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FOREIGN PORTFOLIO INVESTMENTS AND RETURN VOLATILITY: AN ANALYSIS OF THE INDIAN STOCK MARKET

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Abstract *Foreign investments are the investments made by residents of a country in the financial instruments and production process of any other country. Any individual, entity or institution that invests money in the financial markets of other countries is called as Foreign Portfolio Investor. Policymakers of any country are concerned about foreign equity investors because they can withdraw their capital from a country rapidly and hence affect the stability of stock markets in the country. The present paper carries the objective of examining the influence of foreign portfolio investor trading behaviour on the stock markets of India. Various models of GARCH have been used to examine the impact and coefficients were found to be significant in all the cases. Hence the paper suggests the government and economists should design and control suitable foreign investments policies for the Indian Stock markets.*

Keyword: *Conditional Volatility Models, Portfolio Investments, Volatility*

INTRODUCTION

Foreign investment is referred as investments made by investors of one country in financial instruments and production process of another country. In developing countries like India there is a need of foreign capital. These foreign reserves can be used to meet the trade deficit. The flow of foreign capital into an economy can come in two ways. These are direct investments and investments through capital market. Foreign direct comprises investment in the direct production activity. Such investments are basically from medium to long term. Foreign portfolio investments are the investments in the foreign capital markets. These investments are for short term.

In India, to participate in the market, these international institutional investors have to register themselves with the Securities and Exchange Board of India. SEBI in 1995 drafted certain guidelines (FII Regulations) to control and regulate the investments by foreign institutions. To make these foreign investments much simpler, the FPI Regulations came into effect from 7th January 2014.

Under these new regulations, SEBI has placed both Foreign Institutional Investors and Qualified Foreign Investor under one category called as Registered Foreign Portfolio Investors. These investors are authourised to buy and sell the financial instruments of listed Indian companies. Such sales and purchase can be done through registered broker on recognised stock exchanges in India. They can also purchase shares and convertible debentures offered to public as per relevant SEBI guidelines/ regulations.

The individual and aggregate investment limits for the RFPIs shall be below 10% (percent) and 24% (percent) respectively of the total paid-up equity capital or 10% (percent) and 24% (percent) respectively of the paid-up value of each series of convertible debentures issued by an Indian company.[1]

Over the past decades, the shareholdings and trading activity of these institutional investors have increased in the Indian stock market. It is believed by policy makers that foreign institutional investors (FII) can increase volatility in the markets. There have contradicting results of the researches examining the impact of foreign institutional investors on stock market volatility.

The paper is organised as follows. The second section reviews extant literature on volatility in stock markets and foreign institutional investors. The third section discusses the methodology, data, and variables employed to conduct the research, while the next section discusses the results. The fifth and last section highlights the conclusions from the study.

REVIEW OF LITERATURE

This section of the paper gives an overview of the studies done in the past, regarding behaviour of foreign institutional investors in the financial markets.

Hyuk Choe, Bong-Chan Kho, & René M. Stulz (1999) studied the impact of foreign investors on Korean stock market from the period of November 30, 1996 to the end of 1997 using trade data. The study found evidences of positive feedback

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as well as herding. These evidences became weaker during the financial crisis. Moreover, feedback trading by foreign investors completely disappeared during such period. A similar study by Karolyi (2002) analysed data during crisis periods in Korea and Japan. Both the investigations concluded that although foreign investors follow positive feedback trading strategies but their trading behaviour does not destabilise the markets.

Wang & Shen (1999) in their study on the Taiwan stock markets found that foreign investors create volatility in the financial markets. They follow the strategy to buy the stock when prices are high and sell the same when prices get down**.** This results in a high turnover rate which may further cause volatility in the returns of emerging stock markets.

Wang (2000) performed a study on the Jakarta Stock Exchange (Indonesia) and found that a FII sale to domestic investors significantly affects market volatility, but, in contrast, transactions among FII traders do not have much impact on market volatility.

Hamao & Mei (2001) in their study for Japanese stock markets examined the impact of foreign and domestic trading on market volatility and found no strong evidence that foreign trading increases market volatility more than by domestic groups.

Karolyi (2002) analysed data during crisis periods in Korea and Japan, respectively. Both investigations conclude that although foreign investors appear to follow positive feedback trading strategies their trading behaviour does not destabilise the markets.

Chiyachantana *et al*. (2006) studied the impact of institutional trades on volatility in international stock markets across 43 countries. The study concluded that there is a temporary volatility spike during the trade execution period, which reflects the price impact costs faced by the institutions.

Bohl, Brzeszczy´nski, & Wilfling (2007) provide empirical evidence on the impact of institutional investors on stock market returns. The study used Markov- Switching-GARCH analysis which suggested that the increase of institutional ownership has changed the volatility structure of stock returns.

Limei Che (2011) studied the impact of domestic individual investors and foreign investors on stock return volatility. The study found that foreign investors aggravate stock return volatility, while domestic individual investors dampen return volatility.

In the Indian Context, Batra (2003) used daily and monthly data to understand the behaviour of FIIs and equity stocks returns in Indian market. He found the strong evidence of FIIs following trends in the market. However Batra did not found that FIIs have any destabilising impact on the volatility of equity stock market. Coondoo & Mukherjee (2004) used a new technique of analysis that defines three different aspects of volatility i.e. strength, duration and persistence of volatility. The examinations of these three kinds of volatility suggested that the daily values of FII and stock market returns contain a fair amount of volatility. Moreover, the strength and duration of volatility of stock market returns are more or less similar to those of the FII.

Chakraborty (2007) empirically investigated the directional relationship between FII flows and Indian stock market returns for the time period April 1997- March 2005. His study showed that FII flows cause the stock market returns. He also suggested that the Indian policy makers must adopt a careful approach while liberalising the FII policy. Krishna Reddy Chittedi (2008)compared the performance of the Sensex against FIIs in Indian stock market. FIIs investments in BSE Sensex revealed that the liquidity as well as volatility was highly influenced by FII flows.

Sharanjit & Manjinder (2007) conductd a study to examine the impact of FIIs on the Indian stock market. The results were found to be significant in relation to the impact. All the coefficients of conditional volatility models used in the study were found to be significant.

Goudarzi & Ramanarayanan (2011) did an empirical research on impact of foreign institutional investment on the Indian stock market volatility. This study was performed on the sample of 2008-2009 which was a period of financial crisis for the entire world. This study examined the casual relation and co-integration between the two. The study concluded that foreign institutional investments and Indian stock market volatility share a two way relationship. Thus it proved that both FIIs trading activity and stock return volatility act as a cause and effect for each other.

Gupta (2011) explained the growing contribution of FIIs in Indian stock markets. This paper was an attempt to examine the influence of foreign institutional investors on the stock markets. The results of the study were that they both influence each other but timing may be different.

Bhatia & Kishor (2013) in their paper investigated the nature of the relationship between net FII flows, the stock price movements, and the foreign exchange reserves. Before applying Granger casuality test, the stationarity of the series was tested through unit root test. Results of the study show that there is two way relationship between returns on sensex and FII flows. Thus FII flows are Granger caused by sensex and vice-versa.

Rajavat & Joshi (2014) studied the relationship between some selected dependent variables (BSE and FII) and an independent variable (NSE). The study was done on two year daily data of BSE, NSE and FII. Regression analysis was performed and the results showed that the data werenot

Table 1: Descriptive Statistics of Foreign Institutional Investors Trading

	Observation	Mean	Maximum	Minimum	Median	Standard Deviation	Skewness	Kurtosis	JB
Gross Trading by FIIs	2444	0.151946	.941197	478.3224	-447.1390	56.2924	-0.003337	15.94203	17056.70

Source: Compiled by the researcher from the output

serially correlated and FII and BSE do have a joint and significant impact on NSE.

The review of literature gives mixed conclusions on the relationship of foreign portfolio investments and stock market returns. The literature also gives clear evidence that there are very less researches done on examining this relationship with the help of conditional models. Hence this paper carries an objective of measuring the impact of foreign portfolio investments on the returns of stock market with the help of conditional regression models.

DATA AND METHODOLOGY

The study spans the period from January 2001 through December 2013. The stock market indices are representative of the industry sectors. The trading activities in the stock market depend on the composition of these indices. With the growing popularity of the NSE, due to itselectronic trading mechanism and lower trading cost, Nifty has become the most popular index in the Indian stock markets. Thus, the sample population consists of the most popular domestic market indices, Nifty. Rate of return for the study is calculated as the logarithmic difference of closing prices of two consecutive periods. If CP be the closing level on date t and CP(-1) be the same for its previous business day, i.e., omitting intervening weekend or stock exchange holidays, then the one day return on the market portfolio is calculated as:

$R_t = \log (CP/CP(-1))) \times 100$ Equation (1)

Data have been collected from the official websites of National Stock Exchange (www.nseindia.com) and Securities Exchange of Board of India (www.sebi.co.in). On account of this time varying nature of volatility, this study used conditional models of volatility. In any time series analysis, the test for stationarity is important because, in the absence of a stationary series, the standard estimation procedures through conditional volatility models cannot be applied. Thus, analysis begins with testing for stationarity, i.e., unit root testing and correlogram plots (Box Jenkins Methodology). The mean returns are modeled as an ARMA (Auto Regressive Moving Average) (p,q) process in the analyses. The residuals of Fitted Mean Equation are tested for presence of serial correlation (correlogram of residuals and serial correlation test) and ARCH effect (correlogram of squared residuals and ARCH LM test). Finally the conditional variance is modeled as symmetrical ARCH and GARCH processes. The impact of change in the sum of purchases and sales by foreign institutional investors is examined by adding an extra variable in the variance equation of symmetric and asymmetric conditional volatility models.

RESULTS AND DISCUSSIONS

Descriptive Statistics of Trading by Foreign Institutional Investors

The summary statistics for the Gross FII flows are given in Table 1.The results of the normality test are also reported. The 0value of p for Jarque-Bera test statistic shows that the hypothesis of normality has been rejected.

Table 2: Autocorrelation in Log change in Daily Gross Turnover of FIIs

Order	AC	PAC	Q- stat	p-value
1	-0.462	-0.462	523.18	0.0000
3	-0.049	-0.214	529.69	0.0000
5	0.135	-0.007	576.67	0.0000
10	0.116	-0.015	646.63	0.0000
15	0.077	-0.023	682.69	0.0000
20	0.041	-0.023	691.71	0.0000
27	-0.009	-0.031	703.49	0.0000

Source: Compiled by the author from the output

The excess kurtosis estimate for volume is a sign of peaked (leptokurtic) end relative to the normal distribution. The skewness estimate is negative which indicates the distribution has a left tail. These wide ranges of statistics provide a rejection of the hypothesis that returns series is strict white-noise process. The gross trading volume by FIIs is converted to a logarithmic series to make it a stationary process.

Table 3: ADF test results for Log change in Gross Trading Volume by FII

Level of Significance	1% level of Significance			5% level of Significance			10% level of Significance		
ADF Critical Values	**None**	**Intercept**	**Trend and Intercept**	**None**	**Intercept**	**Trend and Intercept**	**None**	**Intercept**	**Trend and Intercept**
Trading Volume by FIIs	-21.3075 (-2.5659)	-21.31500 (-3.43284)	-21.31837 (-1.940954)	-21.3075 (-1.94095)	-21.31500 (-2.86252)	-21.31837 (-3.41165)	-21.3075 (-1.61661)	-21.31500 (-2.56734)	-21.31837 (-3.127703)

Source: Compiled by the researcher from the output
*Note: Figure in parenthesis indicate t values

Table 4: GARCH (1, 1) Model with Gross Trading Flows by FII

Dependent Variable: RT				
Method: ML - ARCH (Marquardt) - Student's t distribution				
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*GARCH(-1) + C(7)*FII				
	Coefficient	Std. Erro	test Statistic	P values
C	0.143054	0.026965	5.305092	0.0000
AR(1)	-0.366398	0.183982	-1.991490	0.0464
MA(1)	0.454141	0.176306	2.575874	0.0100
	Variance Equation			
C	0.061474	0.057130	1.076041	0.2819
RESID(-1)^2	0.145375	0.018840	7.716190	0.0000
GARCH(-1)	0.833201	0.019705	42.28297	0.0000
FII	0.003309	0.007994	0.413946	0.0000
T-DIST. DOF	6.316245	0.649221	9.728954	0.0000
R-squared	0.004458	Mean dependent var		0.046383
Adjusted R-squared	0.001597	S.D. dependent var		1.776801
S.E. of regression	1.775382	Akaike info criterion		3.624514
Sum squared resid	7675.073	Schwarz criterion		3.643510
Log likelihood	-4419.343	F-statistic		1.557857
Durbin-Watson stat	2.015615	Prob(F-statistic)		0.143408
Inverted AR Roots	-.37			
Inverted MA Roots	-.45			

Source: Eviews Output

Stationary test for FIIs Gross trading Time Series

To test the stationarity of the series the study applied Box Jenkins Methodology of examining autocorrelations in the lags of time series. After the data pass through the first test, it is subjected to a second test of stationarity (Unit Root Test). The results of the test are shown in Tables 2 and 3.

Autocorrelation in daily gross volume trading by FIIs is tested with a null hypothesis of no autocorrelation in the values of volume of trading by FII. L Jung Q Statistic is used as test statistic to test the hypothesis. The autocorrelations at various lags reported in Table 3 decline slowly towards zero. The statistical significant values of Q for all orders reject the hypothesis of zero autocorrelation**.** Unit Root Test and Augmented Dickey Fuller Test have a null hypothesis that the series has a unit root i.e. the series is non stationary.

Since all computed values are greater than critical values of t at 1%, 5%, and 10% level of significance respectively, the test rejects the null hypothesis. The ADF test results indicate that input series is stationary in nature. This stationary gross trading FII volume time series can now be subjected to

Table 5: Results of Maximum Likelihood Estimates of Conditional Volatility with Foreign Institutional Flows

Model	ARCH coefficient	GARCH coefficient	Leverage Coefficient	AIC	Foreign trading flow coefficient	Result
GARCH(1,1)	Positive and Significant	Positive and Significant	-	3.624514	Positive and Significant	Flows by Foreign Institutional Investors affects the stock market volatility
EGARCH(1,1)	Positive and Significant	Negative and Significant	Positive and Significant	3.606051	Positive and Significant	
TGARCH(2,2)	Negative and Significant	Negative and Significant	Negative and Significant	3.595011	Positive and Significant	

Source: Compiled by the author from the output

causality, contemporaneous and linear test of significance.

Modeling of Returns and Gross Sales by FIIs

To examine the effect of Gross Trading Flows by FII on stock returns volatility, four competing models selected on the basis of error statistics (shown in Table 4) are employed by adding Gross Trading Volume by FII (X_{2t}) as an exogenous variable in the variance equation of the models. In the conditional variance equation of competing ARCH and GARCH Models, the FII daily change in gross trade volume X_{2t}, used as proxy of daily trades by FIIs at time t, is defined as follows:

$X_{2t}=\log (k_t-k_{t-1})/ k_{t-1}$Equation (2)

wherek_t=Sum of purchase and sales volume by FII's on day t

The GARCH variance equation with gross volume of FII is as follows

Equation (3)

wWhere

s_t is the volatility of the last trading period

s_{t+1} is one step ahead volatility

vand*a*1, *a*2, b_1, b_2, $_p$are the parameters of the model

Results of Table 4 suggest that parameter β is positive and statistically significant indicating that foreign trading volume has a GARCH effect in the stock market. The sum of ARCH and GARCH for the indices increases more than that of volume and almost approaches the level of persistence. The high value of persistency confirms that even the volatility of the index return series has a long memory and very soon the volatility process will return to its mean. Hence, the results clearly indicate that volatility in returns is significantly driven by trading volume of foreign institutional investors. Similar tests on the other two models yielded almost same results and are summarised in Table 5.

The result establishes that there are evidences of significant relationship between trading flows of foreign institutional investors and stock market volatility. Secondly, FIIs flows variable is a significant variable in explaining conditional volatility of market returns.

CONCLUSION

The analysis in this paper indicates that activities of foreign institutional investors in the Indian stock market affect the volatility in the stocks markets as explained by significant variables in the regression equation of the various GARCH models. Volatility in the stock markets is a concern for all the stakeholders of the stock market. As the findings suggest, portfolio investments by the foreigners is one of the important determinant of such volatility, hence the findings of this research would help the investors to consider FPI as an important determinant while taking their investment decisions. It would also recommend to the policy makers to keep a regulatory watch over such investments as such investments, if not properly regulated, could lead to instable markets.

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