



## AN ECONOMETRIC ANALYSIS ON CAUSALITY BETWEEN FOREIGN INSTITUTIONAL INVESTMENTS AND BSE SENSEX

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### ABSTRACT

*With the gradual abolishment of barriers on capital inflow, there has been a surge of investment into the Indian economy. A significant impact of foreign investment has always been felt on the stock market indices which tend to vary according to its flow. This paper investigates whether Foreign Institutional Investment influences BSE SENSEX. An attempt has also been made to study whether there is any reverse influence. To study the direction of influence, Granger Causality Test has been used. To analyze the influence between the variables, daily data of both Foreign Institutional Investments and BSE SENSEX was considered. The time horizon was 7 years, from 2010 to 2016.*

**Key words:** FII, BSE SENSEX, influence, Granger Causality

### Introduction

Foreign investment has always been a key driving force of development especially in a developing economy, like India. Accompanied with the right policy framework, foreign investments can bring economic stability and growth in an economy. Foreign investment takes the form of Foreign Direct Investment and Foreign Institutional Investors / Foreign Portfolio Investment.

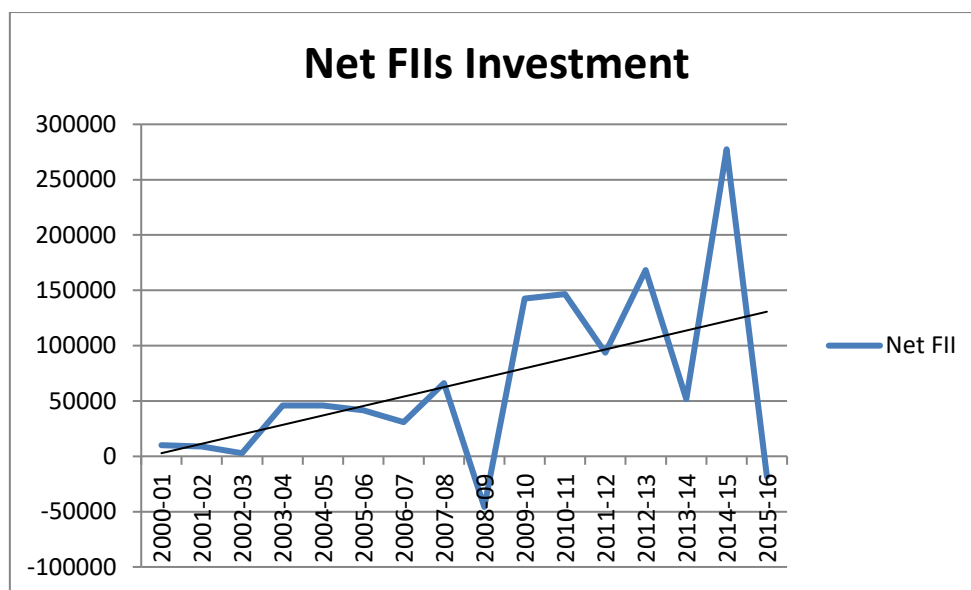
As per SEBI (Foreign Institutional Investors) Regulations, 1995 and 2014, "Foreign Institutional Investor" means an institution established or incorporated outside India and registered with SEBI, which proposes to make investment in India in securities. As per RBI regulations, Foreign Institutional Investors (FIIs) are allowed to invest in the primary and secondary capital markets in India through the Portfolio Investment Scheme (PIS). Under this scheme, FIIs/NRIs can acquire shares/debentures of Indian companies through the stock exchanges in India. The ceiling for overall investment for FIIs is 24 per cent of the paid up capital of the Indian company. The ceiling of 24 per cent for FII investment can be raised up to sectoral cap/statutory ceiling, subject to the approval of the board and the general body of the company passing a special resolution to that effect.

A stock index is a measurement of the value of a group of shares, which is used as tool to describe the strength and movement of market. Among various stock indices in India, BSE SENSEX is seen as an economic barometer by many economists.

When India progressively headed towards a more liberalised policy post 1991, the foreign investment inflow reflected an increasing trend. The scrapping off of the Foreign Exchange Regulation Act (1973) and the enactment of the Foreign Exchange Management Act (1999) was the most compatible step towards liberalisation. The Act liberalised foreign exchange control and restrictions on Foreign Investments.

**Figure 1**

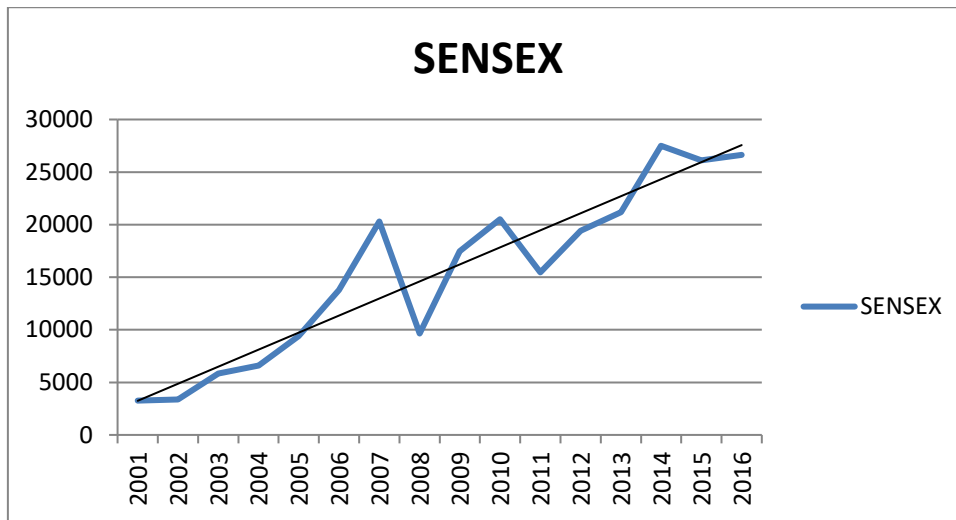
**Trend in Net FII (2001 – 2016)**



Source: [www.fip.nsdl.co.in](http://www.fip.nsdl.co.in)

Even Net FIIs Investment in India is highly volatile in nature and shows an increasing trend. After the period of Global Crisis (2007-08), there was a steep decline in investment reaching INR -45,811 crore during the year 2008-09. It immediately rose to INR 1,42,658 cr. in the year 2009-10. The year 2014-15, recorded an all-time high of INR 2,77,461 cr., which was followed by a steep decline in the year 2015-16.

**Figure 2**  
**Trend in SENSEX (2001 – 2016)**



Source: [www.bseindia.com](http://www.bseindia.com)

SENSEX also showed a sharp decline during the early wake of global crisis, but regained the increasing trend immediately in 2009. In the year 2014, SENSEX also recorded an all-time high of 27499.42 points. From 3262.33 points in 2001, the SENSEX has reached 26626.46 points in the year 2016.

Over the last 16 years, FII and SENSEX recorded an increasing trend, responding positively towards the policies of the Government. Is this increasing trend of these two variables a resultant of influence between the variables? Hence, this study was an attempt to find the direction of influence between FII and SENSEX.

### Statement of the Problem

With the gradual abolishment of barriers on capital inflow, there has been a surge of investment, into the Indian economy. A significant impact of foreign investment has always been felt on the stock market indices which tend to vary according to its flow. The present study attempts to find the causality between Foreign Institutional Investment and BSE SENSEX.

Even though FIIs are allowed to invest through both the primary market and stock exchanges; a major share of FII consists of investment through the stock exchange route. Further, the FII may be in the form of equity and debt, where the debt content is only a meager amount and does not vary. In the year 2016, net equity FII in Stock Exchange was INR 4469.32 crore, whereas in the primary market, it was only INR 25.77 crore. Moreover, the FIIs equity investment was highly volatile and is in a substantial amount; therefore, it can lead to high volatility in a company's share and move the stock index in general. As such the FIIs equity investment may have a direct influence on the stock index.

Further, when the stock index of a country performs well, it signals a favourable investment climate in the country and may attract more foreign capital. Therefore, the stock index may have an influence on the FII.

### **Objectives of the Study**

- To analyse the influence of FII's equity net investment on SENSEX
- To analyse the influence of SENSEX on FII's equity net investment

### **Hypotheses of the Study**

H<sub>01</sub>: FIIs equity net investment does not granger cause SENSEX

H<sub>02</sub>: SENSEX does not granger cause FII's equity net investment

### **Research Methodology**

The study is analytical in nature and uses secondary data such as FII net equity and BSE SENSEX. Daily data from the year 2010 to 2016 was used for analysis. Data on FII equity and BSE SENSEX was collected from [www.fpi.nsdl.co.in](http://www.fpi.nsdl.co.in) and [www.bseindia.com](http://www.bseindia.com) respectively.

The following sequence of tests has been applied on the data – Augmented Dicky Fuller Test to ensure stationarity of each time series data, Vector Auto-regression Model to select the significant lag length and Pairwise Granger Causality Test for hypotheses testing. To carry out the above tests, the statistical software package names E-views 8.0 was used.

The research model formulated for the study is as follows:-

**Table 1**  
**Research Model**

Direction of Causality	Models
<b>Causality between FII_NET ↔ SENSEX</b>	
<i>FII_NET</i> → <i>SENSEX</i>	$FII\_NET_t = \sum_{i=1}^n \alpha_i SENSEX_{t-i} + \sum_{j=1}^n \beta_j FII\_NET_{t-j} + u_{1t}$
<i>SENSEX</i> → <i>FII_NET</i>	$SENSEX_t = \sum_{i=1}^n \lambda_i FII\_NET_{t-i} + \sum_{j=1}^n \delta_j SENSEX_{t-j} + u_{2t}$

### Review of Literature

Stock markets are considered as an inevitable part of the financial system of an economy. Stock markets are a replica of the economic strength of an economy. The development of Stock Market is considered an imperative in order to give an impetus to investment, savings and economic growth. The development of stock market is the outcome of many factors like exchange rate, foreign direct investment, and economic liberalization (Adam et al, 2008). There has been a vast array of studies that analyzed the causal side of relationship between stock market movements and macroeconomic variables.

Dey and Mishra (2008) in their study concluded that FII sales does not Granger cause NSE Nifty till the 9<sup>th</sup> lag, however, from the 10<sup>th</sup> lag onwards FII Sales Granger cause Nifty. On the other hand, Nifty Granger causes FII sales for all reported lags. In the case of FII purchases, they found that Nifty Granger causes it but not in the reverse case.

Raj Chaitanya (2003) in his research work titled ‘Foreign Institutional Investments’ discussed in length about the FIIs and their impact on the Indian economy. Analyzing daily flow data, he concludes that the stock market performance has been the sole driver of FII flows, though monthly data in the pre-Asian crisis period suggests some reverse causality.

The study conducted by Gordon and Gupta (2002) on the portfolio flows in India and the influence of domestic fundamental factors, it was found that there exists a strong impact of the domestic fundamentals on the investment flows into India. They used the data from September 1992 till October 2001 and applied regression model and unit root test. It was concluded that the portfolio flows to India are small, compared to other emerging markets and also less volatile. The combination of domestic, regional and global variables are important in the determination of the portfolio flows into India.

Chakrabarti (2001) concluded that the existing literature on FIIs in India found that the equity return has a significant and positive impact on the FIIs and stock returns are strongly correlated in India. But, given the huge volume of investments, foreign investors could play a role of market makers and book their profits, i.e. they can buy financial assets when the prices are declining, thereby jacking-up the asset prices and sell when the asset prices are increasing.

Sultana & Pardhasaradhi (2012) studied the impact of flow of FII and FDI on Indian Stock Market, by considering NIFTY and SENSEX as the representative of Indian Stock Market. The study found that both FDI and FII play a significant role in determining the stock market trend in India.

Shrivastav (2013) found a significant impact of FII on the movement of BSE SENSEX and NSE NIFTY. However, only a low degree of linear relationship between FII and other sector stock indices could be established.

Juneja (2013) found that there exists a strong positive correlation between FII and Indian Stock Market. Dadich, Chotia, & Chaudhary (2015) concluded that FIIs contributed significantly towards the stock market volatility

### Analysis of Data

The hypothesis was tested using Granger Causality Test. To run the test, it is necessary that the variables are stationary; therefore, Augmented Dickey Fuller (ADF) test was applied for both variables. The results are as given in Table 2 and Table 3.

**Table 2**  
**ADF Unit Root Test for FII\_NET**

Null Hypothesis: FII_NET has a unit root		
Exogenous: Constant, Linear Trend		
Lag Length: 3 (Automatic - based on SIC, maxlag=24)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-13.18623	0.0000
Test critical values: 1% level	-3.963568	
5% level	-3.412512	
10% level	-3.128210	
*MacKinnon (1996) one-sided p-values.		

At 1%, 5% and 10% levels, the critical values were greater than the t-statistic. Further, the *p*-value was less than 0.05. Therefore, the H<sub>0</sub> was rejected and it was concluded that FII\_NET

has no unit-root and it is stationary. The test was conducted with all three possibilities viz., taking constant, constant & liner trend and none as exogenous, and the similar results were obtained.

**Table 3**  
**ADF Unit Root Test for SENSEX**

Null Hypothesis: SENSEX has a unit root		
Exogenous: Constant, Linear Trend		
Lag Length: 0 (Automatic - based on SIC, maxlag=24)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-37.93222	0.0000
Test critical values: 1% level	-3.963561	
5% level	-3.412509	
10% level	-3.128208	
*MacKinnon (1996) one-sided p-values.		

At 1%, 5% and 10% levels, the critical values were greater than the t-statistic. The p-value was less than 0.05. Therefore, the H0 was rejected and it was concluded that SENSEX has no unit-root and it is stationary. The test was conducted with all three possibilities viz., taking constant, constant & liner trend and none as exogenous, and the same results were obtained.

The VAR (Vector Auto regression) was run and the lag length of 10 was selected on the basis of Akaike’s Information Criterion (AIC). The results are shown in Table 4.

**Table 4**  
**Results of VAR**

VAR Lag Order Selection Criteria						
Sample: 1/04/2010 12/30/2016						
Included observations: 1637						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-24847.75	NA	5.25e+10	30.36011	30.36671	30.36256
1	-24747.03	201.0703	4.67e+10	30.24194	30.26174	30.24928

2	-24683.13	127.4144	4.34e+10	30.16876	30.20175	30.18099
3	-24655.98	54.06905	4.22e+10	30.14047	30.18666*	30.15760
4	-24641.91	27.97869	4.16e+10	30.12817	30.18756	30.15020*
5	-24635.24	13.25811	4.15e+10	30.12491	30.19749	30.15183
6	-24626.90	16.54740	4.13e+10	30.11960	30.20538	30.15142
7	-24625.38	3.012120	4.14e+10	30.12263	30.22161	30.15934
8	-24621.26	8.153221	4.14e+10	30.12249	30.23466	30.16409
9	-24614.68	12.99850	4.13e+10	30.11934	30.24471	30.16584
10	-24607.19	14.79151*	4.11e+10*	<b>30.11508*</b>	30.25364	30.16647
11	-24605.07	4.187000	4.12e+10	30.11737	30.26913	30.17366

After ensuring stationarity using ADF and selecting the lag length using the VAR model, the hypothesis was tested using Granger Causality Test. The results of the test are shown in Table 5.

**Table 5**  
**Results of Granger Causality Test**

Pairwise Granger Causality Tests			
Sample: 1/04/2010 12/30/2016			
Lags: 10			
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Null Hypothesis:	Obs	F-Statistic	Prob.
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SENSEX does not Granger Cause FII_NET	1657	8.95760	2.E-14
FII_NET does not Granger Cause SENSEX		1.37526	0.1857
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Ho1: SENSEX does not Granger cause FII\_NET was rejected since the *p* value was found to be less than 0.05.

The study failed to reject Ho2: FII\_NET does not Granger cause SENSEX because *p* value is greater than 0.05. Therefore, it was concluded that there exists uni-directional causality from SENSEX to FII\_NET

**Conclusion**

The major objective of the study was to analyze the causal relationship between Foreign Institutional Investments Equity Net and BSE SENSEX. It was concluded that there is one-



way causality between the two variables, i.e., SENSEX influences Foreign Institutional Investments. But the results of the test did not show any influence of Foreign Institutional Investments on SENSEX. This is evidence to the fact that a blossoming stock market as reflected by the Stock Index is one among the major decision criterion for Foreign Institutional Investors.

The study concludes with a model of causality between SENSEX and Foreign Institutional Investments. In a further study, industry-specific data of Foreign Institutional Investments can be taken to study its influence on stock market indices like SENSEX and NIFTY. Similarly, further studies can be conducted to analyze the relationship between various aspects of Foreign Institutional Investments like Gross Equity Purchases/Sales and stock prices.

### **Limitations of the Study**

1. The time period of the study is limited to 2010-2016.
2. FII was defined as FII Equity Net.

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