

## Long-Run and Short-Run Relationship between Indian Stock Prices and Foreign Direct Investments (FDI) Equity Inflows

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**Abstract:** *The present study is an attempt to find the cointegration and causality among Indian stock prices and Foreign Direct Investment (FDI) equity inflows to India. The CNX Nifty stock prices and FDI equity inflows from April 2011 to March 2016 are considered as sample data for this study. In this research, Augmented Dickey-Fuller unit root test, Pearson's correlation test, Johansen's cointegration test and Granger causality test are applied to analyse the stationarity, relationship, cointegration and causality between stock prices and FDI equity inflows respectively. From the analysis, it is concluded that there exist significant positive correlation and long-run equilibrium relationship between the time series data and it is further inferred that changes in Indian stock prices are found to lead the changes in FDI equity inflows to India in the short-run period.*

**Keywords:** Stock Prices, FDI Equity Inflows, Augmented Dickey-Fuller Unit Root Test, Pearson Correlation Test, Johansen Cointegration Test and Granger Causality Test.

### Introduction

Until the 1980s, commercial loans from banks were the largest source of foreign investment in developing countries. But during the period 1991-1998, FDI and FPI (Foreign Portfolio Investment) comprised 90 percent of the total capital flows to developing countries. Global FDI flows decreased significantly from 2007-2009 due to the financial crisis and finally started rising again in 2010. Hence, when there are talks about the recent phenomenon of globalization, it is referring in large part to the effects of FDI, and this instrument is therefore being the primary focus of today's economic development. Higher amount of FDI equity inflows were from Mauritius, Singapore, United Kingdom, Japan and the USA of Rs.4,80,363.08 crores (33.24%), Rs.2,56,666.81 crores (15.90%), Rs.1,15,591.93 crores (8.01%), Rs.1,10,671.35 crores (7.27%) and Rs.94,574.89 crores (6.22%) respectively between April 2000 and March 2016. Remaining 29.36% of FDI equity inflows were from other countries.

FDI is been recognized as a major source of investment technology for developing countries (Balasubramanyam, Salisu and Sapsford, 1996). FDI can contribute significantly to the economic growth and development of the recipient country by reducing shock arising from low domestic savings and investments (Adam and Tweneboah, 2008). Dunning (1973) identified

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market size, price and growth as major determinates of FDI. It is also postulated that an increase in FDI will positively affect the stock market prices and vice versa (Issahaku, Ustarz and Domanban, 2013). Therefore, the current study is focused on analysing the relationship, cointegration and causality between Indian stock prices and FDI equity inflows during the period April 2011-March 2016.

## **Research Questions, Objectives and Hypotheses**

### **Research Questions**

The following are the research questions of this study:

- Does the Indian stock prices and FDI equity inflows data are predictable?
- Do Indian stock prices and FDI equity inflows have any correlating relationship between each other?
- Does long-run equilibrium exists between Indian stock prices and FDI equity inflows?
- Is there any causal relationship exists between Indian stock prices and FDI equity inflows?

### **Objectives**

The following are the objectives of this study:

- To confirm whether Indian stock prices and FDI equity inflows data are stationary (i.e. predictable)
- To determine the relationship between Indian stock prices and FDI equity inflows
- To analyse the existence of long-run equilibrium between the time series data
- To find the direction of causality between the time series data

### **Hypotheses**

The following hypotheses are set to be empirically tested to study the above mentioned objectives:

- H<sub>1</sub>**: Unit root exists (i.e. non stationarity) in both Indian stock prices and FDI equity inflows data
- H<sub>2</sub>**: There is no significant relationship between Indian stock prices and FDI equity inflows
- H<sub>3</sub>**: There is no long-run equilibrium between Indian stock prices and FDI equity inflows
- H<sub>4</sub>**: There is no causality existing between the Indian stock prices and FDI equity inflows

### **Data and Methodology**

The Indian stock prices and FDI equity inflows data are collected from secondary sources. The period of this study is from April 2011 to March 2016. S&P CNX Nifty stock prices (in thousands) are been considered for the study because it is an index constructed with an impact cost consideration and it is one of the most robust indices available for Indian stock market. The stock prices of S&P CNX Nifty are downloaded from the NSE website. The FDI equity inflows (in crores) data for the period April 2011 to March 2016 are taken from the website of Department of Industrial Policy and Promotion-Ministry of Commerce and Industry, Government of India. in this study, the following are the econometric and statistical tools used for analysing the data.

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S.No.	Methods Employed	Formulae Used	Need
1	Augmented Dickey-Fuller (ADF) Test	$\Delta y_t = \alpha + \pi + \delta y_{t-1} + \sum_{i=1}^m \beta_i \Delta y_{t-1} + \varepsilon_t$	Used to find whether the time series data is stationary or non-stationary
2	Pearson's Correlation Coefficient Test	$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{((n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2))}}$	Used to measure the relationship between two or more random variables or observed data values.
3	Johansen Cointegration Test	Trace Test Statistic $\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^n 1n(1 - \lambda_i)$	Applied to check whether long-run equilibrium relationship exists between two or more time series.
		Maximum Eigenvalue Test Statistic $\lambda_{\text{max}}(r, r+1) = -T 1n(1 - \lambda_{r+1})$	
4	Granger Causality Test	$y_t = \alpha_0 + \sum_{i=1}^m a_i y_{t-i} + \sum_{j=1}^n \beta_j x_{t-1} + \varepsilon_t$ $x_t = \omega_0 + \sum_{i=1}^m \gamma_i y_{t-i} + \sum_{j=1}^n \theta_j x_{t-1} + \varepsilon_t$	Applied to find out the direction of causality between two or more time series data.

### Analysis and Interpretation

**Testing the data for stationarity:** The results for the Augmented Dickey-Fuller unit root test for checking stationarity of time series data are presented in Table 1.

**Table 1: Results of Augmented Dickey-Fuller Unit Root Test**

Time Series Data	Level		First Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
Indian Stock Prices	-0.62	-2.00	-7.85**	-7.78**
FDI Equity Inflows	-6.03**	-6.90**	-6.28**	-6.32**

indicates significance of Augmented Dickey-Fuller unit root test value at 1% level.

From the above table, it is identified that both the data i.e. Indian stock prices and FDI equity inflows are found to be stationary series (Indian stock prices is stationary at first difference and FDI equity inflows is found to be stationary at both level and first difference). Therefore, the *hypothesis 1* is statistically rejected and it is understood that the sample data taken for this study are stationary (predictable). The results are found to be in line with the results of Issahaku et al. (2013), Adam and Tweneboah (2008).

The generated graphical representations of the time series data i.e. Indian stock prices and FDI equity inflows after ADF unit root test are as follows.