International SAMANM Journal of Finance and Accounting
ISSN 2308-2356 January 2016, Vol. 4, No. 1

FIIs INVESTMENTS AND DIIs INVESTMENTS IN INDIA – A CAUSALITY STUDY

Omprakash Kajipet[1] & Sridhar Ryakala[2]

Abstract: *There has been a dramatic increase of portfolio flows from institutional investors into Indian stock market, with professionally managed investment funds taking the lead. Foreign institutional investors have played an important catalyst role in the improvement of the institutional infrastructure of Indian capital market. This has undoubtedly contributed to the most recent development in which domestic institutional investors have started playing an increasingly important role. There have been many instances where DIIs pouring money into Indian stock markets at a time when FIIs are rushing for the exit and such startling calls of DIIs have been highly accurate under many circumstances. The present study aims at analyzing the co-integration and consequently to find both long run and short run causal relationship i.e., unilateral or bilateral between foreign institutional investors' investments and domestic institutional investors' investments in India.*

Keywords: *Foreign Institutional Investors (FIIs), Domestic Institutional Investors (DIIs), Indian Stock Market, Vector Error Correction Model (VECM)*

1. Introduction

Institutional investors are playing an increasingly important role in the world's financial markets. Being highly specialized and managing substantial capital, institutional investors can enhance market features in many ways including increasing liquidity, influencing market psychology, improving disclosures and corporate governance. Institutional investors can also leverage their size to negotiate better services at lower cost. Foreign institutional investors have had a major impact on the development of Indian stock market. There has been a dramatic increase of portfolio flows from institutional investors into Indian stock market, with professionally managed investment funds taking the lead. Foreign institutional investors have played an important catalyst role in the improvement of the institutional infrastructure of Indian capital market. This has undoubtedly contributed to the most

[1] Professor, Department of Commerce & Business Management, Kakatiya University, Warangal, Telangana, India

[2] Assistant Professor, Department of Commerce, Vivekananda Govt. Degree College,Hyderabad, Telangana, India

recent development in which domestic institutional investors have started playing an increasingly important role.

There have been many instances where domestic institutional investors pouring money into stock markets at a time when FIIs are rushing for the exit and such startling calls of DIIs have been highly accurate under many circumstances. The fortunes of the Indian stock markets are mostly driven by interest from foreign institutional investors (FIIs), who invest in hordes for certain period and are as quick on the trigger when it comes to pulling out of the markets. As such, Indian stock markets are frequently left at the mercy of the FIIs, who tend to exhibit drastic shifts in behavior.

Institutional investors by their actions not only influence the stock market but also influence the retail investors' investment decisions, as the movements of institutional investors are closely watched and followed by the small investors. Therefore, the need for studying the trading behavior of institutional investors (both foreign institutional investors and domestic institutional investors) has become the matter of concern. There are few research studies which have attempted to study the herding behavior of foreign institutional investors on the Indian stock market and few have focused on the impact of mutual funds investments on the Indian stock market. But, there is lack of research work carried out to study the causality between the investments of FIIs and DIIs.

2. Objective Of The Study

The present study aims at analyzing the co-integration and consequently to find both long run and short run causal relationship i.e., unilateral or bilateral between foreign institutional investors' investments and domestic institutional investors' investments in India.

2.1 Hypothesis Of The Study

The present study is carried out to test the following hypothesis:

H_o: There is no causality between foreign institutional investors' investments and domestic institutional investors' investments.

H_a: There is causality between foreign institutional investors' investments and domestic institutional investors' investments.

2.2 Data and Research Methodology

The study uses the monthly time series data of Advances to Decline Ratios (ADR) of Foreign Institutional Investors' (FIIs) and Domestic Institutional Investors' (DIIs) investments. FIIs and DIIs investments Purchase to Sales Ratios (PSR) are calculated by the following method:

FIIPSRt= log (Pt/St)

Where, FIIPSRt is the monthly purchase to sale ratio of foreign institutional investments and Pt denotes the monthly FIIs purchases, whereas St denotes the monthly FIIs sales.

DIIPSRt= log (Pt/St)

Where, DIIPSRt is the monthly purchase to sale ratio of domestic institutional investments and Pt denotes the monthly DIIs purchases, whereas St denotes the monthly DIIs sales.

The calculated monthly purchase to sales ratios of foreign institutional investors' investments and domestic institutional investors' are represented by FIIPSR and DIIPSR respectively.

To carry out the predetermined set of objectives and to test the hypothesis the study used the empirical tools such as Normality Tests, Unit Root Tests, Co-integration Tests, Vector Error Correction Model (VECM), Variance Decomposition Analysis (VDA) and Residual Tests as part of research analysis.

2.3 Normality Tests

Normality tests are used to determine if a data set is well-modeled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. The Jarque-Bera test of normality is an asymptotic or large sample test. This test computes the skewness and kurtosis measures and uses the following test statistic:

JB=n [S2/6+ (K-3)/24]

Where n=sample size, S= skewness coefficient, and K=kurtosis coefficient. For a normally distributed variable, S=0 and K=3, therefore the JB test of normality is a test of the joint hypothesis that S and K are 0 and 3 respectively.

2.4 Stationarity Test

Stationarity of a time series is an important phenomenon because it can influence its behavior. If x and y series are non-stationary random processes, then modeling the x and y relationship as a simple OLS relationship will only generate a spurious regression. Time series stationarity is the statistical characteristics of a series such as its mean and variance over time are constant. If a series is stationary without any differencing it is designated as I (0), or integrated of order 0. On the other hand, a series that has stationary when first differenced is designated I (1), or integrated of order one. The stationary properties of the time series data understudy are tested using Augmented Dickey Fuller (ADF), Phillips – Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Tests.

2.5 Co-integration Test

Johansen Co-integration Test is used to verify the existence of co-integration between the variables understudy. Procedures use two tests to determine the number of co-integration vectors; the Maximum Eigen value test and the Trace test. The Maximum Eigen value statistic tests the null hypothesis of r co-integrating relations against the alternative of r+1 co-integrating relations for r = 0, 1, 2…n-1. Trace statistics investigate the null hypothesis of r co-integrating relations against the alternative of n co-integrating relations, where n is the number of variables in the system for r = 0, 1, 2…n-1. When the Trace and Maximum Eigen value statistics yields different results, then the results of trace test should be preferred.

2.6 Vector Error Correction Model (VECM)

If co-integration has been detected between series we infer that there exists a long-term equilibrium relationship between them, so we can apply VECM in order to evaluate the short run properties of the co-integrated series. In case of no co-integration VECM is no longer required and we can directly precede to Granger causality tests to establish causal links between variables.

3. Empirical Analysis

I. Jarque-Bera Statistics are used to test the Normality of the variables i.e., FIIPSR, and DIIPSR. The results are shown in Table I along with descriptive statistics. The skewness coefficient in excess of unity is taken to be fairly extreme (Chou, 1969). High or low kurtosis value indicates extreme leptokurtic or extreme plyatykurtic (Parkinson 1987). Skewness value 0 and kurtosis value 3 indicates that the variables are normally distributed. As per the statistics of Table 5-2 frequency of the variables under study are normally distributed.

Table I: Summary Statistics

Particulars	**FIIPSR**	**DIIPSR**
Mean	0.035724	0.010469
Median	0.035657	0.041404
Maximum	0.361191	0.529703
Minimum	-0.280150	-0.535311
Std. Dev.	0.161463	0.257272
Skewness	0.157422	-0.245117
Kurtosis	2.197799	2.334593
Jarque-Bera	2.506456	2.305446
Probability	0.285581	0.315776
Sum	2.89363	0.84800

	3	9
Sum Sq. Dev.	2.08563 3	5.29509 9
Observations	81	81

The results are further supported by Jarque-Bera statistics, where the probability is insignificant (more than 5 percent) for both the variables under study. The null hypothesis of normality assumption cannot be rejected and concludes that all the variables understudy are normally distributed. The standard deviation indicates that the FIIPSR is relatively less volatile as compared to that of DIIPSR.

II. A time series is said to be stationary if its mean and variance are constant over time. Augmented Dickey Fuller (ADF), Phillips – Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Tests are conducted to verify the stationarity of the variables understudy. The results of ADF and PP are shown in Table II and that of KPSS are presented in Table III.

Table II: Augmented Dickey-Fuller (ADF) Test and Phillips-Perron (PP) Test

Variable	ADF Test Statistics	PP Test Statistics	Probability
FIIPSR	-6.681872*	-6.691977*	0.0000
DIIPSR	-6.723748*	-6.712684*	0.0000

*Denotes statistically significant at 1% and 5% levels

The critical value of ADF Statistics and PP Statistics are -4.076860 and -3.466966 at 1% and 5% level of significance respectively.

It is clear from Table II that the null hypothesis of non-stationary or presence of unit root for both the time series is rejected at the level since the ADF and PP test statistic values are more than the critical values at both 1% and 5% levels of significances. Thus, the variables are stationary and are integrated of order I (0). Further in order to verify the results of ADF and PP unit root test, Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test is applied. The results of KPSS test statistics for both the variables understudy are less than the critical values at 1% and 5% (Table III). Therefore, the null hypothesis of stationary is not rejected. So, both the series in the study viz. FIIPSR, and DIIPSR are stationary and fulfills the requirements for further research process.

Table III: Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

Variable	KPSS Test Statistics	Critical Value (1%)	Critical Value (5%)
FIIPSR	0.054144	0.216000	0.146000
DIIPSR	0.064200	0.216000	0.146000

III. As both the variables under study are found to be I (0), then the next step is to test for the existence of co-integration between them. This is accomplished by using Johansen co-integration test. In order to conduct the co-integration test, the appropriate lag length of the model is determined by using Vector Auto Regression (VAR) model. According to the Akaike Information Criterion (AIC) lag 2 is the appropriate lag for the model. Therefore, for the present model lag 2 is selected as the appropriate lag for the conduct of the co-integration test and for running VECM.

Co-integration rank is estimated using Johansen methodology. Johansen's approach derives two likelihood estimators for the CI rank: a trace test and a maximum Eigen value test. The CI rank (R) can be tested formally with the trace and the maximum Eigen value statistics. The results of the test are given in Table IV and the null hypothesis of r co-integrating vectors is given in column 1 of the table.

Table IV: Johansen Co-integration Test between FII and DII

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigen value**	**Trace Statistic**	**Critical Value (0.05)**	**Probability**
r = 0	0.210611	23.47874 *	15.49471	0.0025
r = 1	0.062477	5.032060 *	3.841466	0.0249
Unrestricted Co-integration Rank Test (Maximum Eigen value)				
Hypothesized No. of CE(s)	**Eigen value**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Probability**
r = 0	0.210611	18.44668 *	14.26460	0.0103
r = 1	0.062477	5.032060 *	3.841466	0.0249

*denotes statistically significant at 5%

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. We reject the null hypothesis that r, the number of co-integrating vectors if the test statistic is greater than the critical values specified. The results co-integrating vectors discloses the rejection of null hypothesis of no co-integrating vectors under both the trace statistics and maximum Eigen value forms of test. The probabilities for different levels of number of co-integrated equations also confirm the rejection of null hypothesis. Therefore we may infer that there is a presence of even more than one co-integrated equations among the variables understudy and which confirms a long run equilibrium correlation between the variables. Nevertheless, we will proceed to estimate the VECM model.

IV. The results disclosed by the Johansen Co-integration test confirmed the existence of long-term equilibrium relationship among the variables. As the precondition of presence of co-integration among the variables is satisfied the Vector Error Correction Model (VECM) can be applied in order to evaluate the short run properties of the co-integrated series. The structure lag is chosen on the basis of Vector Auto Regression (VAR) model, using maximum criterion rule. To maintain consistency, the same lag length (2) is been used for running VECM, which was used for the conduct of co-integration test.

The long run and short run causality between FIIPSR and DIIPSR are studied with the help of two models of VECM, they are:

Model I: FIIPSR as dependent variable and DIIPSR as independent variables.

Model II: DIIPSR as dependent variable and FIIPSR as independent variables.

Model I:

The vector error correction estimates for Model I, where FIIPSR is dependent variable and DIIPSR is independent variable along with respective probabilities are presented in the Table V. C (1) presented in the table represents coefficient of co-integration equation of the model, C (2) and C (3) are the lagged coefficients of FIIPSR, C (4) and C (5) are lagged coefficients of DIIPSR and C(6) is the coefficient of constant. In order to verify the long run relationship between variables coefficient of co-integration equation C (1) is considered.

Table V: (Model I) FII Dependent Variable and DII Independent Variable

Dependent Variable: D(FIIPSR)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-1.234447	0.369810	-3.338057	0.0013
C(2)	0.158330	0.325764	0.486027	0.6284
C(3)	-0.232490	0.253571	-0.916864	0.3623
C(4)	0.208371	0.197070	1.057346	0.2939
C(5)	-	0.170	-	0.68

	0.069920	867	0.409208	36
C(6)	0.005300	0.017113	0.309700	0.7577
R-squared	0.345453	Mean dependent var		0.003565
Adjusted R-squared	0.299998	S.D. dependent var		0.179968
S.E. of regression	0.150572	Akaike info criterion		-0.874943
Sum squared residual	1.632386	Schwarz criterion		-0.693658
Log likelihood	40.12278	Hannan-Quinn criterion		-0.802371
F-statistic	7.599942	Durbin-Watson stat		1.965616
Prob.(F-statistic)	0.000009			

The null hypothesis of no long run causality of independent variables on dependent variable can be rejected when the C (1) has negative value and is significant i.e., the corresponding probability is less than 5%. As per the results disclosed by the VECM for Model-A, C (1) has negative value and its corresponding probability is less than 5%, which is significant, therefore the null hypothesis of no long run causality is rejected and hence confirms that there is long run causality running from DIIPSR to FIIPSR.

In order to analyze the short run causality from the DIIPSR to FIIPSR, Wald test is employed. Lagged Coefficients of DIIPSR are represented by C (4) and C (5). The null hypothesis of no short run causality from DIIPSR is denoted by C (4) = C (5) =0. The null hypothesis is tested with the use of Wald test, the results of which are presented in Table VI.

Table VI: Wald Test

Test Statistic	**Value**	**df**	**Probability**
F-statistic	1.516309	(2, 72)	0.2264
Chi-square	3.032618	2	0.2195
Null Hypothesis: C(4)=C(5)=0			

The null hypothesis of no short run causality from DIIPSR to FIIPSR can be rejected when the Wald test statistic is significant (<5%). As per results disclosed (Table VI), the test statistic is more than 5%, and the null hypothesis cannot be rejected. Therefore, it confirms that DIIPSR does not cause FIIPSR in the short run.

Model II:

The vector error correction estimates for Model II where DIIPSR is a dependent variable and FIIPSR is independent variable are presented in the Table VII. C (1) presented in the table represents coefficient of co-integration equation of the model, C (2) and C (3) are the lagged coefficients of DIIPSR, C (4) and C (5) are lagged coefficients of FIIPSR and C(6) is the coefficient of constant. In order to verify the long run causality of independent variable on the dependent variable, coefficient of co-integration equation C (1) is considered.

Table VII: (Model II) DII Dependent Variable and FII Independent Variable

Dependent Variable: D(DIIPSR)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.410808	0.246695	1.665250	0.1002
C(2)	-0.866116	0.290128	-2.985289	0.0039
C(3)	-0.111771	0.251552	-0.444328	0.6581
C(4)	-0.799138	0.479593	-1.666282	0.1000
C(5)	0.100149	0.373309	0.268275	0.7893
C(6)	-0.014293	0.025194	-0.567321	0.5723
R-squared	0.266682	Mean dependent var		-0.007500
Adjusted R-squared	0.215757	S.D. dependent var		0.250316
S.E. of	0.2216	Akaike info		-

regression	74	criterion	0.101415
Sum squared residual	3.538030	Schwarz criterion	0.079870
Log likelihood	9.955204	Hannan-Quinn criterion	-0.028844
F-statistic	5.236769	Durbin-Watson stat	1.993003
Prob.(F-statistic)	0.000372		

The null hypothesis of no long run causality of FIIPSR on DIIPSR can be rejected when the C (1) has negative value and is significant i.e., the corresponding probability is less than 0.05. As per the results disclosed by the VECM for Model-B, C (1) has positive value and its corresponding probability is insignificant i.e., more than 0.05. Therefore, the null hypothesis of no long run causality cannot be rejected and confirms that FIIPSR does not cause DIIPSR in the long run.

The short run causality from the independent variable (FIIPSR) to dependent variable (DIIPSR) is tested by using Wald test. C (4) and C (5) represent lagged coefficients of FIIPSR. The null hypothesis of no short run causality from FIIPSR is denoted by C (4) = C (5) =0 is tested with the use of Wald test and the results of which are presented in Table VIII.

Table VIII: Wald Test

Test Statistic	**Value**	**df**	**Probability**
F-statistic	3.197366	(2, 72)	0.0467
Chi-square	6.394732	2	0.0409
Null Hypothesis: C(4)=C(5)=0			

The null hypothesis of no short run causality from FIIPSR to DIIPSR can be rejected when the Wald test statistic is significant (less than 0.05). As per results disclosed (Table VIII), the test statistic is 0.0467 which is less than 0.05, therefore the null hypothesis can be rejected and leads to acceptance of alternate hypothesis of causality from independent variable to the dependent variable. Hence it can be concluded that FIIPSR does cause DIIPSR in the short run.

4. Conclusion

This study examined the dynamic interaction between FII's and DIIs Investments in India. From the statistical analysis it is found that the variables understudy are co-integrated which holds that there is long run association between the variables. Moreover, the empirical results of VECM confirm a unidirectional long run causality running from Domestic Institutional Investors' (DIIs) investments to Foreign Institutional Investors' (FIIs) investments. Also, it is evident from the test results that there is short-run unidirectional relationship running from FII's to DIIs. Therefore, it is concluded that the DIIs investments are influencing the FIIs investments in the long run, whereas the FIIs investments are influencing DIIs investments in the short run.

References

Bansal, Anand and Pasricha J.S (2009). "Foreign Institutional Investors' Impact on Stock Prices in India", Journal of Academics Research in Economics, Vol.1, No.2, pp.181-189.

Bhattacharya, Basabi. & Mukherjee, Jaydeep. (2006). 'An analysis of stock market efficiency in the light of capital inflows and exchange rate movements; The India context'Retrieved13Mar.2011

Brennan, M.J., and H.H. Cao. (1997). "International portfolio investment flows", Journal of Finance, Vol. 52, 1855-1880.

Chakrabarti Rajesh (2006). "Foreign Institutional Investments" http://www.prism.gatech.edu/rc166/FII Basu.pdf

David carpenter Partner Mayer, Brown, Rowe and Maw LLP (2005). "Foreign Investment in India", Journal of financial research. Vol. 19.Publisher: MCB UP Ltd.

Endo, Tadashi. (1998). "The Indian Securities Market—A Guide for Foreign and Domestic Investors", Vision Books. India.

Engle, R. F., & Granger, C. W. J. (1987). "Co-integration and Error Correction: Representation, Estimation and Testing", Econometrica, Vol.55, No.21, pp.251-276.

Gorden, James and Gupta, Poonam (2003). "Portfolio Flows into India: Do Domestic Fundamentals Matters?" IMF Working Paper No.WP/03/20.

Johansen, S. (1988). "Statistical Analysis of Cointegration Vectors", Journal of Economic Dynamics and Control, Vol. 12, pp. 231-54.

Johansen, S., & Juselius, K (1990). "Maximum likelihood estimation and inference on co-integration with applications for the demand for money", Oxford Bulletin of Economics and Statistics, Vol.52, pp.169-210.

Kumar SSS (2002). "Role of Institutional Investors in Indian Stock market" Indian journal of economics, Vol. no. 82, issue 327, page no. 549.

Kwiatkowski D., P.C.B. Phillips, P. Schmidt and Y. Shin (1992). 'Testing the Null Hypothesis of Stationary against the Alternative of a Unit Root,' Journal of Econometrics, Vol 54, pp 159-178.

Mishra P.K., Das K.B., and Pradhan B.B. (2009). "Role of FIIs in Indian Capital Market" The Research Network, Vol.4, No.2, June.

Mohan T.T.Ram (2005). "Taking Stock of Foreign Institutional Investors", Economic & Political weekly, June11, 2005, p.2395-2399.

Phillips, P. C. B., & Perron, P (1988). "Testing for unit root in time series regression", Biometrica, Vol.75, pp.335-346.

Prasanna, P.K. (2008) 'Foreign Institutional Investor: Investment preference in India' JOAAG, Vol. 3, No. 2, pp 40-51.

Sridhar Ryakala (2015), "Indian Stock Market and FIIs Investments – A Causality Study", Management Today, Vol.5, No.1, Jan-March 2015.

Thenmozhi M and Kumar M (2009). "Dynamic Interaction among Mutual Fund Flows, Stock Market Return and Volatility", NSE Working Paper No.50.

www.sebi.gov.in

SEBI Annual Reports 2005-06 to 2012-13