Research Paper   **Management**

The Impact of FII Flow on Indian Stock Market – A Arima Modeling Approach

Mr. Guruprasada Rao S R | Assistant Professor DoS in Business Administration, Mahajana Post Graduate Centre, MYSURU

ABSTRACT

Global stock return performance is very important factor and is positively related to foreign equity flows. The financial crisis has caused a large number of foreign fund houses to focus on India. FII are significant factor clinching the volatility in stock market prices. The data collected from 1st January 2015 to 31st December 2015 for BSE Index –Closing Price and FII – Gross Purchase (GP). The study concluded, there is correlation between BSE Index and FII-GP. The ARIMA components indicated the data exhibits stationary implies lack of trend over the period and there is a relationship between observations at Lag 2 and between the current score and the random shock at Lag 1. Finally, based on FII inflow the ARIMA model is suitable in forecasting BSE Index.

Introduction

Foreign Institutional Investment (FII), which is also known as International portfolio investments, are capital flows done by individuals or institutions in countries they are not resident of and plans to have a well-diversified international portfolio. Indian financial markets have grown by leaps and bounds over the last one decade. Due to this the Indian capital market has evolved in terms of providing innovative products, both primary and secondary markets have witnessed the growth in participation of the FIIs. Countries with sound macroeconomic policies and efficient regulatory bodies have reaped the benefit of these increased institutional flows. India is no exception. India has allowed free capital flows by partially deregulating its exchange rate regime and having an independent monetary policy. The financial crisis has caused a large number of foreign fund houses to focus on India and rest of the emerging economies as the growth story has shifted from the west to the east. The Indian policy makers have always tried to increase the participation of the retail investors in the Indian market. But due to the volatile nature of the FII flows, small retail investors most of the times end up making loss. India government is taking all possible measures to try and make the FII flows less volatile by keeping a minimum lock in period for their investments.

Global stock return performance is very important factor and is positively related to foreign equity flows (Griffin (2002). Roy (2007) empirically analyzed the foreign capital flows in India. FII are significant factor clinching the liquidity and volatility in stock market prices (Chittedi 2008). Coondu and Mukhergee (2004) explored volatility of the day to day movement of FII in India and revealed that FII and Stock Market returns are positively correlated. The net FII flow is autoregressed with FII – flow of various lag periods then it does not have significant influence on the monthly volatility of the Index (Mandal & Others (2011)). FII contribution to emerging economy's GDP has increased over a decade as the Emerging economies have liberalized their financial markets to make it easier to access for foreign players (Bekaert & Harvey (2000)). The stock market surges due to the flow of FII's does not last long but ends before the investment subsides (Calvo & Mendoza (2000)).

Statement of the Problem:

Global stock return performance is also very important factor and is positively related to foreign equity flows (Griffin (2002). The Indian capital market has evolved in terms of providing innovative products, both primary and secondary markets have witnessed the growth in participation of the FIIs. The financial crisis has caused a large number of foreign fund houses to

focus on India. FII are significant factor clinching the liquidity and volatility in stock market prices (Chittidi 2008). Whether FII flows affects Indian market return is a matter of study. Chakraborty (2007) empirically investigated the direction of causation between FII flow and Indian stock Market returns.

Objectives:

To study the relationship between BSE Index and FII.

To study the behavioral pattern of BSE Index with FII.

Limitations:

The time series data collected for one year duration – 1st January 2015 to 31st December 2015.

FII flow considered for FII – Gross Purchase (GP) only.

BSE Index is used for the study.

Method:

To accomplish the purpose of the study, the time series data collected from 1st January 2015 to 31st December 2015 for BSE Index –Closing Price and FII – Gross Purchase (GP).

To fulfill the objectives of the study, Correlation analysis and ARIMA (Autoregressive Integrated Moving Average) Model were used by SPSS 22.0 version.

ARIMA (Autoregressive Integrated Moving Average) Model:

Given a time series of data X_t where t is an integer index and the X_t are real numbers, then an ARIMA (*p*,*d*,*q*) model is given by:

$$\left(1 - \sum_{i=1}^{p} \phi_i L^i\right)(1 - L)^d X_t = \delta + \left(1 + \sum_{i=1}^{q} \theta_i L^i\right)\varepsilon_t$$

This defines an ARIMA (*p*,*d*,*q*) process with **drift** δ/(1−Σφ*i*).

Where:

p is the number of autoregressive terms,

d is the number of nonseasonal differences needed for stationarity, and

q is the number of lagged forecast errors in the prediction equation.

Analysis:

Following hypothesis was constructed and tested to fulfill the objectives of the study.

Statistical Hypothesis:

H1: There was no correlation between BSE Index and FII – Gross Purchase.

H2: The time series data fit to ARIMA Model.

To test H1, correlation analysis was used and the computations made was tabulated in table 1.

Table 1				
Correlations				
			GP	BSE
FII -GP	Pearson Correlation		1	.258**
	Sig. (2-tailed)			.000
	N		238	238
BSE	Pearson Correlation		.258**	1
	Sig. (2-tailed)		.000	
	N		238	238
**. Correlation is significant at the 0.01 level (2-tailed).				

The correlation between BSE and FII – GP was positive and r = 0.258. With P = 0.00 < 0.05, the test was significant at 5% levels. I.e. there exists significant correlation between BSE and FII- GP at % levels.

To test H2, ARIMA Model was used. It was customary to present the Goodness of Fit measures – Normalized BIC and stationary R-Squared values for different values of ARIMA (p, d, q) to evaluate for the combination of (p, d, q), the ARIMA Model was optimum fit. The computations were presented in table 2.

Table 2		
Model Type	Normalized BIC	Stationary R-Squared
ARIMA (0,0,0)	14.117	0.067
ARIMA (2,0,1)	11.414	0.942
ARIMA (2,1,1)	11.423	0.942
ARIMA (2,1,2)	11.418	0.041
ARIMA (3,1,2)	11.443	0.043

The Normalized BIC statistic for ARIMA (0,0,0) has highest value and low Stationary R-Squared with Ljung-Box statistic was found to be significant at 5% level suggesting that an improved model should be sought. There by testing the model for various combinations of (p, d, q), it was found that for ARIMA (2, 0, 1) was optimum with Normalized BIC value was least.

d= 0 indicating the time series data exhibits stationary.

p= 2 indicating there was a relationship between observations at Lag 2

q= 1 indicating there was a relationship between the current score and the random shock at Lag1.

The Goodness of Fit statistics of the given model was then presented in the following table 3.

Table 3				
Fit Statistic	Mean	SE	Minimum	Maximum
Stationary R-squared	.942	.	.942	.942
R-squared	.942	.	.942	.942
Root Mean Square Error (RMSE)	284.099	.	284.099	284.099

Mean Absolute Percentage Error (MAPE)	.774	.	.774	.774
Maximum Absolute Percentage Error	6.204	.	6.204	6.204
Mean Absolute Error (MAE)	210.387	.	210.387	210.387
Maximum Absolute Error	1596.997	.	1596.997	1596.997
Normalized Bayesian Information Criterion (BIC)	11.414	.	11.414	11.414

The Goodness of Fit measures – R-squared value = 0.942 was very high, MAPE = 6.204 was low with Normalized BIC value = 11.414 indicating the model best fit for ARIMA (2, 0, 1).

The model statistics for the ARIMA (2, 0, 1) model was tabulated in the table 4.

Table 4						
Model Statistics						
Model	Number of Predictors	Model Fit statistics	Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	Statistics	DF	Sig.	
BSE-Model_1	1	.942	11.069	15	.748	0

The Ljung – Box statistic =11.069 with Non-significance of auto correlations of residuals (P = 0.748), the model was fit at 5% levels.

The graph 1 below highlights the accuracy of the forecasting made with ARIMA (2, 0, 1) model.

Graph 1
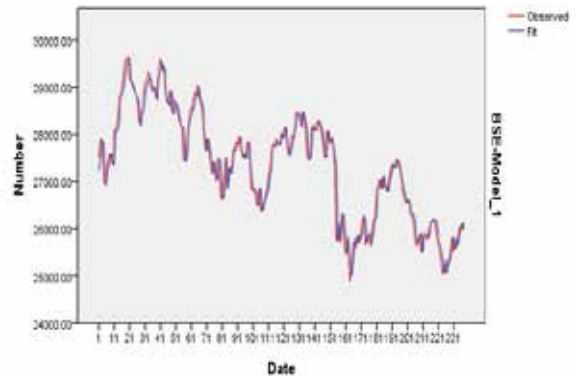
From the above graph indicating the observed time series data was highly volatile and the pattern was repeating once in four month duration.

Findings:

There exists significant correlation between BSE Index and FII-Gross Purchase.

The fit ARIMA (2,0,1) Model describes for d = 0 the time series data is stationary, p = 2 there was a relationship between observations at Lag 2, and q = 1 there was a relationship between the current score and the random shock at Lag1

The BSE Index exhibits Bearish nature and highly volatile.

Conclusions:

The researcher concluded the study, there exists significant correlation exists between BSE Index and FII-GP. The ARIMA components indicated the time series data exhibits stationary indicating lack of trend over the given time period and there is a relationship between observations at Lag 2 and between the current score and the random shock at Lag 1. In the nut shell, based on FII inflow the ARIMA model is suitable in forecasting BSE Index.

References:

1. Anand Deep Mandal and Others: "Volatility of Indian Stock Market and FIIs: A Time Series ARIMA Modeling Approach" – International Journal of Financial Management, Vo. 1 (4), 1-12, 2011.
2. Haritika Arora and Garima Baluja: "Dynamics of FII flows on Indian stock market volatility: An Empirical Exploration using Garch Approach" – Pacific Business Review International Vol. 6, Issue 2 August 2013 P41-47.
3. Coondoo, Mukhergee & others: "Volatality of FII in India", Money and Finance, ICRA Bulletin, Vol. 2, 2004 P15-16.