An Analitical Study on Causal Relationship Between Institutional Investment and Indian Stock Market

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The last decade has observed substantial growth of institutional investment in the stock market of India. The present study is an attempt to analyze the causal relationship for short as well as long term between institutional investment and returns in the stock market of India. The study uses the monthly time series data on Advances to Declines ratio (ADR) of BSE and the institutional investment is represented by ratio of monthly combined purchases of FIIs and MFs to monthly combined sales of FIIs and MFs. The sample period spans from April 2001 to December 2012. Further, the paper employs the empirical tools such as Co-integration, Granger Causality test and Variance Decomposition as part of research analysis. The result of co-integration discloses that there exists at least one co-integrating vector for long-term association between the variables. Further, the Granger causality reveals the presence of uni-directional causality running from institutional investment to BSE-ADR during long span of period. However, it is also observed that variables experience cause and affect relationship in short term association as they witness bi-directional causality between them. The variance decomposition also confirms the significant capacity of institutional activity to influence the Indian stock market. Thus, institutional investors are the significant predictors of return.

Key Words: Institutional investment, Advance-Decline ratio, Co-integration, Granger Causality, Variance Decomposition Analysis

The Indian stock market has witnessed an increasing participation of institutional investors, which are assumed to have steadily controlled the investment scenario of the securities market. The impact of huge capital flows by institutional investors in the Indian stock market has taken the attention of the policy makers and economists during the last decade. Institutional

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investors can be in the form of foreign institutional investors and domestic institutional investors. The government of India opened the doors for foreign investment in September 1992 and formulated policies to encourage the flow of foreign capital into India. It is essential to analyze that whether institutional investors have a stabilizing or a destabilizing control on the stock markets. Bikhchandani & Sharma (2000) depicts the combined valor of the FIIs and mutual funds as an effective force with capability of forecasting the direction of market by using the direction of the flow of funds from FIIs and mutual funds. Whereas, Hamilton (2005) suggested that the increasing presence of institutional investors has led to reforms in the transaction systems of securities trading, functioning of brokers and sub-brokers and creation of liquid markets.

The growth of institutional investors in the market possesses its own set of advantages along with certain problems. The institutional investors, especially foreign portfolio investments, carry a sense of ill repute since at the indication of crisis this flows into reverse direction. Dornbusch and Park (1995) and Richards (2002) disclosed about apprehension with the entry of FIIs in their studies suggesting that, they are positive feedback traders i.e. the traders who purchase when the market increases and sell when the market falls. This act as destabilizing for the reason that the sales by FIIs lead the stock market to fall further and their buys increase the stock market. According to Hamilton (2005) the unreliability for FIIs emanates from their very nature since the portfolio managers have the competence and ability to restructure and rebalance their portfolios dynamically across the countries. Gordon and Gupta (2003) observed causation running from FII inflows to returns in BSE. Thus, FIIs act as market makers and book profits by investing when prices are low and selling when they are high. On the other hand, Banaji (2000) emphasized on the fact that the capital market reforms like improved market transparency, automation, dematerialization and regulations on reporting and disclosure standards were initiated because of the presence of the FIIs.

Thus, the rising influence of institutional investors forms an essential component of the stock market behavior. Therefore, this paper sets out to find whether the Indian stock market has also been subjugated by institutional investors. The paper is organized as follows. In section II, we summarize a few key studies that empirically analyze the relationship between institutional investment and stock market performance. Section III gives an overview of the data and research methodology. Section IV presents the results with discussions and Section V concludes the study.

II REVIEW OF LITRATURE

Many studies have examined the interaction between institutional investors and Indian stock market with widespread econometric methods. Chakrabarti (2001) came with the evidence that the FII flows were highly correlated with equity returns in India and also found that the FII flows are the affect rather than the cause of these returns and hence it contradicted the view that FIIs determine the market return in general. Analogous results were obtained by Mukherjee et al. (2002) on daily data from 1999-2002. The study concluded that although, equity returns were the most important factor in influencing the FII flows into the country but, FII flows do not have significant impact on the returns. Rai and Bhanumurthy (2003) examined the determinants of the FIIs in India by taking the data from January 1994 to November 2002 and found a positive relation between FIIs and stock market return (BSE). Moreover, Griffin (2004) found that foreign flows are significant predictors of returns for Korea, Taiwan, Thailand and India. Panda (2005) examined the impact of FIIs and mutual fund investments on Indian stock market by using Vector Auto regression (VAR) analysis and Granger Causality and established that the mutual fund investments had better explanatory power than FIIs in explaining returns on both indices i.e. BSE and NSE of Indian stock market. The investigation also revealed that FIIs did not affect BSE Sensex rather it was affected by the later. Bhattacharya and Mukherjee (2005) investigated the nature of the causal relationship of FIIs with stock return and exchange rate in India by applying co-integration and long term Granger Causality test and established a bi-directional causality between stock return and FIIs.

Mohan (2006) conferred several benefits of FIIs on Indian economy suggesting that, they boost up capital flows at a time when the balance of payment situation was not comfortable. Upadhyay (2006) also found related results in her study recommending that FII flows complement and expand domestic savings and domestic investment without increasing the foreign debt of India.

A study conducted by Bansal and Pasricha (2009) analyzed the change of market return and volatility after the entry of FIIs to Indian capital market and found that although, there is no significant change in the average returns of the Indian stock market, however, volatility is significantly reduced after India unlocked its stock market to foreign investors. Thenmozhi and Kumar (2009) examined the interaction between mutual funds and security returns. The study concluded that mutual fund flows were significantly influenced by returns but returns were not influenced by mutual fund flows.

A wide literature is available on causal relationship between institutional investment and stock market returns but, most of the existing studies performed on Indian context have been mixed and thus are inconclusive. Therefore, there is a need to further investigate whether institutional investment is the cause or affect of stock market fluctuations in India.

Objective of the Study

The present study is an attempt to analyze the co-integration and consequently to disclose the causal relationship i.e. unilateral or bilateral, between institutional investment and the stock market of India during short and long span of period.

III DATA AND METHODOLOGY

The study uses the monthly time series data on institutional investment and advances to declines ratio (ADR) of BSE. The institutional investment is examined only for foreign institutional investment and mutual funds as they are the most important constituent of institutional investment in the category of foreign and domestic institutions respectively. It is measured by taking ratio of monthly combined purchases of FIIs and MFs to monthly combined sales of FIIs and MFs. The ADR indicates the breadth of the stock market and captures the trend of the entire market in explicit manner. Therefore, we use ADR for empirical analysis instead of returns. The sample period of the study spans from April 2001 to December 2012. The data on monthly FIIs, MF flows and advances/declines have been collected from the archives of SEBI. Further, to carry out the predetermined set of objectives of the study, the paper uses the empirical tools such as Co-integration, Granger Causality test and Variance Decomposition Analysis as part of research analysis.

Hypothesis of the Study:

H_0: There is no significant relation between Institutional Investment and BSE-ADR

Ha: There is a significant relation between Institutional Investment and BSE-ADR

Stationary and Order of Integration

The variables in a regression model must be stationary or co-integrated so as to avoid spurious regression. Therefore, unit root tests are conducted to verify the stationary properties of the time series data. A series is said

to be integrated of order d, denoted I (d), if it has to be differenced d times before it becomes stationary. If a series, by itself, is stationary in level without having to be first differenced, then it is said to be I (0). We use Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979) test to identify whether the variables are stationary. Consider the equation:

$$\Delta Xt = \alpha_1 + \alpha_2 t + \beta X_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta X_{t-1} + \mu_t \quad \ldots\ (1)$$

Where ΔX is the first difference of X series, α_1 is a constant term, t is a time trend, u is the white noise residual term of zero mean and constant variance and k is the lagged values of ΔXt which are included to allow for serial correlation in the residuals.

Co-integration Test

If all variables are found to be I (d), then the next step is to test for the existence of co-integration between them. This is accomplished by using Johansen-Juselius (1990) co-integration techniques. The Johansen-Juselius uses the maximum likelihood approach. This method allows the empirical determination of the number of co-integrating relations and produces maximum likelihood estimators of the parameters of these relations. Two test statistics namely trace test statistic and the maximum eigen value test statistic are used to identify the number of co-integrating vectors. For trace test statistics null hypothesis is the number of co-integrating vectors is less than or equal to r, in which r is 0, 1, 2, 3...so on. The alternative hypothesis against this is that r=n. Meanwhile the null hypothesis for Maximum Eigen value test is the existence of r co-integrating vector and the alternative hypothesis is r+1 co-integrating vectors.

A finding of co-integration implies the existence of a long-term relationship between the dependent and the independent variables. If there is at least one co-integrating relationship among the variables, then the causal relationship among these variables can be determined by estimating the Vector Error Correction Model (VECM)

Granger Causality Test - Error Correction Model

If the series are found co-integrated, there will exist an error correction model (ECM) including error correction term (ECT) obtained from the relevant co-integration regression. Engle and Granger (1987) have shown if the variables are integrated of degree I(1) and are co-integrated then either unidirectional or bi-directional Granger causality must exist in at least the I(0) variables.

If the variables are found co-integrated, the error correcting models are defined as in equations given below:

$$\Delta X_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i} \Delta X_{t-1} + \sum_{i=1}^{m} \gamma_{1i} \Delta Y_{t-1} + \delta_1 ECT_{t-1} + e_t \quad \ldots. (2)$$

$$\Delta Y_t = \alpha_2 + \sum_{i=1}^{m} \beta_{2i} \Delta Y_{t-1} + \sum_{i=1}^{m} \gamma_{2i} \Delta X_{t-1} + \delta_2 ECT_{t-1} + e_t \quad \ldots. (3)$$

The error correction terms (ECT_{t-1}) are the stationary residuals from the co-integration equations. The inclusion of error correction terms in the above equations introduces an additional channel to detect causality. Given such a specification short term and long term causality can be tested. For instance in equation 2, the null hypothesis that Y does not Granger cause X is rejected if not only γ_{1i} are jointly significant from zero but also if δ_1 is significant. The error correction models allow for the fact that Y Granger causes X as long as the coefficient of the error correction term is significant even if are not jointly significant. ECT is used for correcting disequilibrium and testing for long run and short run causality among co-integrated variables. The significance of terms implies Y Granger causes X in the short run and significance of ECT coefficient implies Y Granger causes X in the long-run.

Variance Decomposition Analysis

Once the VECM model is estimated, then we employ Variance Decomposition (VDC). The analyses allow us to investigate the behavior of an error shock to each variable on its own future dynamics as well as on the future dynamics of the other variables in the VECM system. VDC is used to detect the causal relations among the variables. It explains the degree at which a variable is explained by the shocks in all the variables in the system (Mishra, 2004).

IV RESULTS AND DISCUSSION

The results of ADF unit root test performed to confirm the stationary properties of the time series data shows that the absolute value of calculated ADF test statistic is greater than its critical value at 5% level of significance in both the series understudy (Table 1). It indicates that the integration of both series is of order I (0) and there is no unit root. Thus, the null hypothesis of non-stationary data cannot be established and hence both the series are fit for further research.

Table 1: Augmented Dickey-Fuller Unit Root Test

Variable	ADF Test Statistics at Level			
	Constant		With Constant & Trend	
Institutional Investment	-9.5178*	(0)	-9.5522*	(0)
BSE-ADR	-11.5816*	(0)	-12.0429*	(0)

* denotes statistically significant at 1% level.

Note: The optimum lag length is indicated within parenthesis determined by Schwarz criteria. The critical value of ADF statistics are - 4.0265 and - 3.4429 at the 1% and 5% level of significance respectively.

Once it is accepted that the variables are stationary, we proceed to study whether both the series understudy are co-integrated or not. We apply Johansen and Juselius (1990) co-integration approach to examine the bond between institutional investment and BSE-ADR. Akaike information criterion (AIC) is used to choose the optimal lag length. The null hypothesis of r co-integrating vectors is given in column 1 of the Table 2.

Table 2: Johansen Co-integration Test between Institutional Investment and BSE

r	Eigen value	Trace Statistics	Critical value (5%)	Max.Eigen Value	Critical value	Result
r = 0	0.1928	45.967*	15.49	29.128*	14.26	Co-integrated
r = 1	0.1164	16.839*	3.841	16.839*	3.84	

* denotes statistically significant at 5% level.

The maximum eigen value and trace statistics are used to deduce whether the null hypothesis of r = 0 is rejected at 5% level of significance. The rejection of null hypothesis implies that there exists at least one co-integrating vector which confirms a long run equilibrium correlation between the two variables. The result of bivariate co-integrating vectors discloses the refusal of null hypothesis of no co-integrating vectors under both the trace statistics and maximal eigen value forms of test (Table 2). The refutation of null hypothesis confirms the likelihood of at least uni-directional causality from one variable to the other and rules out the non-causality among the variables for long term association.

Further, the Granger causality test with error correction term (ECT) is applied to identify the short run and long run causal behavior between the understudy variables. The error correction model (ECM) takes into account

the lag term in the technical equation that explains the short term adjustment towards the long run. In other words, the error correction coefficient acts as an indication of direction of causal relation and reveals the speed at which inconsistency from equilibrium is corrected or reduced. The rationalization of estimating error correction term is to identify which sample variable play decisive role in information flow and lead lag relationship. Here, the causal association can be observed by investigating the statistical significance and relative magnitude of error correction coefficient.

Table 3: Granger Causality Test with Error Correction Term between Institutional Investment and BSE

Particulars	ΔTotal (-1)	ΔTotal (-2)	ΔTotal (-3)	ΔBSE (-1)	ΔBSE (-2)	ΔBSE (-3)	ECT
ΔTotal	-0.5898	-0.4054	-0.0301	-0.0057	-0.0152	-0.0050	-0.0274
	(5.8749)*	(3.9313)*	(0.3318)	(0.5278)	(1.7373)*	(0.7241)	(0.4696)
ΔBSE	-1.9748	0.1245	0.0337	0.0342	0.0774	-0.0309	4.0209
	(1.4704)**	(0.0902)	(0.0278)	(0.2384)	(0.6588)	(0.3363)	(5.1426)*

* and ** denotes statistically significant at 5% level and 10% level.

The result of Granger causality test with error correction model is reported in Table 3. The structure lag is chosen on the basis of Vector Auto Regression (VAR) model by using Akaike's minimum Final Prediction Error (FPE) criterion. To make consistency, the same lag length has been chosen as for co-integration test. The ECT represents the long run impact of one variable on the other while the change of the lagged independent variable describe the short run causal impact. As regards to causality between institutional investment and BSE-ADR, the results indicate that BSE-ADR does not granger cause institutional investment in the long run whereas institutional investment granger causes BSE-ADR as evidenced by the statistically significant ECT. This implies that BSE-ADR does not affect FII flows rather it was affected by the later in the long run relationship which further indicates that the fluctuations in institutional investment affect the BSE. Thus, the institutional investments are the cause of ups and downs in the BSE stock market. However, in the short run, there is bi-directional causality running from BSE-ADR to institutional investment and also from institutional investment to BSE-ADR as the estimated coefficients in respect of lagged values of independent variables turn out to be statistically significant i.e. both variables are the cause and affect of each other.

Table 4: Variance Decomposition of Institutional Investment and BSE

Variance Decomposition of Institutional Investment				Variance Decomposition of BSE		
Period	**S.E.**	**Institutional Investment**	**BSE**	**S.E.**	**Institutional Investment**	**BSE**
1	0.1740	100.00	0.0000	2.3276	8.2354	91.7646
2	0.1863	99.9998	0.0002	2.4123	11.6254	88.3746
3	0.1944	98.8066	1.1934	2.4729	15.4192	84.5808
4	0.2187	98.8101	1.1899	2.4899	16.5697	83.4303
5	0.2339	98.4095	1.5905	2.5152	18.1293	81.8707
6	0.2458	98.5578	1.4422	2.5547	20.5356	79.4644
7	0.2602	98.6717	1.3283	2.5836	22.2823	77.7177
8	0.2726	98.6802	1.3198	2.6100	23.8477	76.1523
9	0.2842	98.7364	1.2636	2.6395	25.5216	74.4784
10	0.2960	98.7826	1.2174	2.6678	27.0689	72.9311

Moreover, the empirical tool of Variance Decomposition Analysis is performed to gauge the comparative shock that one variable has upon another variable within VECM model thereby, signifying the percentage of forecast error of a variable which is explained by another variable within short run dynamics and interactions. This analysis is performed to supplement the Granger Causality test results. Table 4 shows the result of variance decomposition of institutional investments and BSE-ADR for a variance period of 10 months. In case of bi-variate modeling of understudy variables, the results disclosing the information share for all the months depict that the institutional investments discloses more than 98 percent of its own forecast error variance whereas, BSE does not explains any consequential amount of institutional investments variance. On the other hand, BSE explains 92% to 73% of its own forecast and remaining 8% to 27% percent is explained by institutional investments over a phase of ten months.

Thus, variations in the variables are predominantly attributed to their own variations which fall steadily over the increase in time horizon. However, the variance decomposition of BSE clearly shows that the BSE is influenced to a very large extent by innovations in the institutional investments. Therefore, the result clearly depicts that the price changes in BSE can be considered due to institutional investments as there is larger flow of information from institutional investments to BSE.

V CONCLUSIONS:

The present paper is an attempt to explore the influence of institutional investment on the share price movements (BSE-ADR) of Indian stock market. The growing role of institutional investors has become an issue of concern

for efficient functioning of Indian stock market. The statistical analysis of co-integration between institutional investment and BSE-ADR holds that variables are coupled together for long term association. Thereafter, the Granger causality test with ECT reveals uni-directional causality running from institutional investment to BSE-ADR for long period and bi-directional causality in the short period. The Variance Decomposition also explains the dominant role of institutional investment in the information dissemination.

Thus, the result concludes that the institutional activities are capable in judging the market movements and therefore, can influence the forecasts about market direction of the Indian stock market. In other words, the institutional investment play a leading role in the Indian stock market and the later is in the control of former. Therefore, there is greater than ever call for a strong regulatory system for Indian stock market so that the institutional investors can by no means be in charge of the trading of the share market with inclusion and withdrawal of huge volume of funds. Hence, the regulatory bodies should keep a close watch on the behavior of these flows so as to play down their unfavorable impact on the real economy of the country. Moreover, according to Bikhchandani and Sharma (2000), markets become more efficient with the growing presence of institutional investors who predominantly go by fundamentals. Therefore, efforts should be made to bring in the virtues of institutional investments through a rational and practical reform process.

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