://www.moneycontrol.com								

The Table 1 shows the net investment of FIIs in the Indian stock market. It could be seen that the FII net investments have been gradually increasing, with a slight variation since 1993-94. There was positive net investment inflow in most of the years, except the negative flows during the years 1998-99 and 2008-09. The net investment of FII was ₹ 5127 crore in the year 1993-94, and it gradually increased, but at fluctuating rates. There were negative flows, i.e., a net outflow during two years, 1998-99 and 2008-09. After 2002-03, there was a steep increase in the net investment by FIIs, with 2003-04 recording a whooping 16 times increase over the previous year. It is also in this year that both the indices - Nifty and Sensex - recorded the maximum gain over the previous year, 81.14% and 83.38% respectively. Quantum wise, 2009-10 witnessed the maximum net inflow of ₹ 1,42,658 crore, which showed a growth of more than 4 times as compared to the previous year. In case of Nifty and Sensex, there was steady change marked by both increase and decrease. Starting from 2003-04, the change had been more rapid, with that year recording the maximum gain over the previous year. 2008-09 was an exceptional year, marking a huge fall due to impact of the global financial crisis.

The growth of FII investment, the Nifty and the Sensex could be seen through the CAGR, which was 18.60%, 9.53% and 9.30% respectively during the 18 years time period that was considered for the study . It is evident that the growth in FII has been quite impressive. While studying the trend of net investment of FIIs as compared to Sensex and Nifty, out of the 17 years, in 11 years, the movement of Sensex and Nifty were in line with the movement of FII investment. In other words, in these periods, the increase in net investments by FII coincides with an increase in Nifty and the periods of decline in net investments by FIIs is characterized by a decline. With regard to Sensex, the number of years of such similar movements is 12. With regards to the remaining years i.e., 6 of Nifty and 5 of Sensex respectively, an opposite movement is seen, i.e., positive change in one alongside a negative change in the other. However, one aspect which is striking is that the proportion of changes in both the index values is only a very low proportion of that of FII flows. This leads one to a broad conclusion that the impact of FII flows has only been minimal. This aspect is verified further in the forthcoming paragraphs.

FII INVESTMENTS AND STOCK MARKET RETURNS

As mentioned earlier, the impact of FII flows might be many, but the impact on investors' return in India is considered. Change in the market index is sure to affect stock returns, either positively or negatively. Hence, returns are considered as a variable.

To find out whether there is any relationship between FII net investment and the behavior of Indian stock market returns, correlation between FIIs net investment and return on Nifty index and FII net investment and return on the Sensex index was applied for the period of 11 years from 1st April, 2000 to 31st March, 2011 for changes on a daily basis. There were 2691 daily observations during the study period, and the results are presented in the Table 2.

Table 2

Correlation Between FIIs Net Investment And Nifty Returns			
		FII	**Nifty**
FII	Correlation coefficient	1	0.201**
	P-value		0.000
	No. of observations	2691	2691
Correlation Between FIIs Net Investment And Sensex Returns			
		FII	**Sensex**
FII	Correlation coefficient	1	0.204**
	P-value		0.000
	No. of observations	2691	2691

** Correlation is significant at 1% level

The Table 2 shows that there have been positive correlations between FIIs net investment and Nifty (0.201) and FIIs net investment and Sensex (0.204). This basically means that there has been an impact of FII flows on the market returns as indicated by the positive correlation, but it has not been very considerable, as indicated by the low value of 0.2 as against 1, which would indicate a perfect correlation. When testing the nature of the relationship, the correlation is significant at the 1% level.

It is also seen that the correlation in both the cases is almost equal, revealing that the indices of Nifty and Sensex have had a similar behavior as far as the correlation with FIIs' net investment is concerned. Movement of the stock market is influenced by numerous factors and FIIs net investment has only been one, but not a major factor.

The relationship between FII net investment and the Indian stock market is calculated for each year from 2000-01 to 2010-11 individually to check the relationship between them and they are presented in the Table 3. During the study period, during all the years, FII net investment and Nifty return are positively correlated. The highest correlation is found in the year 2008-09 (0.326), followed by the year 2010-11 (0.323). 2000-01 reported lowest correlation (0.044) during the study period. Over the study period of 11 years, in 8 years, the correlations are significant either at 1% or 5% level. Even though correlations in the years 2000-01, 2001-02 and 2004-05 are positive, they are not significant at the 1% and 5% levels.

The correlation between FII net investment and Sensex are almost the same as that of Nifty returns. 2008-09 recorded highest correlation (0.343) during the study period, followed by the year 2010 -11 (0.322), and 2007-08 (0.309). During the study period, 2000-01 was the only year showing a negative correlation (-0.005), but it was not significant at the levels considered. In all other years, FII net investment is positively correlated with Sensex. Correlations are significant in 8 years among 11 years; they are insignificant in the years 2000-01, 2001-02 and 2004-05, as observed in the case of Nifty returns. The results also show that the correlation coefficient increased during the study period.

Even though the analysis of correlation reveals a positive correlation between FII net investment and the Indian stock market during the study period, it is comparatively higher since 2004-05, than the previous years of the study period. Hence, the whole study period is divided in to two sub-periods and correlation between FIIs net investment and Indian stock market is examined. The first sub-period starts from 1st April, 2000 and ends with 31st March, 2005 and the second sub-period begins from 1st April, 2005 and ends with 31st March, 2011. The correlation results for the two sub-periods are presented in the Table 4.

Table 3

Correlation Between FIIs' Net Investment And Nifty Returns

Year		Nifty										
		2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
FII	Correlation coefficient	0.044	0.122	0.148*	0.203**	0.056	0.154*	0.162*	0.296**	0.326**	0.240**	0.323**
	P-value	0.491	0.056	0.020	0.001	0.384	0.015	0.014	0.000	0.000	0.000	0.000
	No. of observations	249	247	249	249	247	249	229	247	240	239	246

Correlation Between FIIs' Net Investment And Sensex Returns

Year		Sensex										
		2000-01	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
FII	Correlation coefficient	-0.005	0.102	0.138*	0.230**	0.058	0.158*	0.170**	0.309**	0.343**	0.250**	0.322**
	P-value	0.936	0.109	0.029	0.000	0.362	0.013	0.010	0.000	0.000	0.000	0.000
	No. of observations	249	247	249	249	247	249	229	247	240	239	246

** Correlation is significant at 1% level

* Correlation is significant at 5% level

Table 4

Correlation between FIIs' net investment and Nifty returns

Year	Nifty		
		Sub-period I	**Sub-period II**
FII	Correlation coefficient	0.089**	0.244**
	P-value	0.002	0.000
	No. of observations	1241	1450

Correlation between FII's net investment and Sensex returns

Year	Sensex		
		Sub-period I	**Sub-period II**
FII	Correlation coefficient	0.079**	0.251**
	P-value	0.006	0.000
	No. of observations	1241	1450

** Correlation is significant at 1% level

The correlation between FIIs net investment and Nifty are positive in both the sub-periods, but it is lower in the first sub-period (0.089) than in the second Sub-period (0.244). Hence, it can be concluded that in the second period (2005-2011), FIIs net investment had influenced the Indian stock market more than it did in the first sub-period (2000-2005). In case of correlation between FIIs net investment and Sensex returns, the results are mostly similar except that the correlation figures are slightly higher as compared to Nifty. The probability values reveal that the correlation was significant at 1% level in both the sub-periods, both with regard to Nifty and Sensex. The year 2008-09 recorded the highest correlation (0.326 in case of Nifty, and 0.343 in case of Sensex), and it was in 2008-09 that the Indian stock market experienced a bear market. Hence, it can also be inferred that FIIs influenced the Indian stock market more in the bear market than in the bull market (2005-06, 2006-07 and 2007-08). The significance of correlation, both in case of Nifty and Sensex returns are significant from 2000-01 to 2010-11, except in the years 2000-01, 2001-02 and 2004-05.

CONCLUSION

FII net investment in Indian stock market has been increasing since their advent. During this period, the indices Nifty and Sensex had also increased. FIIs net investments' CAGR was 18.60% during the period, while that of Nifty and

Sensex recorded 9.30% and 9.53% respectively in the same period. When analyzing the relationship between FIIs net investment and the Indian stock market, they were positively and significantly correlated during the study period. Correlation between FII net investment in Nifty and Sensex was 0.201 and 0.204 respectively. However, when the entire period was subdivided and analyzed, it was found that the influence of FII net investment had been higher in the latter period, meaning that it started to have more influence on the stock market of late.

REFERENCES

1. Babu Suresh M. (2008). "Casual Relationship Between Foreign Institutional Investments and Stock Returns in India." *International Journal of Trade and Global Markets*, Vol. 1, No. 3, pp. 259 - 265.

2. Business Line. *"Instanex Index To Track FII Performance."* January 29, 2009 http://www.thehindubusinessline.com/2009/01/29/stories/2009012951751100.htm accessed on June 5, 2010.

3. Business Standard. *"Understanding the FII",* January 2, 2008 http://www.business-standard.com/india/news/ajay-shah-understandingfii/309410/ accessed on June 5, 2010.

4. Chakrabarti Rajesh (2001). "FII Flows To India: Nature and Causes." *ICRA Bulletin - Money and Finance*, Vol. 2, No. 7, pp. 61- 81.

5. Chalapati Rao K.S. , Murthy M.R. and Ranganathan K.V.K. (1999). "Foreign Institutional Investments and The Indian Stock Market." *Journal of Indian School of Political Economy,* Vol. XI, No. 4, pp. 623 - 647.

6.*Foreign Institutional Investments,* accessed on June 2, 2011 http://www.moneycontrol.com/india/stockmarket/foreigninstitutionalinvestors/20/54/activity/FII

7. Foreign Institutional investments, accessed on May 31, 2011 http://www.sebi.gov.in/sebiweb/investment/statistics.jsp?s=fii

8. G. Saravanan and Dr. Malabika Deo (2011). "Recent Financial Crisis and The Role of Foreign Institutional Investors In India With Reference to NSE. " *Indian Journal of Finance*, Vol. 5, No.2, pp. 3-9.

9. Gupta Ambuj (2011). "Does the Stock Market Rise or Fall Due to Foreign Institutional Investors in India." *Journal of Arts, Science and Commerce,* Vol. 2, Issue 2, pp.99 - 107.

10. Handbook of Statistics of the Indian Securities Market, 2010, SEBI.

11. *Index of Nifty*, accessed on May 31, 2011 http://nseindia.com/marketinfo/indices/histdata/historicalindices.jsp

12. *Index of SENSEX*, accessed on May 31, 2011 http://www.bseindia.com/stockinfo/indices_main.aspx?indi=BSE30%20%20&fromDate=01/04/2000&toDate=31/05/2011&DMY=D

13. Mukherjee Paramita, Suchismita Bose and Dipan Kor Coondoo. (2002). "FII in the Indian Equity Market: An Analysis of Daily Flows During January 1999 - May 2002." *ICRA Bulletin - Money and Finance*, Vol. 2, No. 9-10, pp. 21 - 51.

14. P. Krishna Prasanna (2008). "Foreign Institutional Investors: Investment Preferences in India." *Journal of Administration and Governance*, Vol. 3, No. 2, pp. 40-51.

15. Pal Parthapratim (1998). "Foreign Portfolio Investment in Indian Equity Markets: Has Economy Benefited?" *Economic and Political Weekly,* Vol. 33, No. 11, pp. 589-598.

16. Pal Parthapratim (2005). "Volatility in The Stock Market in India and FIIs A Study of The Post Election Crash." *Economic and Political Weekly,* Vol. 40, No. 8, pp. 765-772.

17. Roy M.K. (2001). "Stock Market in Liberalized Economy: Indian Experience." *Economic and Political Weekly*, Vol. 36, No. 4, pp.367-369, p.371, p.373, pp. 375-376.

18. Rudra Titas (2010). "Voluntary Disclosure Practices And FII Flows - A Study of Selected Indian Firms." *Indian Journal of Finance*, Vol. 4, No.12, pp.21-28.

19. Samal , Kishore C . (1997). "Emerging Equity Market in India: Role of Foreign Institutional Investors." *Economic and Political Weekly*, Vol. 32, No. 42, pp. 2729-2732.

20. Sarkar Nityananda and Debabrata Mukhopadhyay. (2005). "Testing Predictability and Nonlinear Dependence in the Indian Stock Market." *Emerging Markets Finance And Trade*, Vol. 41, No. 6, pp. 7 - 44.

21. Tripathi Neeta (2008). "Foreign Institutional Investment Flows (FIIs) in Indian Companies." *Indian Journal of Finance,* Vol. 2, No. 2, pp.17-24.