

BEHAVIORAL MODELING OF FOREIGN INSTITUTIONAL INVESTOR'S IN INDIAN EQUITY MARKET

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ABSTRACT

In the last decade, the Foreign Institutional Investor (FII) flows have increased almost twenty times and attained shares of thirteen and six percent in the National Stock Exchange and Bombay Stock Exchanges respectively in the cash segment of the Indian equity market. This raises the issue of behavioral modeling of FII flows with respect to local and global stress in the market. The present study empirically documents static and dynamic interaction between FII flows and stock market returns using daily data from 2000 to 2009 using ordinary least squares regression and vector auto regression along with an impulse response function. The regression results show strong evidence of positive feedback trading of FIIs with an adjusted R square of eleven percent. Further a Granger Causality test leads to rejection of both of the null hypotheses lending strong support to a bidirectional relation between FII flows and equity market returns in Indian. However, the overall response function of institutional investors to a one standard error shock reveal a sharp and significant impacts dying out in four to five days. Thus, the paper recommends active and informed churning strategies by portfolio managers and investors dealing with firms with higher FII participation at the time of local or global stress.

JEL: G11; G15

KEYWORDS: Positive Feedback, FII, Granger Causality, VAR, Market Return, Impulse Response Function

INTRODUCTION

Almost two decades ago, the Government of India allowed Foreign Institutional Investors (FIIs) integrating the Indian economy with global financial markets. Since then FIIs flows have exhibited four different structural periods with widely different characteristics in quantum and momentum. Institutional investors changed their momentum drastically at three different points in time: 1997 (Asian crisis), 2004 (Election and UPA Government), 2008 (Lehman Crisis and Satyam debacle). Initially it appears that FIIs are speculators and tend to make money in short spans. However recently they are net buyers in spite of mutual funds being net sellers. Thus, the prime facie facts lead to mixed observation pertaining to behavior of FIIs in the Indian equity market. The paper is organized into five sections. The second section reviews the relevant literature and objectives. The third section deals with data and methodology. The fourth section presents results and some discussion. Finally, some concluding comments are provided.

LITERATURE REVIEW

Transnational capitalism has directed the flow of significant amount of capital from developed to emerging economies. International capital investment can play a useful role in development by adding to the savings of low and middle- income developing countries (Michael and Menkhoff, 2003; Mody *et al*, 2001) in order to increase their pace of investment. But at the same time, the volatility of flows can be a

matter of deep concern among third world countries as they can be easily exposed to disruptions and distortions (Dodd, 2004). The process of liberalization has triggered a huge influx of foreign capital into the Indian financial market resulting in a deepening and widening of its capital market. FIIs remained net investors in the country except during 1998-99 (Pasricha, J. and U. Singh, 2001) and their investment has been steadily growing since their entry in the Indian markets. Chakrabarti, R (2001) establishes a high correlation between FIIs and contemporaneous returns in the Indian markets.

Mukherjee, P. et al (2002) concludes there are various probable determinants of FII. FII flows, to and from Indian markets tend to be caused by return in the domestic equity market and not the other way. Returns in the Indian equity market are indeed a vital, and perhaps the single most important, factor that influences its rate of flow. In addition they also discovered a strong demonstration effect in the action of FIIs which has become the key driver of the domestic market as well as the foreign exchange market. Trading behavior of FIIs and the impact of their trading biases upon stock market stability indicates that FIIs have a positive feedback on investors on a daily basis (Batra, A, 2004). But there has been no conclusive evidence of positive feedback trading on a monthly basis. The role of return, risk and inflation as determinants of foreign institutional investors in the Indian capital market depends on stock market returns, inflation rates (both domestic and foreign) and ex-ante risk (Rai, K. and N. Bhanumurthy, 2004).

Contemporaneous flows of FIIs in India are positive and highly significant (Griffin, 2004). FII and Stock Index show positive correlation, but fail to predict the future value. FIIs investments are simultaneously influenced by the previous trading day as well as next trading day results (Ahmad et al, 2005). Most studies generally point to a positive relationship between FII investments and movement of the National Stock Exchange share price index. Some also agree on bidirectional causality stating that foreign investors have the ability to operate like market makers given their volume of investments (Babu and Prabheesh, 2008).

FIIs inflows have actually imposed certain burdens on the Indian economy (Rakshi et.al, 2006). Sudden increases and decreases in FIIs in India have raised several issues regarding the real implications of FIIs. The impact of FIIs can largely be observed at: (1) stock market (2) exchange rate and (3) forex reserves. Numerous studies examine the relationship between stock markets and FIIs, but some gap has been observed in the literature related to dynamic interaction between FIIs and the equity market. The recent plummet and surge in inflows warrants a fresh investigation to shed light onto the issue of causality between FIIs and equity markets. The present study is an attempt to examine the static and dynamic relation between FII and stock returns in Indian. To be more specific, this paper detects the direction of relationship between FII and market returns. Second, in the case of interdependence, we check the dynamic relation of FII flows to the lagged values of market return and vice versa. Finally, the paper also appraises the existence of positive feedback trading hypothesis in Indian equity market.

DATA AND METHODOLOGY

Aggregate daily FII data comprising three components purchases, sales and net purchases were obtained from 7th January 2000 to 6th August 2009 from the monthly bulletin of Money Control. Net FII purchases (purchases less sales) were normalized by market capitalization at time t (Goetzmann & Massa, 2003). The paper used five notations relating to FII viz. FIIP, FIIS, NFIIP, FIIPT and UFIIPT referring to FII purchases, FII sales, net FII purchases, net normalized FII purchases, and unexpected net normalized FII purchases respectively. The UFIIPT series is generated by subtracting estimated FIIPT from actual FIIPT. Thus, the number of observations for all components of FII is 2,338 which is further reduced to 2,336 in static analysis. The data on the market index (S&P CNX Nifty) is collected from the official website of National Stock Exchange (www.nseindia.com). Days when there is no trading are omitted and the price change is computed from the last day the market was open. Market returns are taken by the log difference in the price index.

$$RT = \text{Log}P_t - \text{Log}P_{t-1} \tag{1}$$

RT is the return of the market (S&P CNX Nifty) at time t.

P_t and P_{t-1} indicate the market's index at the end of day t and t-1 respectively.

Similarly RTP and RTF are the returns in the previous period (t-1) and following period (t+1) respectively.

The study is undertaken using daily data. Daily data give more precise results and enable capture of lead lag dynamics between FII and market return. To carry out the analysis between FII and market return the study is completed in four stages as follows:

Static Analysis

As a first step to explore the direction of relationship between FIIPT and market return the Granger Causality test is performed to eliminate the simultaneity bias in the bivariate model. By this technique the channels of causality are established using the standard “identification by ordering” methodology. The channel of causality is established from the results of Granger Causality test (Granger, 1969). Then Augmented Dickey Fuller tests and Phillips Perron tests are conducted to check the presence of a unit root to estimate the bivariate model under OLS assumptions.

Dynamic Analysis: The second step is Dynamic Analysis. In order to capture the dynamic interaction between market return and FIIPT flows, the paper uses unrestricted Vector Auto Regression (VAR) without any restrictions on the structure of the system as below:

$$FIIPT_t = FIIPT_{t-1} + FIIPT_{t-2} + \dots + FIIPT_{t-n} + R_{t-1} + R_{t-2} + \dots + R_{t-n} + \epsilon_1 \tag{2}$$

$$R_t = R_{t-1} + R_{t-2} + \dots + R_{t-n} + FIIPT_{t-1} + FIIPT_{t-2} + \dots + FIIPT_{t-n} + \epsilon_2 \tag{3}$$

Where $FIIPT_t$ is the net normalized FII purchases at time t.

The study uses VAR to quantify the impact of innovations (ϵ_1, ϵ_2) in returns by net FII purchases and vice versa. In addition, the paper generates Impulse Response Function to trace the time path of shocks on the variables contained in the VAR and finally identify the appropriate lag length using the AIC and SBC criterion.

Decomposition of FII Flows: The third step is to explore the bivariate model further by separating the flows into expected and unexpected components and investigating the regression results of both the components with market return.

Test of Positive Feedback Trading Hypothesis

The positive feedback trading hypothesis describes the strategy of rushing in when the markets are booming and rushing out when the markets are on the decline. Thus it expects a positive relationship between current FII investment and the past performance of the market. For estimation, the paper examines the following regression equations.

$$FIIPT_t = C + \beta_1 (RT) + \beta_2 (RTP) \tag{4}$$

$$UFIIPT_t = C + \beta_1 (RT) + \beta_2 (RTP) \tag{5}$$

$$RT = \beta(FIIPT) + C \tag{6}$$

Where $FIIPT_t$ is net normalized FII purchases at time t, calculated by dividing net $FIIP$ at time t by the market capitalization at t-1. β_1 and β_2 are regression coefficients and RTP is the return in the previous period. $\beta > 0$ indicates positive feedback trading.

RESULTS AND DISCUSSION

Table 1 and 2 show descriptive statistics and the autocorrelation (AC) and partial autocorrelation (PAC) at different lags respectively for various components of FII. The results of the autocorrelation matrix reveal that various components of FII have a high correlation at lag 1 but lower correlation at higher lags indicating the daily FII investments are independent of its distant lagged values. There is clear indication that the FII pattern is short lived and persists for very short duration. Further the unit root test is conducted based on Augmented Dickey Fuller Test and Phillips Perron tests (Phillips and Perron, 1988).

Table 1: Descriptive Statistics

Variable	Observation	Mean	median	S.D	J.B	
					t-statistics	p value
FIIP	2338	1278	732.1	1396	4235	0.00
FIIS	2338	1180	583.5	1353.9	4225	0.00
NFIIP	2338	97.64	51.9	554.5	39986	0.00
FIIPT	2338	0.011	0.008	0.038	46945	0.00

Table 1 presents the descriptive statistics of four components of FII viz. FIIP, FIIS, NFIIP and FIIPT. It is evident from the table that NFIIP and FIIPT are relatively more volatile than FIIP and FIIS. Further JB statistics also claim that all the particulars are not strictly drawn from normal population.

Table 2: Autocorrelation Matrix at Different Lags

Variable	Statistics	length of lag		
		1	3	5
FIIP	AC	0.827	0.784	0.794
	PAC	0.827	0.216	0.141
FIIS	AC	0.867	0.816	0.814
	PAC	0.867	0.199	0.137
NFIIP	AC	0.326	0.227	0.190
	PAC	0.326	0.127	0.060
FIIPT	AC	0.291	0.222	0.151
	PAC	0.291	0.138	0.040

Table 2 describes the autocorrelation and partial auto correlation at three different lags of one, three and five days for all components of FII. In this table, PAC has changed drastically from one to three and subsequently from three to five days for all components of FII leading to gradually diminishing impact of lagged foreign institutional investments.

The results (Table 3) show that all the components of FIIs are stationary in their level forms indicating the absence of trend and the long term mean reversion. From the Jarque –Bera statistics, it may also be inferred that various components of FII are unlikely to be drawn from a normal distribution. The standard deviation in FII, which is indicative of unconditional variance in FII, however continues to remain high for all the components of FIIs. Table 5 shows the Vector Auto Regression (VAR) results of the FIIPT and RT and the UFIIPT and RT. The VAR analysis is undertaken with different lag lengths and the appropriate lag 6 is selected on the basis of AIC and SBC results. The FIIPT and UFIIPT regression equations show that they are significantly correlated to their own lagged values up to four days where

they have significant relation with lagged daily returns up to three lags. These results lend support to positive feedback hypothesis in the Indian context. The graphs for the impulse response function are generated by VAR model and depicted in Figure 1.

Table 3: Test of Stationary Series (Unit Root)

Particular	Unit Root Tests			
	Augmented Dickey Fuller Test		Phillips Perron Test	
	Test Statistic	Critical value (5%)	Test Statistic	Critical value (5%)
FIIP	-4.73**	-2.78	-13.80**	-2.86
FIS	-4.78**	-2.78	-11.14**	-2.86
NFIIPT	-14.01**	-2.78	-37.67**	-2.86
FIIPT	-14.78**	-2.78	-38.84**	-2.86

Table 3 shows the results of Unit Root test (ADF and PP) at five percent level of significance. Results indicate the null hypothesis is rejected for all components of FII making them stationary and fit for further analysis. ** indicates significant at five percent level of significance.

Figure 1: Response to a Shock to FIIPT

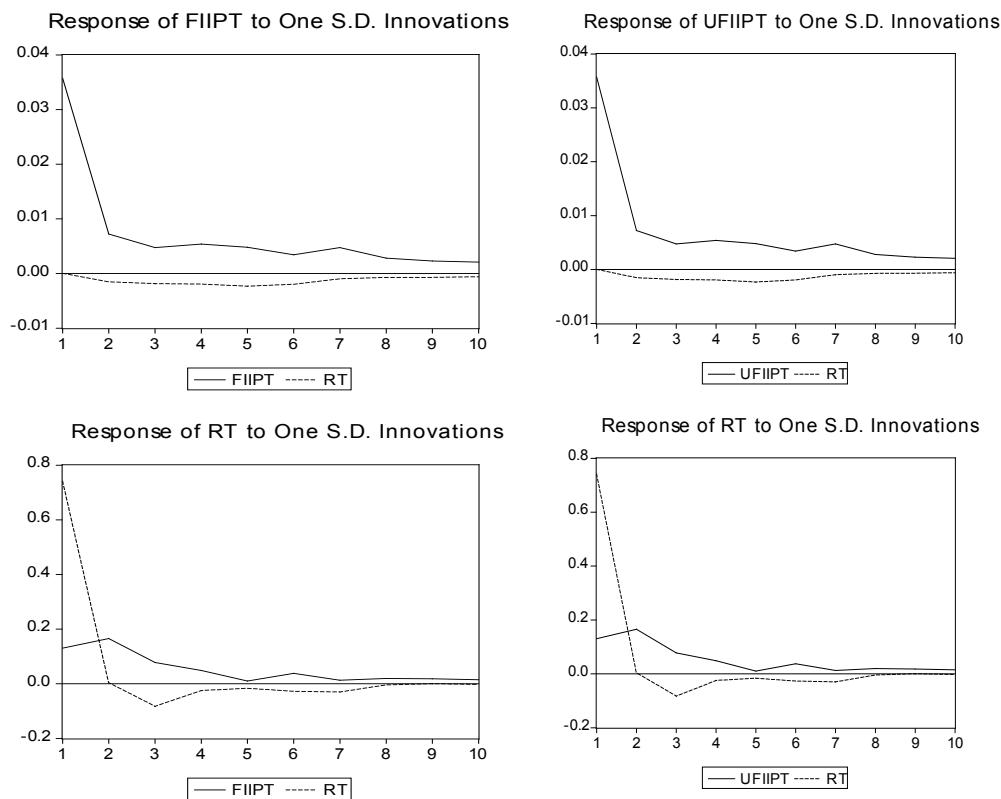


Figure 1 depicts the Impulse Response Function of FIIPT and UFIIPT (unexpected FIIPT) to one S.D Innovations in the left and right columns respectively. It clearly supports the short lived nature of FIIPT and UFIIPT owing to steep slopes in both the scenarios.

The response of FIIPT and UFIIPT to a one standard error shock to lagged return is sharp and significant for a very short period. However, the impact remains intact for a prolonged duration with lesser fluctuations. This may be attributed to some unknown macroeconomic factors or some hidden information apart from lagged returns. The results of the VAR model further support our conclusion from static estimation. Further direction of causality is tested between stock returns and FIIPT using Granger causality tests. The results in Table 4 show that the null hypothesis “RTP does not Granger cause FIIPT” is rejected and the null hypothesis “FIIPT does not Granger cause RTF” is rejected as well.

This is clear indication of bidirectional causality between stock return and FIIPT. This also reveals that Foreign Institutional Investors are well informed compared to retail investors and their buying and selling activity determines the market direction. This is particularly in consonance with a previous study by Babu and Prabheesh (2008) who examined the dynamic interaction between FII flows and stock market returns using daily data from 2003 to 2007. They found the existence of bidirectional causality between FII flows and stock returns and adequate symptoms of momentum trading hypothesis.

Table 4: Granger Causality Test

Pair wise Granger Causality Tests (2 Lags)			
Null Hypothesis:	Obs	F-Statistic	Probability
FIIPT does not Granger Cause RTF	2336	116.3	0.00*
RTP does not Granger Cause FIIPT	2336	37.72	0.00*

Table 4 shows the pair wise Granger Causality tests between return and FIIPT. It is evident that both the null hypotheses are rejected at one percent level of significance leading to bi directional relationship between return and FIIPT. It leads to dynamic dependence of both the variable on each other.

Table 5: Dynamic Analysis of FII and Return

VAR Results between FIIPT and RT			VAR Results between UFIIPT and RT		
Lagged Independent	FIIPT	RT	Lagged Independent	UFIIPT	RT
FIIPT(-1)	0.21**	4.60**	UFIIPT(-1)	0.21**	4.61**
FIIPT(-2)	0.10**	1.59**	UFIIPT(-2)	0.10**	1.59**
FIIPT(-3)	0.12**	0.95**	UFIIPT(-3)	0.12**	0.95**
FIIPT(-4)	0.08**	-0.46	UFIIPT(-4)	0.08**	-0.46
FIIPT(-5)	0.04	0.50	UFIIPT(-5)	0.04	0.48
FIIPT(-6)	0.07**	-0.20	UFIIPT(-6)	0.07**	-0.20
RT(-1)	-0.00**	0.00	RT(-1)	-0.00**	0.00
RT(-2)	-0.00**	-0.10	RT(-2)	-0.00**	-0.10
RT(-3)	-0.00**	-0.01	RT(-3)	-0.00**	-0.01
RT(-4)	-0.00**	-0.01	RT(-4)	-0.00**	-0.01
RT(-5)	-0.00	-0.02	RT(-5)	-0.00	-0.02
RT(-6)	-0.00	-0.02	RT(-6)	-0.00	-0.02
C	0.00**	-0.05**	C	0.00	0.02
R-squared	0.14	0.07	R-squared	0.14	0.07
Adj. R-squared	0.13	0.07	Adj. R-squared	0.13	0.07

Table 5 shows the Vector Auto Regression (VAR) results between RT and FIIPT in the first three columns and VAR results between RT and UFIIPT in the last three columns. Results are shown with respect to the lagged values of both the variables up to six lags. The appropriate length of lag six is determined on the basis of highest adjusted R square and lowest AIC and SC of results at different lags. The first and fourth columns present the lagged independent variables up to six lags. Each of the lagged independent variable has corresponding coefficient with appropriate sign and significance level. ** refers to significant coefficient at five percent level of significance. The above results show that the behavior of FIIPT and UFIIPT can be explained up to thirteen percent with lagged FIIPT and lagged return. Further it is also evident that the FIIPT depends on its lagged values and lagged return up to 4 days.

Table 6 presents the regression results of FIIPT and UFIIPT with current and lagged daily returns. The results show a positive and significant coefficient of lagged returns with FIIPT and UFIIPT. It is prime facie evidence that FIIs have been positive feedback traders at aggregate flows. The similarity of regression results using FIIPT and UFIIPT as dependent variables may be on account of a significant role of an unexpected component (adjusted R square is 0.11) in both the series. The higher value of unexplained variation in regression results is in consonance with the several findings who conclude there are several external factors like LIBOR, emerging market stock returns and changes in credit ratings that determine FII. From the static regression results, it is evident that unexpected FII flows play a major role indicating that FII traders are positive feedback traders.

Table 6: Regression Statistics

Regression of	Independent Variable	Coefficient	Adjusted R-squared
FIIPT	C	0.01*	0.11
	RT	0.01*	
	RTP	0.01*	
FIIPT = 0.01 + 0.01(RT) + 0.01(RTP) (4)			
UFIIPT	C	-0.00*	0.11
	RT	0.01*	
	RTP	0.01*	
FIIPT = -0.00 + 0.01(RT) + 0.01(RTP) (5)			
RT	C	-0.03*	0.05
	FIIPT	4.88*	
RT = -0.03 + 4.88(FIIPT) (6)			

Table 6 presents the regression estimates of following equations. $FIIPT = C + \beta_1 (RT) + \beta_2 (RTP)$, $UFIIPT = C + \beta_1 (RT) + \beta_2 (RTP)$ and $RT = C + \beta (FIIPT)$. The third column shows the coefficients of independent variables with their significance levels. The last column shows the adjusted R square for each regression estimates. * indicates significance at 1 percent level of significance. Regression estimates of all equations have significant positive coefficients indicating strong positive feedback relationship.

CONCLUDING COMMENTS

This study is conducted to analyze static and dynamic relationship between FII flows and stock market returns in Indian. In order to accomplish the results, the Granger Causality test, Regression, VAR and Impulse Response Function are applied using time series data of FII and market index for the last ten years. The empirical investigation of FII flows reveals many stylized facts. First, FII flows are significantly correlated to their lagged values and lagged returns. The response of FII flows to a one standard error shock to lagged return is sharp and significant for a very short period. Secondly, there is a bidirectional relationship between FII flows and returns with FII granger causing return and vice versa.

Finally, the findings here corroborate evidence of positive feedback trading. These results are predominantly more important for investors because the quantum of FII inflows have substantially changed in the last decade due to liberalization and have influenced the stock market. Results substantially show that the FII traders have their own method of investment and normally their trend persist for a short duration. Further it leads to the conclusion that FII traders are rushing into the market when the market shows a bullish trend and rushing out of the market in bearish phase. This paper has certain limitations for traders who actively participate in sector, theme or style specific indices instead of diversified indices. Future research is needed to quantify the impact of FII flows in specific sectors, selected themes and various styles of investments.

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