

MACRO ECONOMIC VARIABLES AND FOREIGN INSTITUTIONAL INVESTMENT IN INDIA: A STUDY WITH GRANGER CAUSALITY TEST

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ABSTRACT

The attempt is made with this paper to examine the causal relationship of macro-economic variables of Foreign Institutional Investment inflows in India. This study has covered the period of global financial crises due to which, the macro variables such as money supply, inflation. The Foreign exchange reserve, IIP and FIIs. The role of FII has been observed which was helpful to frame economic policies of India For this study monthly data has been used ranging from April 2008 to March 2015. EViews software has also been used to test stationarity and granger causality test. So that objective behind this paper can be achieved. And further, this research can contribute in others research so as to understand the different policies running in the economy.

KEYWORDS: Foreign Institutional Investments (FII), Granger Causality Test, Macro-Economic Variables, Unit Root Test & Global Financial Crises

INTRODUCTION

To remove economic crises and to achieve faster economic growth, India invited foreign investor with introduction of LPG policy 1991. It was helpful for nation as it has increased capital inflow in Indian economy. The portfolio investment received by India from FIIs since 1992 made India's status as more faster and inclusively growing economy in the world. Among most of the Asian countries like Thailand and Indonesia, India received greater attention of FIIs. From 1991 crises to the global financial crises 2008-09, FIIs played an important role in developing Indian Economy across the world. FIIs flows in India have shown an increasing trend after 1992 to 2015 which was 13 Cr in 1992 and 277459.68Cr in 2014-15.

To manage such flow in Indian market, various challenges were faced by Indian policy maker as FIIs are directly prejudiced by various macro variables such as FOREX, money supply, inflation and IIP. Hence it is important to understand the relation between FII and macro- economic variables in Indian economy.

Meaning of Foreign Institutional Investment: Foreign investment refers to investment made by residents of a country in financial assets and production process of another country. Entities covered by the term 'FII' includes "overseas Pension funds, mutual funds, investment trust, asset Management Company, Nominee Company, bank institutional portfolio manager. University funds etc." FIIs generally invest in two ways:

EQUITY INVESTMENT

100% investment could be in equity related instruments or up to 30% could be invested in debt instruments i.e.70 (Equity Instruments):30 (Debt Instruments).

100% DEBT

100% investment has to be made in debt securities only.

During the period of April 2008 to March 2015, India experienced the great fluctuation and a risk in return and inflation in the economy due to FIIs withdrawal from economy in 2008-09 this period was known as global financial crises period. During the same period (2008 -2015), inflows of FII were observed with great ups and down. During 2014-15 FIIs net investment was observed at 277459.68 Rs. Crore and it was -45811.00 Rs. Crore in 2008-09. It was the great outflow of FIIs, which has adversely affected our Indian stock market as well as other area too.

Macro-economic variables are regularly working as major variables to indicate India's faster growth and increasing trend of GDP. These macro variables are directly or indirectly influencing the pattern of FIIs and also FIIs influencing the pattern of Macro-economic variables. Thus with this paper it is analysed that how money supply, Inflation, foreign exchange reserve and IIP are related with FII.

REVIEW OF LITERATURE

There are tremendous studies that have been conducted so far in the field whether the FII investment behaviour is reflected in the stock market at various intervals of time. Many studies have done across the world mainly related to effect of FII volatility across various economy as well as Indian economy and the contagion effects of a financial crisis in which work done by

Prof. Lakshmi Sharma (2004) in his study found that impact cost and the quantum of shares available for trading in the market seem to be two important considerations for FIIs for their investment purposes. But of the two significant variables, impact cost has emerged as the most important variable explaining FIIs investment in a company. For his study he used regression model for the FIIs investment as dependent variable and impact cost, market return, and the shareholding of non-promoters category of shareholders to total outstanding shares was tested with empirical data.

Gordon and Gupta (2003) have documented that lagged domestic stock market returns are an important determinant of FII flows. **Bose and Dipankar 2004** in their study attempted to estimate the quantities impact of certain regulatory policy decision related to FII investment in India using the technique of intervention analysis of time series econometrics.

Rajput and Thaker(2005) state that no long run positive correlation exists between exchange rate and Stock Index in Indian context except for year 2002 and 2005. **Badhani, (2005)**, examines the long term and short-term relationship among stock prices, Dollar Rupee exchange rate and net FIIs investment in India using monthly data from April1993 to March 2004. Study finds long term relationship between FIIs investment flow and stock prices and between FIIs investment flow and exchange rate. However no long-term relationship was found between exchange rate and stock prices. Study also shows that exchange rate long term granger causes FIIs investments flow and vice versa. It suggests that FIIs use positive feedback trading in respect to exchange rate. BI-directional long term causal it was found between FIIs investment flow and stock prices.

Karimullah (2009) examined the impact of FIIs equity investment behaviour in the Indian stock market and found bi-directional causality between FII and stock return. **Kumar Sundaram(2009)** in his paper, "Investigating causal relationship between stock return with respect to exchange rate and FII: evidence from India" examine the causal

relationship between FOREX rate and FIIs in India. **Manjinder KAUR, Sharanjit S. Dhillon(2010)** in their study observed that macroeconomic determinants, economic growth of India (IIP) has significant and positive impact on FIIs investment inflows to India both in long run and short-run. However, all other macroeconomic factors have significant influence only in long-run such as inflation in home country represented by US Producer Price Index (PPI) has significant and positive influence while inflation in India represented by Wholesale Price Index (WPI) has negative and significant influence on FIIs investment in India. To explore the various determinants of FIIs investment in India they used Autoregressive Distributed Lag (ARDL) model which has been applied to examine the co-integration relationship between FIIs investment and various macroeconomic and financial indicators of home (US) and host country (India). Before estimating ARDL bounds test, stationarity of all the variables has been examined by applying Dickey and Fuller (1979) unit root test to determine the order of integration. For this the types of Augmented Dickey Fuller (ADF) regression has been applied. **Rajender kumar 2011**, in his paper titled “ determinants of FIIs in India : Evidence from Granger causality test” investigated a causal relation between FIIs and WPI, IIP, stock market return, money supply, interest rate for a period of 17 years ranging from January 1993 to December 2009 with granger causality test. And he found that only Stock market returns, IIP and exchange rate are the main determinants of FIIs in India for this period.

OBJECTIVE OF THE STUDY

The Attempts has been Made

- To understand the various concept of macro-economic variables.
- To check the stationarity of the series.
- To study the causal relationship between FII and macro-economic variables of India.

DATA COLLECTION AND RESEARCH METHODOLOGY

To achieve the objective of the study, the secondary data has been collected from www.sebi.gov.in, www.rbi.org.in for a period ranging from April 2008 to March 2015. Various publications of SEBI, RBI, Economic Political weekly, books and journals etc will be used. EVIEWS 8 software will be used for ADF unit root test and granger causality test. So that the growth and stationarity of variables will be measured, tabulated and analysed.

HYPOTHESES

Ho: There is causal relation between FIIs and macro economic variables.

FOREIGN INSTITUTIONAL INVESTMENT IN INDIA

To see the trend of FIIs in India we analysed the following table through which we can see the changing scenario of FIIs in India before and after global financial crises:

Table 1: FIIs in Ten Financial Years

Financial year	INR crore		
	Equity	Debt	Total
2005-2006	48800.50	-7333.80	41466.70
2006-2007	25235.70	5604.70	30840.40
2007-2008	53403.80	12775.30	66179.10
2008-2009	-47706.20	1895.20	-45811.00
2009-2010	110220.60	32437.70	142658.30

Table 1 :Contd.,			
2010-2011	110121.10	36317.00	146438.10
2011-2012	43737.60	49987.90	93725.50
2012-2013	140032.60	28334.40	168367.00
2013-2014	79708.68	-28059.89	51648.79
2014-2015	111332.59	166127.09	277459.68

Source: CDSL

With help of above table, it can be seen that FIIs investment has increased over the period of time while a very small changes are seen during this decade. In 2006-07 FIIs investment has decreased from 41466.70 Rs crore to 30840.40 Rs crore but during financial crises it can be seen that FIIs made leak from Indian market especially by withdrawing through Equity which made 45811.00 Rs crore outflow from our economy due to which Indian economy met with various problems. but this dilemma was solved soon and FIIs returned with good inflow as 142658.30 Rs. Crore which has given a boost to our economy and this scenario was continued, reached at 277459.68 Rs crore in 2014-15. That augmentation has been observed in equity and debt also.

FII AND MACRO-ECONOMIC VARIABLES

- Foreign Institutional Investment:** Foreign Institutional Investor (FII) means an institution established or incorporated outside India which proposes to make investment in securities in India. They are registered as FIIs in accordance with Section 2(f) of the SEBI (FII) regulation 1995. FII are allowed to subscribe to new securities or trade in already issued securities. Foreign investment refers to investment made by residents of a country in financial assets and production process of another country. Entities covered by the term 'FII' includes "overseas Pension funds, mutual funds, investment trust, asset Management Company, Nominee Company, bank institutional portfolio manager. University funds etc." In this paper FII is measured in Indian rupees crores.
- Foreign-Exchange Reserves:** Are called reserve assets in the balance of payments and are located in the capital account. Hence, they are usually an important part of the International Investment Position of a country. The reserves are labelled as reserve assets under assets by functional category. In terms of financial assets classifications, the reserve assets can be classified as Gold bullion, Unallocated gold accounts, Special drawing rights, currency, Reserve position in the IMF, interbank position, other transferable deposits, other deposits, debt securities, loans, equity (listed and unlisted), investment fund shares and financial derivatives, such as forward contracts and options. In present study FOREX is measured Rs. crore.
- Money Supply:** The entire stock of currency and other liquid instruments in a country's economy as of a particular time. The money supply can include cash, coins and balances held in checking and savings accounts. Economists analyze the money supply and develop policies revolving around it through controlling interest rates and increasing or decreasing the amount of money flowing in the economy. Money supply data is collected, recorded and published periodically, typically by the country's government or central bank. Public and private sector analysis is performed because of the money supply's possible impacts on price level, inflation and the business cycle. In present study money supply is measured in Rs. crore
- Inflation:** Inflation is the percentage change in the value of the Wholesale Price Index (WPI) on a year-on year basis. It effectively measures the change in the prices of a basket of goods and services in a year. In India, inflation is calculated by taking the WPI as the base. Here values of inflation are in percentage.

- Index of Industrial Production:** IIP or the index of industrial production is the number denoting the condition of industrial production during a certain period. These figures are calculated in reference to the figures that existed in the past. Currently the base used for calculating IIP is 1993-1994. As IIP shows the status of industrial activity, you can find out if the industrial activity has increased, decreased or remained same. Today it is important, because with the news of recession hovering over the horizon, better IIP figures indicate increase in industrial production. It makes investors and stock markets become more optimistic. The optimism amongst the stock markets and investors translates into the markets going up. This is because the markets expect the companies' performance to increase. This ultimately leads to the growth in the country's GDP. It implies improvement in country's economy, thus making it an attractive investment destination to foreign investors.

The time series data for the analysis are monthly estimates ranging from April 2008 to March 2015 i.e. 7 financial years monthly data, hence no of observation is $7 \times 12 = 84$ observation. The variables used in the model are estimated in their units of measurement which are used in following way:

Variables	Unit	Label	No of Observation
FII's total investment	Rs in Crore	Foreign Institutional Investment	84
Inflation(WPI)	In percent	Months on Years base wholesale price ndex	84
IIP	General index	Index of industrial production	84
M3*	Rs. in crore	Money supply broad money concept	84
FOREX	Rs. In crore	Foreign Exchange Reserve (only currency assets)	84

* M3 data from 2014- 2015 has been taken from chart displayed on money control site.

ECONOMETRICS ANALYSIS

Unit Root Test

Total 84 observations are used to test. Here all series are checked whether they are stationary or not during this period. For this Augmented Dickey fuller unit root test has been used

A unit root test is a feature of processes that involve through time that can cause problems in statistical inference involving time series models. A linear stochastic process has a unit root if 1 is a root of the process's characteristic equation. Such a process is non stationary. If the other roots of the characteristic equation lie inside the unit circle- that is, have a modulus less than one then the first difference of the process will be stationary. It uses the following model.

$$Y_t = Y_{t-1} + ut \tag{1}$$

With this model, stationarity of FII and Macro variable such as forex, IIP, Inflation and money supply is measured.

Empirical Result of the Study

Table: 2 Unit Root Test ADF Statistics at Level (Null Hypothesis = Series are Non Stationary)

Variable	ADF Statistic(Intercept)	ADF Statistics (Trend and Intercept)
FII	-3.871911(.000)	-4.281546(.000)
	-3.512290*	-4.073859*
	-2.897223**	3.465548**
	- 2.585861***	-3.159372***
FOREX	1.906120(.0603)	-1.114880(.2683)

IIP	-1.765397(.0814)	-3.600934 (.0006)
M3	1.797146(.0761)	-1.970103(.0524)
Inflation	-2.557695(.0124)	-2.637477(.0101)

* McKinnon critical value at 1% level of significance

** McKinnon critical value at 5% level of significance

*** McKinnon critical value at 10% level of significance

In bracket, PP values are given

It can be easily said that FII monthly series is stationary at levels because its T values are -3.871911 and -4.281546 (level) which are more than critical values at 1 %, 5% and 10% of significance at intercept and trend & intercept. Whereas forex monthly series is stationary at 1 difference as value is -6.651171 which is more than critical values of all level of significance and non stationary at level because T value are found lesser negative at trend and intercept than critical values at 1%, 5% and 10% level of significance. In estimating the unit root of inflation` it is found that series is unit root at intercept and trend and intercept at level while it is also non unit root at first difference of intercept because value found here is -4.153362(more than critical values of all level of significance), same in container of money supply series it is also non stationary at level and stationary at first difference with the value -7.574083, while the series of IIP is found stationary at trend and intercept as it is -3.6000934 which is satisfied at 5% and 10 % level of significance. But all series are found stationary at First difference. All series are tested at 1 lag. Thus a null hypothesis is rejected for FII and IIP, accepted for other variables. While a null hypothesis is rejected at first difference in both intercept and trend and intercept.

Granger Causality Test: FII and Macro Variables

To test Granger causality, we have used four macro variables such as IIP, Money Supply, Inflation and Foreign Exchange Reserve (FOREX) with FII.

The granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. ordinarily, regressions reflect “mere” correlation but granger causality in economics could reflected by measuring the ability of predicting the future values of a time series using past values of another time series. That the Granger test finds only “predictive causality”

A time series X is said to granger cause Y if it can be shown, usually through a series of t-test and F-test on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y. Thus here X variable is FII and Y variables are FOREX, money supply, IIP and inflation.

Causality Test Equation for FII and Forex

$$\text{FII} = \alpha_0 + \alpha_1 \text{FII}_{t-1} + \dots + \alpha_L \text{FII}_{t-L} + \beta_1 \text{Forex}_{t-1} + \dots + \beta_L \text{Forex}_{t-L} + \epsilon_t \quad (1)$$

$$\text{Forex} = \alpha_0 + \alpha_1 \text{Forex}_{t-1} + \dots + \alpha_L \text{Forex}_{t-L} + \beta_1 \text{FII}_{t-1} + \dots + \beta_L \text{FII}_{t-L} + \epsilon_t \quad (2)$$

L in the above equations indicates lag length of the variable. Null Hypothesis $H_0: \beta_1 = \beta_2 = \dots = \beta_L = 0$; and Alternate Hypothesis $H_A: P_1 \neq \beta_L \neq 0$. In equation 1 null hypothesis is forex does not granger cause FII and in equation 2 is FII does not granger causes forex. Rejection and acceptations of null hypothesis is based on F statistic value if, the F - statistic obtained are less than the critical F value. In such case the alternate hypothesis is rejected meaning that one variable does not granger causes another variable and it's vice versa.

Causality Test Equation for FII and Money Supply (M3)

$$FII = \alpha_0 + \alpha_1 FII_{t-1} + \dots + \alpha_L FII_{t-L} + \beta_1 M3_{t-1} + \dots + \beta_L M3_{t-L} + \epsilon_t \tag{3}$$

$$M3 = \alpha_0 + \alpha_1 M3_{t-1} + \dots + \alpha_L M3_{t-L} + \beta_1 FII_{t-1} + \dots + \beta_L FII_{t-L} + \epsilon_t \tag{4}$$

In equation 3 null hypotheses is M3 does not granger cause FII and in equation 4 is FII does not granger causes M3. Rejection and acceptations of null hypothesis is based on F statistic value if, the F - statistic obtained are less than the critical F value. In such case the alternate hypothesis is rejected meaning that one variable does not granger causes another variable and it's vice versa.

Causality Test Equation for FII and Inflation

$$FII = \alpha_0 + \alpha_1 FII_{t-1} + \dots + \alpha_L FII_{t-L} + \beta_1 Inflation_{t-1} + \dots + \beta_L Inflation_{t-L} + \epsilon_t \tag{5}$$

$$Inflation = \alpha_0 + \alpha_1 Inflation_{t-1} + \dots + \alpha_L Inflation_{t-L} + \beta_1 FII_{t-1} + \beta_L FII_{t-L} + \epsilon_t \tag{6}$$

In equation 5 null hypothesis is Inflation does not granger cause FII and in equation 6 is FII does not granger causes inflation. Rejection and acceptations of nul hypothesis is based on F statistic value.

Causality Test Equation for FII and Index of Industrial Production (IIP)

$$FII = \alpha_0 + \alpha_1 FII_{t-1} + \dots + \alpha_L FII_{t-L} + \beta_1 IIP_{t-1} + \beta_L IIP_{t-L} + \epsilon_t \tag{7}$$

$$IIP = \alpha_0 + \alpha_1 IIP_{t-1} + \dots + \alpha_L IIP_{t-L} + \beta_1 FII_{t-1} + \beta_L FII_{t-L} + \epsilon_t \tag{8}$$

In equation 7 null hypothesis is IIP does not granger cause FII and in equation 8 is FII does not granger causes IIP. Rejection and acceptations of null hypothesis is based on F statistic value if, the F - statistic obtained are less than the critical F value. In such case the alternate hypothesis is rejected meaning that one variable does not granger causes another variable and it's vice versa.

Here to test the causal relation between macro variables F value has been used according to which Critical values for rejection of null hypothesis at 5 percent and 1 percent level of significance are:

- 3.25 (5%) and 5.21(1%) for lag 2,
- 2.88(5%) and 4.42(1%) for lag 3,
- 2.67 (5%) and 3.97(1%) for lag 4.

Result of Granger Causality Test

Table 3: Pairwise Granger Causality Tests

Sample: 2008M04 2015M03			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
Inflation does not Granger Cause FII	82	0.53281	0.5891
FII does not Granger Cause Inflation		0.62285	0.5391
FOREX does not Granger Cause FII	82	2.53173	0.0861
FII does not Granger Cause FOREX		0.47798	0.6219
IIP does not Granger Cause FII	82	1.15602	0.3201
FII does not Granger Cause IIP		0.50726	0.6041
M3 does not Granger Cause FII	82	1.93160	0.1519

Table 3: Contd.,		
FII does not Granger Cause M3	1.13117	0.3280

Focusing on above table no 3 where granger causality test is done at lag 2, it can be seen that there is no causal relation between FII total investment and Macro-economic variables as all F statistic values are found less than critical values at 5% and 1% significance level at lag 2. Thus it can be said that null hypotheses cannot be rejected as found values in inflation and FII are .53281 and .62285 thus in both case null hypotheses is accepted, same picture can be seen in FOREX and FII, FII and IIP, FII and M3.

Table 4: Pairwise Granger Causality Tests

Sample: 2008M04 2015M03			
Lags: 3			
Null Hypothesis:	Obs	F-Statistic	Prob.
Inflation does not Granger Cause FII	81	0.33479	0.8002
FII does not Granger Cause Inflation		0.60112	0.6163
FOREX does not Granger Cause FII	81	1.67078	0.1806
FII does not Granger Cause FOREX		3.41989	0.0216
IIP does not Granger Cause FII	81	2.43863	0.0712
FII does not Granger Cause IIP		0.40959	0.7466
M3 does not Granger Cause FII	81	1.63689	0.1881
FII does not Granger Cause M3		1.44580	0.2364

Null hypotheses in the result is rejected here for “FII does not granger cause FOREX” because we found the obtained F statistics as 3.41989 in this case which is more than the critical value of 5% level of significance. Hence we can reject the null hypothesis and accept alternate hypotheses that FII granger causes Forex during this period. Because of which India’s foreign exchange reserve has been increasing over a period of time. But the null hypothesis are accepted in all other variables as FII and IIP, FII and M3, FII and inflation. Because result found here depicts that FII does not granger cause macro variable other than FOREX. Even their P value obtained here are more than 0.05 (95 %) of significance level except FII on FOREX.

Table 5: Pairwise Granger Causality Tests

Sample: 2008M04 2015M03			
Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Prob.
Inflation does not Granger Cause FII	80	1.04580	0.3899
FII does not Granger Cause inflation		0.48458	0.7470
IIP does not Granger Cause FII	80	1.77451	0.1435
FII does not Granger Cause IIP		0.22368	0.9243
FOREX does not Granger Cause FII	80	1.42717	0.2339
FII does not Granger Cause FOREX		2.29459	0.0676
M3 does not Granger Cause FII	80	1.64530	0.1724
FII does not Granger Cause M3		1.02797	0.3989

In the table 5, granger causality test is applied at lag 4 and we can see that both null hypothesis for Inflation and FII, FII and IIP, FII and Forex, FII and M3 are accepted because in all causality relation, F statistic values are found less than the critical values of 5% and 1% level. Even P values are also more than the .05. Thus it can be said that there is no causal relation between FIIs and macroeconomic variables at lag 4. It means FIIs are not playing any role in changing the pattern of macro-economic variables in our economy.

CONCLUSIONS

To conclude, it can be said that FIIs are very important player in our economy as FII and its returns in Indian stock market had shown a drastic change in foreign exchange reserves of India. The surge in foreign funds flowing into in equities coupled with record NRI funds and dollar purchases by the Reserve Bank of India (RBI) has boosted the foreign exchange reserves to over \$300-billionmark at the end of March, which is the highest since December 2011.

During the decade 2005 to 2015, it is found that FIIs investment behaviour is increasing in our economy sometime their behaviour was fluctuating like during the period of global financial crises when they withdrew about 45811 Rs. Crore from economy and left India unstable during that period it shows that Indian capital market is largely affected by foreign institutional investment.

With the help of Augmented Dicky Fuller unit root test, the result found shows that FIIs changes are stationary at level while Forex, M3 and inflation changes are unit root at level while no unit root found at 1 difference in intercept and trend and intercept whereas IIP is stationary at level in trend and intercept. Unit root result found here also be analysed which was resulted in stationarity of all variables at 1 difference in intercept and trend & intercept. For this, unit root test was applied with Reviews.

Granger causality test in E-Views software have shown a different result. According to which our hypotheses are rejected for few variables. The test is done above at 2, 3 and 4 lags of granger causality test to fulfil our paper hypotheses which determined to test the causal relation between foreign institutional investment and macro variables as “ There is causal relationship between FII and macroeconomic variables in the economy during 2008 -2015”. But result found here states that there is no causal relationship between FIIs and IIP, M3, and inflation during this period. But FII granger cause Forex at 5% level of significance at lag 3 during the same period.

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