Foreign Institutional Investment, Stock Market, and Volatility: Recent Evidence from India

** Sayantan Bandhu Majumder*
*** Ranjanendra Narayan Nag*

Abstract

The paper makes an attempt to explore the linkages between the flow of foreign institutional investment (FII), stock market returns and their volatility after the outburst of the global financial crisis in the context of India. The analysis is based on the auto regressive conditional heteroscedasticity (ARCH) family of the model. To the best of our knowledge, this technique has hardly been used in the existing literature on FII flow, stock market returns and their volatility. Analyzing the daily data from January 2008 to February 2012, the present paper finds that higher stock market returns amplify the volume and volatility of the FII flow without any evidence on the other direction. Moreover, the intraday and overnight stock market returns have different implications for FII flow and its volatility. The paper also finds that the flow of FIIs has no significant effect on inducing volatility in the stock market.

Keywords: **foreign institutional investment, GARCH model, information transmission, stock market, volatility**
JEL Classification: C58, G01, G23

In the recent past, many emerging economies have embarked on the programme of financial reforms. An important component of such reforms has been the liberalization of the capital account; and indeed, restrictions on capital movements were removed or greatly weakened in many of these economies during the late 1980s and early 1990s. This process of financial reform and capital account liberalization has been an integral part of a much broader reorientation of economic policies among emerging economies towards a much more market friendly disposition. But the financial sector liberalization in general and capital account liberalization, in particular, have always remained a contentious issue. More specifically, the debate was intensified regarding the benefit of capital account liberalization for an emerging economy like India. The argument was that portfolio investment is very volatile and explosive in nature. Investors are known to pull back portfolio investment at the least clue of trouble in the host country, which often leads to disastrous consequences for the economy[1]. In the aftermath of the global financial crisis, emerging market economies have been experiencing fluctuating capital flows: significant inflows until the collapse of Lehman Brothers, following a sudden outflow, but again a rebound of inflows after a few months.[2]

Now, we consider the Indian experience in the aftermath of the global financial meltdown. Strong domestic fundamentals combined with growth potentials and the scope for portfolio diversification have made India an attractive destination for foreign institutional investors. There are two channels of foreign institutional investment flow – Equity investment[3] and investment in Debt[4]. Since the opening of the stock market to foreign investors in 1992, there has been a steady increase in foreign institutional investment (henceforth FII) flow in equities and gradually, this has become the main route of FIIs in India. Consequently, the FIIs have also acquired a significant presence in the Indian stock market. In total market capitalization, FIIs account for about 18 percent and make about 50 percent of average daily deliveries on the stock market. At the same time, there is unease over the volatility of FII flows and its impact on the stock market.

Next, we comment on the macroeconomic implications of stock market development and FII flows. Stock market

* *M.Phil Scholar,* Department of Economics, University of Calcutta, 56A, B. T. Road, Kolkata -700 050.
E-mail : sayantankol@gmail.com
** *Associate Professor,* Department of Economics, St. Xavier's College, 30 Park Street, Kolkata -700 016.
E-mail : rnnag12@gmail.com

[1] This phenomenon is often known as 'Contagion,' which is defined as an episode when the consequences are fast and furious, and evolve over a matter of hours or days following an event. This is an inherent feature of the flow which is FII in nature.
[2] It may be because of the depressing environment in developed countries.
[3] In case of equity route, the foreign institutional investors can invest in instruments like securities in the primary and secondary market including shares which are listed, unlisted, or to be listed on a recognized stock exchange in India, domestic mutual fund etc.
[4] In case of debt route, the foreign institutional investors can invest in instruments like debentures, bonds, Treasury bill etc.

development in general and increased stock market return, in particular, reduces the cost of borrowing and thus induces investment in the economy, which in turn stimulates the output and employment in the short run and growth in the long run. The effect of FII inflow on the real sector is ambiguous. It leads to currency appreciation, which has a negative effect on net export. On the other hand, FII inflows can help to bridge the saving-investment gap so that the economy can maintain a sustained high growth rate. It is also argued that FII inflow increases the allocative efficiency by flowing from low return capital abundant developed countries to high return capital scare developing countries. Moreover, the foreign institutional investors not only enhance competition in financial markets, but also improve the alignment of asset prices to fundamentals. Thus, it helps to stabilize the market and spur the long run growth. FII flows along with a bullish stock market has an impact on the price-earning (P/E) ratio of the firms. A higher P/E ratio reduces the cost of finance and encourages new equity issues, which finally leads to an investment boom. The flipside is that the volatility in the FII inflows has a deleterious impact on macroeconomic stability and the ability of the government to take various pro-poor policies.

It follows from the preceding discussion that stock market development along with FII flow produces macroeconomic outcomes in terms of growth. Accordingly, the paper makes an attempt to examine the nexus between the flow of foreign institutional investment and stock market return in India after the outburst of the global financial meltdown. Though the epicenter of the crisis was the US financial system, but it spread across the globe due to the financial globalization in general, and large international cross-holding of assets in particular[5]. Though the outburst of the crisis took place in 2007, but its effects were felt on the emerging countries like India after a few lags, particularly around the beginning of 2008. In the Indian context, the major channels through which the crisis has affected the Indian financial market and thus the real sectors of the economy were the export, foreign institutional investment, and external commercial borrowings (ECB). Among these three alternative channels, our focus is on the channel related to the flow of FIIs, which is relatively unexplored. With increasing relaxation of capital account transaction and the close integration of the domestic economy with international financial markets, the first significant impact of the global crisis was on the country's capital inflow, especially with reference to FIIs. Immediately after the crisis, there was a surge of outflow of FIIs, which might also have had a negative impact on domestic investment. Given the relative thinness of the Indian share market, the fall in foreign institutional investment led to bursting of India's stock market bubble.

In Chakrabarti (2001), Mukherjee, Bose, and Coondoo (2002), and Coondoo and Mukherjee (2004), the focus is on the implication of FIIs for Indian economy in the aftermath of the East Asian Crisis. Of late, the focus has shifted to the implication of FIIs for developing countries like India in the trail of the global financial crisis. Virtually, there is no study on this issue in the Indian context. Hence, the present paper makes an attempt to fill this void in the literature. In doing so, the paper attempts to address the following questions: First, the study attempted to examine the extent to which the stock market returns in India influence the FII flow and its volatility. Secondly, the paper examined whether the change in the flow of FIIs affects the stock market returns and induces greater volatility in the stock market.

Literature Review

Extensive literature is available on different aspects of the financial crisis[6]. With the waves of financial liberalization in the emerging economies came in large volume of funds that moved from developed to the emerging economies. Consequently, the initial focus of the researchers was to unearth the determinants of such a flow and also to ascertain its impact on receiving countries. Since 1990s, several research works were done to track the cause-effect relation between FII flows and domestic financial market return, particularly the stock market return. But the results were ambiguous.

Kim and Singal (1993) analyzed the behavior of stock prices following the opening of a stock market to large capital flows. The study failed to find any systematic effect of liberalization on stock market volatility. Analyzing the situation between the time period from January 1990 to March 1998, Kumar (2001) found that the volatility of stock market return at BSE had significantly declined after the capital account liberalization. Chakrabarti (2001) analyzed the monthly data from July 1993 to December 1999, and found that FII flows aggravated the equity market bubble in

[5] See Krugman, P. (2008), International Finance Multiplier for detailed discussion.

[6] See Dornbusch, R. (2001), "A Primer on Emerging Market Crisis." NBER Working Paper No. 8326 for detailed discussion on emerging market crisis.

India, though they did not initiate them. Another appealing conclusion made by the study was that the Asian crisis marked a regime shift in the determinants of FII flows. Chakrabarti regressed the variable FII flows on stock return and the other relevant variables identified in the literature and showed that the stock market return has become the sole driving force behind FII flows into India following the East Asian crisis. In an analogous study by Mukherjee, Bose, & Coondoo (2002), which used daily data, also concluded that the net FII inflow is correlated with the return in the Indian equity market, and the former is more likely to be the effect than the cause of the Indian equity market return. This study made a detailed analysis of the FII flows – considering FII sales, FII purchases, and net FII flows separately. Rai and Bhanumurthy (2004) found that stabilizing the stock market volatility and minimizing ex-ante risk would help to attract more FIIs. Coondoo and Mukherjee (2004) used the non-parametric approach to study the volatility pattern of FII flows, stock market return, and some other macro-economic variables. The overall finding of the study was that the FII flows and stock market return in India exhibit quite high volatility in terms of both extent and duration. This was one of the earliest studies (that was conducted in the Indian context) which focused largely on the volatility of the flow. Moreover, they found evidence that volatility of FIIs and stock market are interrelated. Mazumder (2004) did not find much evidence in favor of the claim that FIIs have generated volatility in the stock market return. Pal (2005) concluded that the withdrawal of foreign portfolio capital in the post-election phase has affected the price and equity holding pattern of different sensex companies. Moreover, the sensex is quite closely related to FII movement in India and also supports the feedback-trading hypothesis. Upadhyay (2006) showed that FII inflows into the equity market increases the stock prices, and also, the high degree of volatility in the stock market can be attributed to the increase in investment by foreign institutional investment. Saravanan and Deo (2011) found the destabilizing impact of FIIs on the Indian stock market during the financial crisis. Moreover, the study showed that FIIs followed positive feedback theory during the pre-crisis period, whereas in the crisis period, they followed the negative feedback theory.

However, the issue of interconnection between the FII flows and stock market in the trail of global financial crisis is relatively unexplored in the Indian context. The purpose of the present paper is to fill this gap in the literature.

Data

FII flows in India can be captured in terms of three variables – FII sales, FII purchases, and Net FII flows (calculated as purchases less sales and henceforth denoted by FIIN). In this paper, we focus solely on FIIN. It should be further noted that the FII flows in India can be categorized into - investment in equities and investment in debt. As the FII investment in equities have remained consistently much higher as compared to that of the debt instrument, this paper has considered only the FII investment in equities.

In the present paper, we have considered FIIN as a proportion of the size of the market capitalization (henceforth denoted by MCAP) of the previous day (henceforth denoted by RFIIN), instead of net FII. RFIIN series has been calculated by using the following technique:

$$RFIIN_t = FIIN_t / MCAP_{t-1}$$

We also have data on daily return in the Indian stock market, calculated on the basis of daily closing price of BSE sensex. Unlike earlier studies, we make distinction between intraday return and overnight return which were calculated as follows:

$$\text{Daily Return}_t = \log(close_t / close_{t-1}) \text{ [henceforth denoted by DRETURN]}$$
$$\text{Intraday Return}_t = \log(close_t / open_t) \text{ [henceforth denoted by IRETURN]}$$
$$\text{Overnight Return}_t = \log(open_t / close_{t-1}) \text{ [henceforth denoted by ORETURN]}$$

Where open and close stands for opening and closing price of BSE sensex.

The paper considers daily data from January 2008 to February 2012, which produces a total of 1005 observations. Since the objective of the paper is to analyze the situation after the outburst of the global financial crisis, the sample period was chosen to examine the implications of the global financial crisis for the Indian economy.

Empirical Methodology

Analysis of time series data must be based on stationary variables in order to evade the problem of 'spurious regression' (Granger & Newbold , 1974). Generally, it is done by using the unit root test. There are varieties of the unit root test. Among them, the most frequently used tests are Augmented Dicky-Fuller (ADF) test (1979, 1981), Phillips-Perron

(PP) test (1988), KPSS test as proposed by Kwiatkowski et al. (1992). Since it is well known that the ADF test has a low power and it requires that the error terms be serially uncorrelated, we rely on the PP and KPSS test. The advantage of using the PP and KPSS test is that while in the PP test, the null hypothesis is that the variable is 'non-stationary,' in the KPSS test, the null hypothesis is that the variable is 'stationary'. Hence, these two tests mutually make a good blend of test of stationary.

❖ **Econometric Model:** Most of the previous researchers have either used the least square (OLS) technique or vector auto regression (VAR) model or rarely the generalized least square (GLS) method to analyze the several dimensions of the issue. However, the present paper uses the popular GARCH model. The major motivation for using the GARCH model is the nature of the data[7] and focus on volatility. Since the GARCH model is very popular and is frequently used in financial econometrics, we provide only a brief review of the GARCH model [8]. The ARCH model was initially pioneered by Engel (1982) and thereafter generalized by Bollerslev (1986) by allowing conditional variance to be a function of not only the previous period's conditional variance. Engel, Lilien, and Robins (1987) further extended the model and developed the popular GARCH in the mean model. Variations are necessary to acclimatize the standard GARCH model to the need arising from examining the time series property of specific issues in finance and economics. Here, we employ the following model based on AR (1)-GARCH (1,1)[9] specification to relate the stock market return, flow of FII, and their volatility:

$$RFIIN_t = \alpha_0 + \alpha_1 RFIIN_{t-1} + \alpha_2 Return_{t-1} + \varepsilon_t \quad \text{--- (1)}$$

$$h_t = \beta_0 + \beta_1 h_{t-1} + \beta_2 \varepsilon^2_{t-1} + \beta_3 Return^2_{t-1} \quad \text{--- (2)}$$

$$\text{With } \varepsilon_t | F_{t-1} \sim N(0, h_t)$$

Where $\beta_0 > 0$ and β_1 and $\beta_2 \geq 0$ to make sure the variance is positive. Also $\beta_1 + \beta_2 \leq 1$ to ensure stationarity; the information set is available up to time t-1, and is denoted by F_{t-1}.

In the above-mentioned model (henceforth mentioned as Model-1), the conditional mean equation of RFIIN depends on its own lag term as well as the lagged term of stock market return. The mean spillover effect is introduced by the lagged return term, $Return_{t-1}$. The conditional variance of the FII flow depends on the squared error term, the conditional variance term of the previous day, and also on the squared stock market return of the previous day.[10] Significance of β3 will ensure the information spillover from stock market return to the volatility of FII flow.[11] In a similar fashion, the following model (henceforth mentioned as Model-2) will help us to verify the spillover from the flow of FII to the stock market return:

$$Return_t = \alpha_0 + \alpha_1 Return_{t-1} + \alpha_2 RFIIN_{t-1} + \varepsilon_t \quad \text{--- (3)}$$

$$h_t = \beta_0 + \beta_1 h_{t-1} + \beta_2 \varepsilon^2_{t-1} + \beta_3 RFIIN^2_{t-1} \quad \text{--- (4)}$$

Empirical Results

❖ **Preliminary Analysis:** Before going into the detailed analysis, the paper presents the preliminary analysis which includes the different descriptive statistical measures of the variables. The Table 1 presents the descriptive statistics of the variables.

All the variables are leptokurtic in nature. The high excess kurtosis suggests that series have a fat-tailed distribution, and thus, none of the series follow normal distribution, which was further verified by the Jarque-Bera (JB) test. The Ljung-Box (LB) Q statistics are significant for all the series, representing the presence of serial correlation. Thus, there is an indication that the AR specification is useful here. Moreover, the LB- Q statistics for the squared series are also highly significant[12], indicating the presence of time-varying volatility. Thus, the preliminary analysis of the data

[7] The variables involved in the analysis are characterized by leptokurtic fat-tailed distribution with excess kurtosis and time-varying volatility, which has been discussed in detail in the preliminary analysis section.

[8] See Bollerslev, T. (2008). "Glossary to ARCH (GARCH)." CREATS Research Paper for detailed discussion on different specifications of the ARCH family of model.

[9] Here ,we ignore the aspect of asymmetry, where EGARCH specifications may be appropriate.

[10] Here, we take the squared term to ensure the positive variance condition of the GARCH model.

[11] Similar kind of model specification was used by Lin et al. (1994), followed by Baur and Jung (2006) etc. However, the context was different.

[12] This indicates dependency in the second moment of residuals, which contradicts the assumption of a constant, time-invariant variance.

Table 1: Descriptive Statistics of the Variables				
	DRETURN	**IRETURN**	**ORETURN**	**RFIIN**
Mean	-0.000079	-0.000453	0.000374	0.000028
Median	-0.000036	-0.000514	0.000382	0.000024
Maximum	0.06944	0.02518	0.04425	0.00122
Minimum	-0.05039	-0.03976	-0.02754	-0.00068
Standard Deviation	0.00849	0.00716	0.00439	0.000179
Skewness	0.27515	-0.39983	0.32976	1.118709
Kurtosis	9.8577	6.06122	17.935	10.3088
Jarque-Bera(JB)	1982.009*	419.191*	9359.19*	2446.53*
No of observation	1005	1005	1005	1005
LB(10)	18.45*	18.97*	23.15*	687.76*
PP	29.522*	34.819*	31.474*	27.275*
KPSS	0.2263*	0.2302*	0.1938*	0.6722*
Squared LB(10)	216.82*	330.60*	177.58*	89.606*
* Represents being significant at 1% level of significance				
Source: Authors' Research				

indicates the aptness of using the GARCH model to capture the fat-tailed distribution and time-varying volatility. Furthermore, the results of the PP test and the KPSS test suggests that all the series are stationary.

❖ **Model Estimation:** In this section, we present the results of the estimated AR (1)-GARCH (1, 1) models. The result of the estimated AR (1)-GARCH (1, 1) model relating to the daily flow of foreign institutional investment and daily return of the stock market are provided in the Table 2. In the second column (henceforth mentioned as Table 2a), we provide the estimation result of Model-1, considering RFIIN as the dependent variable. On the other hand, in the third column (henceforth mentioned as Table 2b), we present the estimation result of Model-2, considering DRETURN as the dependent variable. Results of the Table 2a show that the variable $DRETURN_{t-1}$ is statistically significant in both the mean and variance equation of RFIIN and moreover, it is positively related with the conditional mean and variance of RFIIN. This result states that higher daily stock market return (of the previous day) attracts the flow of funds, but the flipside is that it also induces volatility in the flow of FIIs. On the other hand, the results obtained in the Table 2b show

Table 2: Results of AR (1)-GARCH (1, 1) Model using RFIIN and DRETURN		
α_0	0.000014 (2.636)*	0.00016 (0.8817)
α_1	0.4899 (15.82)*	0.04967 (1.4112)
α_2	0.0082 (13.11)*	1.0863 (0.9145)
β_0	0.000001 (5.339)*	0.00001 (2.145)**
β_1	0.6846 (12.54)*	0.8855 (64.272)*
β_2	.010055 (4.303)*	0.1117 (7.279)*
β_3	0.000011 (3.388)*	4.415 (0.7769)
Log-Likelihood	7480.303	3548.127
ARCH-LM test (F-statistics)	0.7514 (0.7514)	0.1138 (0.7359)
Skewness	2.04485	0.1171
Kurtosis	18.2838	4.9468
$\alpha_2=\beta_3=0$ (F-statistics)	101.087*	0.59304
* Represents being significant at 1% level of significance		
** Represents being significant at 5% level of significance	Source : Authors' Research	

that the variable $RFIIN_{t-1}$ is neither significant in the mean equation nor in the variance equation of daily return. Thus, one can deduce the result as a support in favor of 'positive feedback' theory, which essentially talks about the return chasing behavior on the part of the investors. The results have a strong appeal for the policymakers, which we have discussed in detail in the next section.

As the skewness and kurtosis coefficients for the standardized residuals indicate a deviation from the normality assumption, we also report the robust t-value. Moreover, the ARCH-LM test provides no evidence of the neglected ARCH effect. The GARCH analysis entails that there is a strong evidence of unidirectional information spillover from stock market returns (calculated on the basis of daily closing price) to the average flow of foreign institutional investment and its volatility. Moreover, the paper provides some more interesting results by considering the intraday and overnight return from the stock market. These two alternative indicators have been used to capture the different pattern of information spillover during the trading hours of the stock market and at the time when the market is closed.

In the Table 3, we present the results of the estimated AR (1) -GARCH (1, 1) model relating the daily flow of foreign institutional investment and daily intraday (close to open) return of the stock market.In the second column of Table 3 (henceforth mentioned as Table 3a), we present the estimation result of Model-1 considering RFIIN as the dependent variable. On the other hand, in the third column (henceforth mentioned as Table 3b), we show the estimation result of Model-2 considering IRETURN as the dependent variable. The results obtained in the Table 3a show that the variable $IRETURN_{t-1}$ is statistically significant in both mean and variance equation of RFIIN, and thus it indicates a strong evidence of information spillover from the stock market to the flow of FIIs as before. On the other hand, the results of the Table 3b state that the variable $RFIIN_{t-1}$ is statistically significant only in the mean equation of IRETURN, and it is positively related with the conditional mean of the intraday stock market return. Thus, the results of the Table 3 entails that there is a strong evidence of mean spillover from either way and the higher intraday stock market return (of the previous day) leads to higher volatility of the flow of FIIs as well. As the skewness and kurtosis coefficients for the standardized residuals indicate a deviation from the normality assumption, we also report the robust t-value as already noted above. Moreover the ARCH-LM test shows no evidence of neglected ARCH effect.

Table 3: Results of AR (1)-GARCH (1, 1) Model using RFIIN and IRETURN

α_0	0.000018 (3.195)*	-0.000317 (-1.758)***
α_1	0.4967 (15.296)*	-0.0584 (-1.6229)***
α_2	0.0067 (8.2416)*	2.5135 (2.154)**
β_0	0.000001 (5.0266)*	0.000001 (2.8116)*
β_1	0.6666 (10.960)*	0.9045 (73.446)*
β_2	0.1039 (4.3771)*	0.0864 (6.769)*
β_3	0.000026 (4.147)*	-2.0754 (-0.4387)
Log-Likelihood	7431.184	3680.029
ARCH-LM test (F-statistics)	0.1293 (0.6287)	1.2152 (0.2706)
Skewness	1.8149	-0.17376
Kurtosis	16.1329	3.7732
$\alpha_2=\beta_3=0$ (F-statistics)	42.972*	2.351***

* Represents being significant at 1% level of significance

** Represents being significant at 5% level of significance

*** Represents being significant at 10% level of significance

Source : Authors' Research

The results of the estimated AR(1)-GARCH(1,1) model involving daily flow of foreign institutional investment and overnight (open to open) return of the stock market is depicted in the Table 4. In the second column (henceforth mentioned as Table 4a), we provide the estimation result of Model-1 considering RFIIN as the dependent variable. On the other hand, in the third column (henceforth mentioned as Table 4b), we show the results of the Model-2 considering ORETURN as the dependent variable. The results state that the variable $ORETURN_{t-1}$ is statistically significant in the mean equation of RFIIN only, and it is positively related. On the other hand, from Table 4b, we can infer that the

variable $RFIIN_{t-1}$ is statistically significant in the mean equation of ORETURN, but unlike the earlier case, it is negatively related. Hence, we get an evidence of significant mean spillover in either direction. But we fail to find any evidence of information spillover from overnight stock market return to the volatility of the flow of the FIIs. The skewness and kurtosis coefficient for the standardized residuals indicate a deviation from the normality assumption. ARCH-LM test results shows no evidence of the neglected ARCH effect.

Table 4: Results of AR (1)-GARCH (1, 1) Model using RFIIN and ORETURN

α_0	0.000005 (1.0523)	0.00024 (4.0467)*
α_1	0.5261 (16.8707)*	0.06875 (1.807)***
α_2	0.0127 (12.5366)*	-0.68494 (-1.895)**
β_0	0.00001 (5.2351)*	0.00001 (4.8741)*
β_1	0.7136 (15.1961)*	0.7731 (41.279)*
β_2	0.1383 (5.0231)*	0.26365 (10.877)*
β_3	0.000001 (0.16622)	0.4593 (0.4942)
Log-Likelihood	7444.443	4451.777
ARCH-LM test (F-statistics)	0.2874 (0.5920)	0.5027 (0.4785)
Skewness	1.4647	0.016109
Kurtosis	13.5358	9.5709
$\alpha_2=\beta_3=0$ (F-statistics)	79.681*	2.4344***

* Represents being significant at 1% level of significance

** Represents being significant at 5% level of significance

*** Represents being significant at 10% level of significance Source : Authors' Research

The observed results show that the daily stock market return in India is the significant factor behind the average flow of foreign institutional investment and its volatility. Moreover, further exploration has offered us some additional information, which has a strong appeal to the policymakers. Considering the two alternative indicators of stock market returns - one for the daily return during the trading hour (IRETURN) and the other when the market is closed (ORETURN), the paper comes across a strong support of bidirectional mean spillover between stock market and the flow of foreign institutional investment. In addition, we find that the intraday stock market return is the significant factor behind the volatility of the flow of foreign institutional investment. Hence, the linkages become relatively stronger at the time of the trading hours. The paper also supports the claim of Bakaert and Harvey (1998), Mazumder (2004) etc., which states that the inflow of FIIs does not have any significant impact in increasing the volatility of the Indian stock market.

Conclusion

The major objective of the paper is to revisit the relationship between stock prices and the flow of foreign institutional investment in the Indian context, particularly after the eruption of the global financial crisis. More specifically, the focus of this paper is to examine the extent to which the stock market return in India influences the FII flow and vice versa. In addition, the paper also makes an attempt to verify whether any change in the flow of FII has induced the stock market volatility and vice versa. In other words, we attempted to investigate whether there is any evidence of information spillover between stock market return and FII flow.

Analyzing the daily data from January 2008 to February 2012, the paper arrives at the following conclusions: First, the study finds a strong evidence of information spillover from stock market return (calculated on the basis of daily closing price of the sensex) to the average flow of foreign institutional investment and the volatility of the flow devoid of any support from the other way round. By exploiting this result, policymakers can attract higher flow of FII just by maintaining the bullish stock market sentiment. However, the hazardous aspect is that this will induce higher volatility of the flow as well. Second, higher intraday stock market return encourages higher flow of FII, and also, it induces the increased volatility of the flow. The paper also finds evidence that higher flow of institutional investment fuels

intraday stock market returns. Thus, in this context, we get an evidence in favor of 'positive feedback' theory and the 'price pressure hypothesis' [13]. Hence, we get strong evidence of information spillover in either way, and this aspect should be kept in mind before suggesting a proper policy in this regard. Third, we find an evidence of bidirectional mean spillover between overnight stock market return and the flow of foreign institutional investment, which entails that the information spillover from the stock market takes place even when the market is closed. Moreover, it can be inferred that the overnight and intraday stock market return has different nature of influence on the FII flow and its volatility. Fourth, the paper also finds that the inflow of FII does not significantly add to the stock market volatility. Hence, our study does not support the skeptical view that FII renders the stock market more volatile in developing countries. This result has a strong appeal to the researchers and policymakers, as there is hardly any consensus on the impact of capital flow on the stock market volatility. Finally, the paper suggests that maintaining the bullish sentiment of the stock market in the country can attract a hefty amount of foreign institutional investment, which can help to improve the balance of payment position of the country. However, at the same time, this will invite an amplified volatility of the flow, which is the most risky facet of such a flow. Hence, any policy aiming to attract foreign institutional investment can't brush aside the aspect of volatility of such capital flows.

Research Implications

We suggest some policy measures to mitigate the adverse effects of volatility of FII flows. Strengthening the macroeconomic fundamentals and improving the supervision mechanism are the necessary policy options. Foreign institutional investors have a tendency of price rigging. Thus, the policymakers should encourage the small domestic investors to participate in the equity market and thereby countering the tendency of FIIs to destabilize the equity market. It has been also experienced from the several episodes of BOP crises that at the beginning of financial turmoil, there occurs reversal in foreign institutional investment. This puts a heavy pressure on the exchange rate. Hence, maintaining a sufficient foreign currency reserve is necessary to avoid the occurrence of such a crisis. It can be easily identified that the abrupt and sudden reversal of flow is the main problem associated with FIIs, which often leads to catastrophic consequences. The tendency can be reduced by pursuing policies towards more global integration in general, and financial liberalization in particular, along with strengthening the domestic fundamentals such that at the time of turbulence, the economy can sustain on its own. Moreover, the importance of regulatory mechanism of SEBI and RBI can hardly be overemphasized. Strengthening the prudential norms and transparency is much needed.

Scope for Further Research

The study can be easily extended to accommodate many other dimensions of the issue like, does the higher volatility of FII flow lower the stock price and amplify the stock market volatility and vice versa. Moreover, in this paper, we have focused on the time period after the outburst of the global crisis, which in itself a restless time for the economy. Thus, it is quite logical to extend the study to analyze the pre-crisis situation when the economy was in a relatively calm mood. This will help us to locate how the situation has changed (if at all) in the trail of the global crisis.

References

Baur, D. G., & Jung, R. (2006). "Return and Volatility Linkages between the US and the German Stock Market." *Journal of International Money and Finance, 25* (4), pp. 598-613.

Bollerslev, T. (2008). *"Glossary to ARCH(GARCH)."* CREATES Research Paper No. 2008-49. SSRN, Retrieved from http://ssrn.com/abstract=1263250 or http://dx.doi.org/10.2139/ssrn.1263250

Chakrabarti, R. (2001). "FII Flows to India: Nature and Causes." *Money & Finance, 2* (7), pp.61-81.

Coondoo, D.,& Mukherjee, P. (2004). "Volatility of FII in India." *Money & Finance, 2* (15-16), pp. 85-102.

Dornbusch, R. (2001). *"A Primer on Emerging Market Crises."* NBER Working Paper No. 8326, National Bureau of Economic Research, Inc.

[13] Price Pressure Hypothesis asserts that higher inflow of foreign capital causes an increased demand for domestic shares, which in turn raises the prices of the domestic stocks.

Kim, E. H., & Singal, V. (1993). "Opening up of Stock Markets by Emerging Economies: Effect on Portfolio flows and volatility Stock prices." In Claessens, S., & Gooptu, S. (Eds.) *"Portfolio Investment in Developing Countries."* World Bank Discussion Paper 228, pp.383-403.

Kumar, S. (2001). "Does the Indian Stock Market Play to the tune of FII Investments? An Empirical Investigation." *ICFAI Journal of Applied Finance, 7* (3), pp.36-44.

Krugman, P. (2008). *"The International Finance Multiplier."* Unpublished Manuscript. Princeton University, Princeton, NJ, Retrieved from http://www.princeton.edu/~pkrugman/finmult.pdf

Lin, W.,-L., Engle, R.F., &Ito, T. (1994). "Do Bulls and Bears Move Across Borders? International Transmission of Stock Returns and Volatility." *The Review of Financial Studies, 7* (3), pp.507-538, DOI:10.1093/rfs/7.3.507.

Mukherjee, P., Bose, S., & Coondoo, D. (2002). "Foreign Institutional Investment in Indian Equity Market: An Analysis of Daily Flows during January 1999 - May 2002." *Money & Finance, 2* (9-10), pp. 21-51.

Mazumdar, T. (2004). "FII Inflows to India: Their Effect on Stock Market Liquidity." *ICFAI Journal of Applied Finance, 10* (7), pp. 5-20.

Pal, P. (2005). "Volatility in the Stock Market in India and Foreign Institutional Investors: A study of the Post-Election Crash." *Economic and Political Weekly, 40* (8), pp.765-772.

Rai, K., & Bhanumurthy, N. R. (2004). "Determinants of Foreign Institutional Investment in India: Role of Return, Risk and Inflation." *The Developing Economies, 42* (4), pp.479-493. DOI: 10.1111/j.1746-1049.2004.tb00246.x.

Saravanan, G., & Deo, M. (2011). "Recent Financial Crisis and the Role of Foreign Institutional Investors in India with Reference to NSE." *Indian Journal of Finance, 5* (2), pp.1-7.

Upadhyay, S. (2006). "FIIs in the Stock Market and the Question of Volatility." *Portfolio Organizer, May*, pp.22-30.

Appendix

Table 1(a) : Contemporaneous Correlation between the Variables

	RFIIN	DRETURN	IRETURN	ORETURN
RFIIN	1.0000			
DRETURN	0.0339	1.0000		
IRETURN	0.0486	0.8556	1.0000	
ORETURN	-0.0137	0.5368	0.02266	1.0000

Source: Compiled by the Authors

Table 1(b) : Data Source

Name of the variable	Data source
FII	Website of SEBI
RFIIN	Calculated by the Authors
Closing Price of SENSEX	Website of Bombay Stock Exchange (BSE)
Opening Price of SENSEX	Website of Bombay Stock Exchange (BSE)
DRETURN	Calculated by the Authors
IRETURN	Calculated by the Authors
ORETURN	Calculated by the Authors