Research Paper

How FII market are correlated to equity market in India?

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Abstract
This study mainly focuses on FII flows in India and its impact on Indian equity market viz BSE, NSE. This study covers 10 years secondary nature time series data from 2010 to 2019. This research paper concluded its result with the help of statistical tools such as ADF, Correlation, Regression, VAR, Granger Causality. This study shows that there is a positive relationship between the FII flows and Indian equity performance but the impact is not significant. This makes the research to conclude that Indian equity market performance is not only depending upon FIIs but also other unexplained factors like domestic investors, inflation, interest rate, government policy etc.
Keywords: Foreign Investment Investor (FII), BSE, VAR.

I.   Introduction

Any investment flowing from one country into another is foreign investment. The Government of India differentiates cross-border capital inflows into various categories like foreign direct investment (FDI), foreign institutional investment (FII), non-resident Indian (NRI) and person of Indian origin (PIO) investment. Inflow of investment from other countries is encouraged since it complements domestic investments in capital-scarce economies of developing countries.

India opened up to foreign investments gradually over the past two decades, especially since the landmark economic liberalization of 1991. Initially, Indian government holds a higher control on foreign investments and slowly the government has reduced controls on foreign trade and investment. Higher limits on foreign direct investment were permitted in a few key sectors, such as automobiles, textiles, telecommunications etc. However, tariff spikes in sensitive categories including agriculture are still hindering the foreign access to India's vast and growing market.

FIIs have been allowed to invest in the Indian capital market since September 1992 when the guidelines for Foreign Institutional Investment were issued by the Government. The Foreign Institutional Investors (FIIs) have emerged as important players in the Indian equity market in the recent past with a contribution of nearly 60% of the total foreign investment. FIIs include asset management companies, pension funds, mutual funds, investment trusts as nominee companies, incorporated/institutional portfolio managers or their power of attorney holders, university funds, endowment foundations, charitable trusts and charitable societies.

The working of stock exchanges in India started in 1875. BSE is the oldest stock market in India. National Stock Exchange comes second to BSE in terms of popularity. BSE and NSE represent themselves as synonyms of Indian stock market. The 30-stock sensitive index or Sensex was first

compiled in 1986. The Sensex is compiled based on the performance of the stocks of 30 financially sound benchmark companies. India opened its stock market to international investors in September 1992, and since then, the country has received significant foreign investment, mostly in equities. FIIs not gave direct benefit as of creating real investment into a country but provides large amount of capital to a country through the capital market. FIIs growing participation is one of the most important feature of the Indian stock market development. FIIs played a critical role in increasing India's foreign exchange reserves

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II.   Review Literature

Yadav, S. (2022) analyzed with data and reveals a significant adverse relationship between FIIs net flow and the Sensex index rejected null hypothesis and accept the alternative hypothesis i.e. FIIs net flow has significant influence on the Sensex index, due to a substantial P-value. This analysis shows that when the FIIs net flow increases in the Sensex index then the other investors sells their holdings to earn the profit and this will cause the Sensex index fall. Not only the net flow of FIIs but some other factors like position of domestic investors, political situation, rupee rate in comparison to dollar and inflation etc. are also influenced the Indian capital market.

Singh (2015) study investigates the cause and effects of foreign institutional investors' Investment in Indian by finding the relationship between the foreign institutional investment and financial and real economy variables over the period from January 2007 to March 2014. Johansen's co-integration and vector error correction model have been applied to explore the long-run equilibrium relationship between FII flows and macroeconomic and financial variables. The analysis reveals that the FII's investment in India & variables under the study are cointegrated and, hence, a long-run equilibrium relationship exists between them. Observed from the VECM that in the long-run, the relationship between the FII investment in India and wholesale price index, index of industrial production and exchange rate are positive.

Joo (2014) concluded in their study with correlation analysis revealed that there is moderate low positive correlation between Net FIIs and NIFTY and SENSEX. From the results of GARCH test analysis, it was inferred that volatility of Indian stock market is influenced by the previous periods volatility and FIIs investment are also contributing significantly to the volatility of NIFTY and SENSEX, which are major indices representing Indian stock market. So results suggest that volatility of Indian stock market and FIIs has increased over the period of study but the volatility was maximum during financial down turn and then normalized to moderated levels.

Gupta(2017) revealed that there has been a moderate degree of positive correlation and direct linear relationship between FDI & BSE Sensex and FDI & NSE CNX Nifty. The results of the regression residual analysis revealed that FDI has been significant predictors to measure the bull and market trends in Indian stock market. It can be concluded

that the behaviour of foreign direct investors has influenced the performance of stock market indices in India. It has been suggested that the government of India along with its implementing and regulatory bodies should make further effort to attract more and more FDI for the smooth and rapid development of the stock market and the economy as a whole.

Raphael & Jaco (2021) This study shows that the stock price movement in Indian capital market is determined by the buying and selling activities of FIIs. The huge investment by FIIs causes the bull run in stock indices and on the other side, large scale withdrawal causes slump in stock prices. Therefore, the policy makers and regulators in India should set up an investment environment which can be a focus for huge cross-border institutional capital inflows across the globe. This study also revealed that the existence of the causality between FIIs flows and capital market returns in Indian economy.

Kumar (2011) concluded that the significant relationship between the FIIs and Sensex index. We found the inverse relationship which suggests that FIIs invest more in Sensex index when the index at lower point and invest lesser amount when the Sensex index goes high or we say that when the index goes at high level then FIIs sell their financial assets and book the profit from capital market. The result concludes that FIIs contributions to Sensex has going up and fall down in based upon the level of Indian capital market. Not only the level of capital market factors like political situation, rupee rate in comparison to dollar and inflation etc. are also influenced the FIIs investment.

Bansal(2015) explained FIIs investment flows, there may be other reasons as well that may have some degree of influence on market volatility and return. While the FIIs investment flows and contemporaneous SENSEX, NIFTY, market capitalization and market turnover have been strongly correlated in India, the correlation between FIIs investments and market volatility and market return has been comparatively low. It means volatility in Indian market is not the function of FIIs investment flows. There may be some other reasons which induced the volatility in Indian market.

Chaudhury (2020) study, it is evident that there is a high positive correlation between FDI & BSE Sensex and FDI & CNX Nifty, the correlation is found significant at 1% level. The two models developed were tested using linear regression analysis. In the first model BSE Sensex as a dependent variable and FDI as independent variable. Based on the analysis it can be concluded that flow of FDI into India and BSE Sensex trend are dependent. Similar results were obtained for second model Nifty as a dependent variable. No doubt, FDI not only leads to access to foreign capital, but also facilitates the domestic countries the flow of sophisticated technology, desired skills, tools of innovation etc.

Objective
To analysis the impact of flow of FII on Indian equity market.

Hypothesis
H0= There is no direct relationship between FII and equity market in India.
Data and Methodology

Research gap
After the 1991 economic policy the Indian economy become liberal for world economy. In this situation the foreign investment has been increases with the time. Moreover, the foreign investment has taken a important ground in the measuring or considering the pricing of the equity of the economy. So many studies have been taken in this ground but most of them are based on theoretical concept. Few of them consider practical approach in this regard.

Methodology and theoretical framework
In this study covered 10 years' time series data from 2010 to 2019 of FII flow and BSE, NSE.
Research design is empirical based and data collection is made through secondary source. Moreover, different statistical tools are to be used such as stationarity model check, correlation, regression and VAR, Johansen Cointegration test.

Normality test
The time series data of both stock indices are tested for normality to know whether these indices distributions are normal along to the central tendency or not. Thus, we use Jarque Bera (JB) test to check normality for the monthly closing values of stock-market indices. The JB test is most widely used for determine the nature of time series data distribution. (Mohansundaram & Karthikeyan, 2015).
This test statistic used in the JB test is as follows:
[3]$JB = n [S^2/6 + (K-3)^2/24]$ (2)
Where JB Jarque Bera, n= number of sample size, S= Coefficient Skewness, K= Coefficient Kurtosis. The variables are normally distributed when S is equal zero and K is equal to 3.

Unit root test
By using an autoregressive model, a unit root test is used for examining given variable are normally distributed (stationarity) or not. The presence of a unit root in the data series is checked by applying the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. If we discuss about testing of unit root test there are so many tests are available but, in our study, we used popularly adopted test that is Augmented Dickey- Fuller (ADF) model test. Before finding the co-integration among any economy Time series data should be stationary for analyzing i.e. whether the statistical properties of the series should be constant ((Dickey & Fuller , 1979). In the ADF model the test control for high correlation order with through lagged difference terms for the dependent variables that are on the right side of the regression. The econometric test used in the Augmented Dickey Fuller are as follows:
$\Delta Yt = b0 + \beta Yt-1 + \mu 1\Delta Yt-1 + \mu 2\Delta Yt-2 + …. + \mu p \Delta Yt-p + \mu t$
Where, Yt is for the time series that are tested,
b0 is denoted the intercept term,
β is for the coefficient of interest in the unit root test,
μp is denoted for the parameter of the augmented lagged first difference of Yt to represent the pth order auto regressive process and
μt is denoted the white noise error term. ((Mohansundaram & Karthikeyan, 2015).

Vector autoregression model (VAR)
When it is found that there is no cointegration vector by using Johansen cointegration test with the maximum Eigen value, there is only unrestricted VAR test is available to be used for analyzing the short-run relationship between both the stock indices. The vector autoregression (VAR) model is used for to finding is there any the linear interdependencies between the multiple time series indices or not? This is widely used test for forecasting systems of interrelated time series and for examining the vigorous impact of random disturbances on the variables system. In vector autoregression (VAR) test each value of variables are denoted by its own lagged values over the other variable available in the given variable system.

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[3] *https://doc.uments.com/h-stock-market-performance-and-economic-growth-empirical-evidence.pdf*

The econometric mathematical formula of VAR is represented as follows:
= A1Yt-1 + … + ApYt-p + Bxt + et (6)
Where Yt is a 'k' vector of endogenous variables, xt is a 'd' vector of exogenous variables, A1 …
Ap, 'B' are matrices of coefficients to be estimated, and et is a vector of innovations that may be concurrently correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.((Mohansundaram & Karthikeyan, 2015).

Granger Causality

The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x if x helps in the prediction of y or equivalently if the coefficients on the lagged x "s are statistically significant. It is pertinent to note that two-way causation is frequently the case; x Granger causes y and y Granger causes x.
In Granger's Causality, there are bi variate regressions of the under-mentioned form:
Yt = α0 + α1Yt-1 + …+α 1Yt-1 + β1 Xt-1 +…. +β1 Xt-1 + εt …….………..(12)
Xt = α0 + α1Xt-1+….+ α1 Xt-1 + β1Yt-1 +….+ β Yt-1 +μt…………..………..(13)
for all possible pairs of (X, Y) series in the group. Where εt and μt are two white noise random disturbance terms.
Garch Model

III.   Results and Findings
The normality test has been conducted for the data of FII and BSE stock indices. Jarque-Bera test has been applied for the normality of both data. Table 1 shows the results, along with the descriptive statistics. The skewness value (0) and kurtosis value (3) is considered as the data is normally distributed. Thus, the value of BSE indices is differing from the normality that is BSE (-0.35, 2.12) but FII (0.7, 3.03) that are near to normality. The probability of 0.03 and 0.09 indicates that the null hypothesis that is data is normally distributed is rejected for BSE but accepted for FII.

Table -1

Statistics	BSE	FII
Mean	0.24710	0.49215
Median	0.21544	0.41164
Maximum	0.41253	0.33781
Minimum	0.88916	-0.27622
Std. Dev.	0.78967	0.10997
Skewness	0.35400	0.07749
Kurtosis	2.124644	3.02723
Jarque-Bera	6.97145	0.12750
Probability	0.030632	0.93823
Sample size	118	118

Source: Data from www.finance.yahoo.com

After the test of normality, the next essential step is to verify whether the data used for the study has a unit root or not. The easiest and simplest way to check for stationarity is to plot a time series data graph and note the trends in mean and variance. Time series data is believed to have stationarity if the mean and variance of the time series are constant over the time period. The data series graphs are shown below of the stock-market indices which specify that stock-market indices are not moving around the constant mean and variance.

Figure-1
BSE Index time series
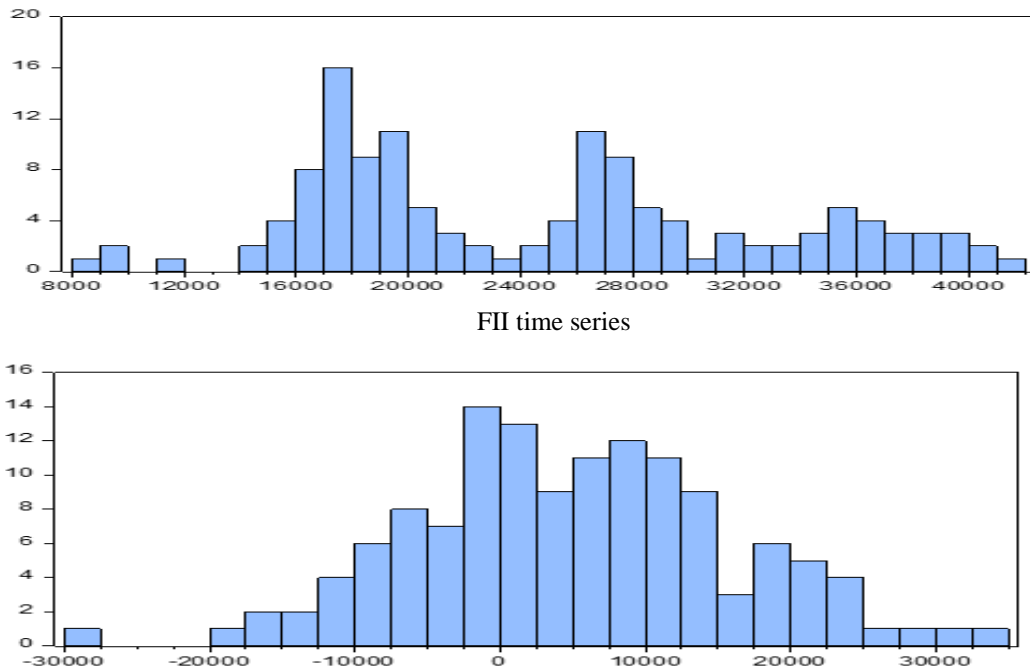
FII time series

Unit root test is applied in addition to the graphical inspection to decide the real nature of time series. For this, the Augmented Dickey-Fuller (ADF) is carried out to verify the stationarity of the time series data. The tests are carried out with the null hypothesis of non- stationarity (has unit root) for each data series and the results indicate both data series are at the non-stationary level and become stationary after first-order difference. The null hypothesis that data is non- stationary is rejected at 1st order difference in Augmented Dickey- Fuller (ADF) test. Moreover figure -2 shows the stationary time series graph after ADF test.

Table -2

Augmented Dickey – Fuller (ADF) test -Trends and Intercept				
Data Series	At level		At 1st order Difference	
	t- statistics	Prob.	t-statistics	Prob.
BSE	-0.573550	0.8715	-9.768045	0.0000
FII	-4.91582	0.0005	-5.238979	0.0002

Figure-2
Time series graph
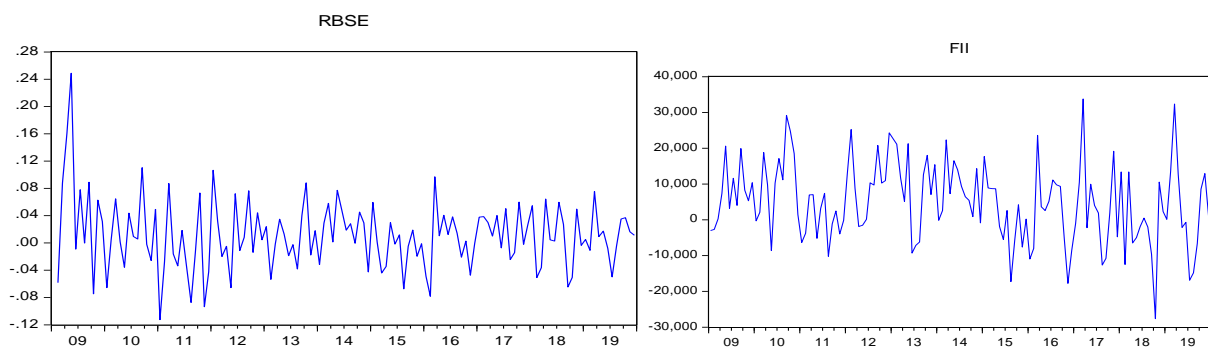
In Table-3 Durbin Watson econometrics test analyze the data and it is found that both time series data are positive auto corelated with their past value with considering error term. The p- value is less than 0.05 null

hypothesis that is there is no auto-correlation is rejected and both indices BSE and FII is positively correlated to themselves. Output value of Durbin Watson test are 1.9898 and 1.8979 respectively.

Table 3

Durbin Watson Test at 1st order test		
Data series	t-statistics value	Prob.
BSE	1.9898	0.00001
FII	1.8979	0.00001

A correlation test is carried out between the BSE and FII, that gives the preliminary insight into the existence of co- movement among the time series variables. Table- 4 displays the correlation between both markets indices.

Table-4
Correlation matrix between Nifty and Dow Jones

Indices	BSE	FII
BSE	1	0.49327
FII	0.49327	1

With the table -4 we can analyze that BSE and FII have a moderate positive association that is 49.32% percent, which indicates that both markets are following the same trends over the applicable period. In other words, there is moderate linear trends exists between BSE and FII This is because they may be sharing a common driving force.

A correlation between both markets (BSE and FII) provide a motivation to further analysis is their past value of one markets sufficient factor for prediction of the future and present value to other stock indices. That is calculated through the Granger causality test. The results of Granger Causality test is widely used for highly sensitive to the order of lags. For taking of optimum number of lags that is required for the analysis we used VAR lag order selection criteria. Table 5 shows the result.

Table-5
VAR Lags order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-1075.762	29.99347	149325.7	17.58962	17.72680*	17.64534
2	-1069.091	12.79878*	142990.3	17.54620	17.77483	17.63907*

*Indicate the lag length to be selected

Table-6
VAR Granger Causality/Block Exogeneity Wald tests

Null Hypothesis	F-Statistics	P-value	Decision on Ho
Dependent variable: BSE			
FII does not Granger cause BSE	0.300651	0.6819	Not Rejected
Dependent Variable: FII			
BSE does not Granger Cause FII	3.170128	0.0114	Rejected

The Granger causality test result indicates that the null hypothesis that is 'FII does not Granger cause BSE' is rejected, and 'BSE does not Granger cause FII' is rejected. This indicates that the FII can be used to forecast the BSE index as well as its own lags. In the given studies time series data BSE is non-stationary at the beginning (At level) and after the first-order difference become stationary and FII time series data is stationary from the beginning.
After that Johansen's cointegration test is applied for analysis of the long-term interlinkages between both stock indices.

Table-7
Johansen cointegration test

Unrestricted cointegration rank test (Trace)				
Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	0.05 Critical value	Prob**
None *	0.221050	31.97921	15.49471	0.0001
At most 1	0.001994	0.253497	3.841466	0.6146

| Unrestricted cointegration rank test (Maximum Eigenvalue)				
Hypothesized no. of CE(s)	Eigenvalue	Max-Eigen statistic	0.05 Critical value	Prob**
None	0.221050	31.72571	14.26460	0.0000
At most 1	0.001994	0.253497	3.841466	0.6146

* Rejection of null hypothesis at 0.05 level;
** Mackinnon, Haug & Michelis (1999) p-values

In Johansen's cointegration test, the presence of 1 cointegration equation is represented by the trace statistics value and no cointegration equation is represented by the Max-eigenvalue at 0.05 level. If critical value of the Johansen test is less trace statistics value and Max-Eigen value than the null hypothesis is rejected and p-value is less than 0.05. As above in both table critical value has significant value that is 15.49471 and 14.26460 and p- value is less that 0.05 that is 0.0001, 0.0000 respectively.

Variance Decomposition- It shows that BSE is not explained by FII. But BSE have a relevant impact in explaining FII. In short run BSE is explained by itself it means that other variable that is FII have no effect of forecast in BSE. That means it has strong exogenous impact. In long run BSE 99.36 percent explained by itself and 0.63 percent explained by FII that is very nominal. With such value we can concluded that in short and long run BSE has exogenous impact. Where as FII in short run and long run it explained by BSE 33.75105 and 37.08646 respectively. Which makes a strong conclusion that BSE has directly impact in forecasting of FII. That helps for investors in better portfolio management as well for policy making.

Variance Decomposition using Cholesky (d.f. adjusted) Factors

Variance Decomposition of RBSE

Variance Decomposition of FII
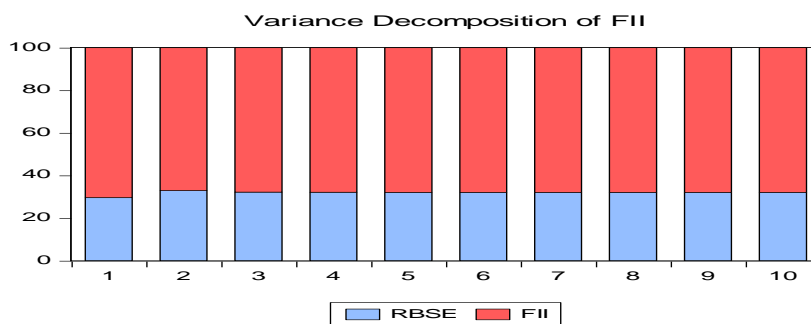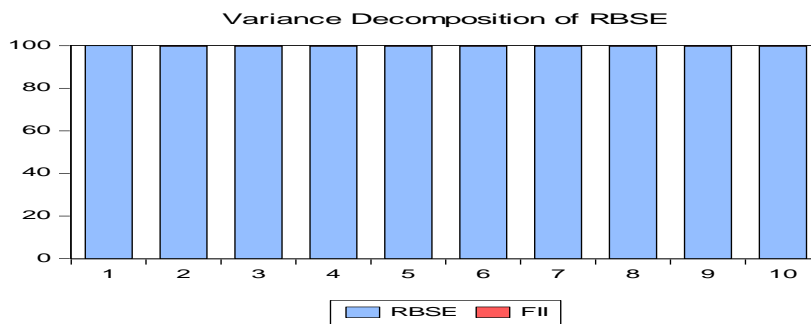
IV. Conclusion

The endeavor of this study to empirically investigated the relationship and degree of correlation between Indian stock markets and FII. Initially both market are non-stationary (Unit root Test) and converted in to stationary data after applying the Augmented Dicker Fuller (ADF) 1st order difference test. While analyzing

the autocorrelation (Durbin Watson test) on both BSE and FII. It is found that there is a strong positive auto correlation among the variables of both markets and they are highly correlated to each other. To examine the dynamics interlinkages between markets, Vector Autoregression (VAR) test has been applied that indicates that both market is predictable by their market variable movement. Hence the null hypothesis that there is no interlinkage between both the markets is rejected and both (BSE,FII) markets are highly correlated in short-run (Maran, Dhanaraj, Valadkhani & Chancharat) which means the stock market (BSE) is highly corelated to FII in short- run. But in long -run they are independent to each other. That provides a further investment diversification opportunity international market as well better prediction in different investments criteria.

FIIs not gave direct benefit as of creating real investment into a country but provides large amount of capital to a country through the capital market. FIIs growing participation is one of the most important feature of the Indian stock market development. FIIs played a critical role in increasing India's foreign exchange reserves. Many factors like rupee movement, interest rates, inflation, political situation and investment regulations influenced the FIIs investment which changed the Indian stock market face. FIIs are the trendsetters in any market because they were the first one who reacts accordingly to the international situations. Whenever the risk in international market were increase then FIIs pull back their investment into the home market. For a country it is very essential to pay attention towards FIIs in the economy and understanding its key feature to predict the chances of reversal of it.(Yadav, 2022)

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