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Stock Market Performance and Economic Growth: A Causal Relation

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Abstract
Stock market performance is often considered as an important factor affecting the economic performance of a nation, directly or indirectly. This paper investigates the causality between the activities or performance of the stock market and economic growth in India. Using data for the period 2011-12 Q1 to 2019-20 Q3, the study employed ARDL Test for determining the relationship between GDP at constant prices representing real economic activity and some measures of stock market activity namely: Market capitalisation, Market turnover and Net Investments by FIIs in the Indian capital market. The findings indicate that various stock market activities affect the economy in various ways and to different extents and they do not exhibit an unambiguous positive relation with the real economic activity.
Key Words: *Stock Market, Economic Growth, ARDL Test*

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I. Introduction

There exist extremely different views amongst the economists regarding the relationship between the phenomenon of financial development and economic growth, as being clearly indicated in the existing literature. The occurrences of several financial crises in different countries of the world, especially in their post financial liberalisation periods, give an indication that the finance growth relationship is not unambiguously positive.

Stock markets are some institutional arrangements that are closely observed not only by every industry but also by the government of a nation and its Central Bank. It is sometimes evident that a rising stock market is the sign of a developing industrial sector, but it has always remained an interesting question for researchers as to whether they help in the growth of the economy. Most studies have depicted a positive relationship between the various indicators of stock market performance and economic growth; however, such a relation is not always unambiguous.

Gadasandula, K. (2019) analysed the relation between four macroeconomic factors; Inflation, GDP, bank rate and exchange rate, and the Indian Stock Market (Nifty Index), the results indicating that there are significant causal associations between those factors and the Nifty Index.Nazir, M. S., et al. (2010) also suggested that the stock market performance indicators (four dependent variables) were significantly positive correlated with GDP per capita, in the context of Pakistan. Ho, Sin-Yu. (2018) also depicted similar findings in the context of Hong Kong. Petros, J. (2011) has attempted to show a relationship between stock market development and economic growth, in the economy of Zimbabwe for the period 1991 to 2007, the results indicating that there existed significantly strong positive correlation between the two in the short run as well as in the long run. Gürsoy, C. T. & Müslümov, A. (2000) examined the causal relationbetween the stock market and economic growth in the context of time series data summarized for 20 nations for the period 1981 to 1994 and indicated a bidirectional causal association between economic growth and stock market performance of nations in the long run, and a causation from economic growth to stock market development in the short run.

On the contrary, Singh, A. (1997) concludes that stock market development has been essential for both internal and external financial liberalization in 1980s to 1990s and is still continuing, but these developments are unlikely to assist in obtaining faster industrialization and quicker long term growth of the economy in many of the developing nations, due to varied reasons; it is not mandatory that stock market development results in economic growth. Similarly, Jarrett, J. E., et al. (2009) depicts that the Chinese financial market returns and the prices are not a reliable barometer of the changes in the country's economy and there is no proof that the SZ and the SH Granger cause economic prosperity in China.

Like any other financial market, stock markets operate through the channels of financial intermediation, diverting savings efficiently into productive investment opportunities. They ensure liquidity at

the same time providing avenues for higher returns, risk diversification, faster trading of stocks and huge market of resources for corporates. Thus, financial markets are expected to enhance business activities and can bepositively correlated with economic growth in a country.Caporale, G. M., et al. (2005), revisits the relationship between stock market development and economic growth by forming a theoretical basis to establish the channels by which these markets affect long run growth of the economy, and the findings indicates that through the channel of investment productivity, growth and development of the economy can be pushed up by share markets in less-developed countries in the long run. The results of Agarwal, S. (2001)showed that development in stock market development and investment are very much interrelated and in turn the former is linked with economic growth.

Higher returns and greater access to liquidity however, can bring down precautionary savings as these might seem more lucrative to the risk-taking investors. Also, interest rates may rise too high due to the incidence of huge volatility in stock market prices which may lead to inefficient resource allocation and greater unpredictability, thus resulting in compromises with the productive capacity as well as the quantity of investment thereby hindering economic growth. Nazir, M. S., et al. (2010) indicates that the size of the stock market is seen to depict a stronger positive relation or influence than liquidity on growth.

The Efficient Market Hypothesis suggests that an efficient capital market enables the prices of the securities to rapidly adjust by accommodating to any new information that is available.Hence, the current period prices of the securities should reflect all available information about the various aspects of the securities. It is in this context that it can be stated that movements or changes in stock prices should reflect future expectations corporate performance and corporate profits. If stock prices are effective in accurately reflecting the underlying fundamentals, then they can be used as leading indicators of future economic activities and economic growth, highlighting the causality between the macroeconomic variables and stock prices and its importance in policy making. However, Singh, D. (2010) showed that the prices in the Indian Stock Market did not always incorporate all the available information and thus not all macroeconomic variables cannot be used as a trading tool to earn supernormal profits in the nascent stock market of India. There exists "informational inefficiency" in the several markets influencing macroeconomic variables like WPI, exchange rate, etc. Mohtadi, H. & Agarwal, S. (2007), showed that in the long run an economy's growth and the stock market are related to one another positively; however, the value of share traded ratio is not a correct barometer of stock market liquidity because developing countries experience high volatility in their markets causing mispricing of shares.

With the end of 2019, there were various market experts in India who had raised the doubt regarding the stability of the bullish market stressing on the fact that this bullish trend indicated an apparent disconnect the stock market performance and the harsh economic realities faced by the country. The macroeconomic scenario indicated that India's GDP growth had declined sharply to six-year lows during the quarters of April-June and July-September of 2019-20, owing primarily to a fall in consumption demand. On the other hand, the Sensex touched the 41,000 mark for the first time ever and the Nifty surpassed the 12,100 mark. This situation in the context of the Indian economy indicated that the performance of stock markets and the macroeconomic performance can often change in opposite directions due to the fact that the investors and hence the financial markets are often affected by global developments and global fund flows. Moreover, it is alsothe fact that the investors and the markets are forward looking so that anyunfavourable news tends to get discounted very quickly in the markets, thus shifting the focus of governments and companies towards remedial actions. All these get reflected in the stock prices, often creating an unambiguous relation or a puzzle for the people who are outside the market ecosystem.

An opposite event was seen to happen during the year 2015-16, when the Indian economy grew at nearly 8 per cent, witnessing the highest rate of growth during the recent years and also during the entire decade, the stock markets performed terribly. The Sensex and the declined sharply moving into the bear territory in 2015, recording declines of 22.92 per cent and 21.99 per cent respectively by February, 2016. These events show that the idea of the stock market performance affecting economic growth of an economy seems to be a sufficiently debatable issue.

This paper attempts to examine the effect of stock market development on economic growth in the context of the Indian economy. Our results did not fully support the general notion of stock market development representing the economic condition of India. The stock market represents a vital part of our economic system but trends in markets cannot be treated as a basis for commenting on the economic condition of India.

II. Objective

The objective ofthe paper is to analyse and understand the effectof stock market activities upon real economic activity in the context of the Indian economy. GDP at Constant Pricesis considered to represent real economic activity and stock market activities are indicated by the variables - Market Capitalisation; Market Turnover and Net Investments made by Foreign Institutional Investors (FIIs) in the Indian Capital Market.

Analysis

Forthe analysis, an attempt has been made to find out the effect of changes in the selected stock market variables upon the variable GDP at Constant Prices, representing economic growth. The data on the selected variables are collected from the websites of the Central Statistical Organisation and the Reserve Bank of India, indicating that secondary data has been used for the analysis. The same has been attached in Annexure-1. Time series data have been taken on all these variables consisting of 35 time periods (or quarters) starting from Quarter 1 of the Financial Year 2011-12 to Quarter 3 of Financial Year 2019-20.

The variables considered for the purpose of analysis are explained here:

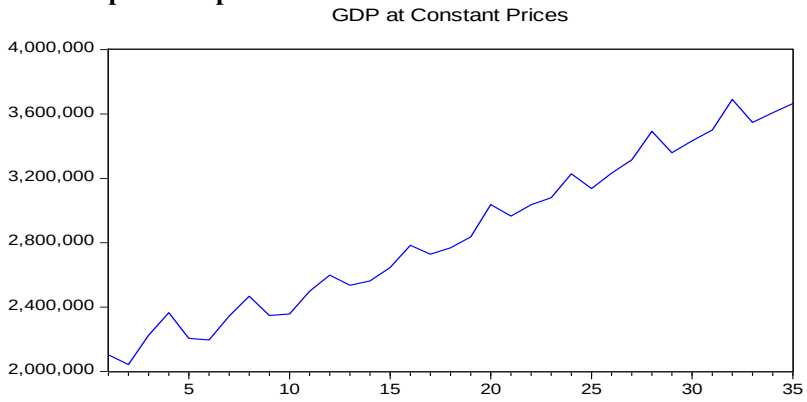
- ***GDP at constant prices***is also referred to as Real GDP and is calculated by taking into consideration the prices of some base year, thus adjusting for any price changes or inflation happening between the current year and the base year. Hence, GDP at Constant Prices represents the real economic activity;
- ***Market Capitalisation of BSE and NSE*** together refers to the sum total of all the shares listed for all the public enterprises that are traded on these exchanges multiplied with their respective share prices;
- ***Market Turnover of BSE and NSE*** together, for a time period, is calculated as the ratio of the total number of shares that were traded on these exchanges by the mean number of shares listed on the BSE and the NSE. It represents the liquidity prevailing in the market;
- ***Net Investments by FIIs*** into our country's capital markets refers to the difference between the investments made by foreign institutions in our stock market and the investments made by Indian institutions in foreign capital markets. Institutional Investors includes the likes of mutual funds, hedge funds, insurance companies etc.

Toconduct a Time Series Analysis, the first requirement is to check whether the time series variables are stationary or not i.e. whether they have a unit root or not. A time series analysis of the variables can be conducted only when all the variables are made stationary, i.e., there should not exist any trend for any of the variables, i.e., there should be no presence of unit root.

A time series data is said to be stationery if the mean and the variances of the variables remain constant over time.Also, the covariance depends on the time lag between two values of a variable, and not on the specific time periods chosen.

The Eviews software has been used for the analysis of the data.

Graph 1: Graphical Representation of the time series of GDP at Constant Prices



Graph 1 gives a clear indication that there is an increasing trend in the time series data of GDP at Constant Prices. However, to have a confirmation of the presence of trend in the data, the ADF test is conducted, the results of which are presented below.

Table 1: Augmented Dickey-Fuller Unit Root Test of GDP at Constant Prices

Null Hypothesis: GDP_AT_CONSTANT_PRICES has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.207818	0.4684
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP_AT_CONSTANT_PRICES)
Method: Least Squares
Date: 04/01/20 Time: 20:39
Sample (adjusted): 6 35
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_AT_CONSTANT_PRICES(-1)	-0.362386	0.164138	-2.207818	0.0375
D(GDP_AT_CONSTANT_PRICES(-1...	-0.234124	0.154899	-1.511460	0.1443
D(GDP_AT_CONSTANT_PRICES(-2...	-0.218169	0.151736	-1.437822	0.1640
D(GDP_AT_CONSTANT_PRICES(-3...	-0.383620	0.146084	-2.626021	0.0151
D(GDP_AT_CONSTANT_PRICES(-4...	0.489231	0.157238	3.111395	0.0049
C	758009.3	317839.6	2.384880	0.0257
@TREND("1")	18746.97	8373.502	2.238845	0.0351

R-squared	0.941356	Mean dependent var	48659.32
Adjusted R-squared	0.926058	S.D. dependent var	96653.36
S.E. of regression	26282.28	Akaike info criterion	23.39214
Sum squared resid	1.59E+10	Schwarz criterion	23.71909
Log likelihood	-343.8821	Hannan-Quinn criter.	23.49673
F-statistic	61.53307	Durbin-Watson stat	1.736834
Prob(F-statistic)	0.000000		

Table 1 represents the results of the ADF test conducted on the time series data of GDP at Constant Price (at levels). The t-statistic value (2.207818) of the ADF test indicates that its absolute value is less than the critical value(s) (particularly the critical value at the 5% level of significance) and the associated probability of this t-statistic value is much greater 0.05 (0.4684). These results indicate that the null hypothesis of the ADF test is accepted i.e., the time series data of GDP at Constant Prices has a unit root (the time series is non-stationary). Moreover, the second part of the table shows that the trend coefficient (18746.97) is statistically significant and much greater than 1. All these observations imply that the data is not stationary.

To undertake time series analysis, the non-stationarity should be removed and for this the first difference of the data on GDP at Constant Prices is considered, and again the ADF test is conducted.

Table 2 : Augmented Dickey-Fuller Unit Root Test of First Difference of GDP at Constant Prices

Null Hypothesis: D(GDP_AT_CONSTANT_PRICES) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.161905	0.4924
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP_AT_CONSTANT_PRICES,2)
Method: Least Squares
Date: 04/01/20 Time: 20:43
Sample (adjusted): 6 35
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP_AT_CONSTANT_PRICES(-1))	-1.325242	0.612997	-2.161905	0.0408
D(GDP_AT_CONSTANT_PRICES(-1),2)	-0.027747	0.462921	-0.059939	0.9527
D(GDP_AT_CONSTANT_PRICES(-2),2)	-0.275631	0.305912	-0.901014	0.3765
D(GDP_AT_CONSTANT_PRICES(-3),2)	-0.622818	0.156407	-3.982038	0.0006
C	57902.13	23297.29	2.485360	0.0203
@TREND("1")	325.4419	759.7880	0.428333	0.6722

R-squared	0.974590	Mean dependent var	7269.479
Adjusted R-squared	0.969296	S.D. dependent var	161645.2
S.E. of regression	28324.40	Akaike info criterion	23.51769
Sum squared resid	1.93E+10	Schwarz criterion	23.79793
Log likelihood	-346.7654	Hannan-Quinn criter.	23.60734
F-statistic	184.1001	Durbin-Watson stat	1.807503
Prob(F-statistic)	0.000000		

Table 2 represents the results of the ADF test on the first differences of the time series data on GDP at Constant Prices. The results reflected in this table can be interpreted in exactly similar way as in the case ofTable 1. Hence, comparing the value of the ADF t-statistic with the critical values, and considering the associated probability of the ADF t-statistic, we can conclude that the time series data on the first difference of GDP at Constant Prices is non-stationary (i.e., the null hypothesis of the presence of a unit root is accepted). Moreover, the second part of the table again shows that the trend coefficient (325.4419) is still much greater than 1, but not statistically significant.

The results of Table 2 indicate that the trend has not been removed through first differencing, and hence we should consider the second differencing of the data.

Table 3: Augmented Dickey-Fuller Unit Root Test of Second Difference of GDP at Constant Prices

Null Hypothesis: D(GDP_AT_CONSTANT_PRICES,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-36.00838	0.0000
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP_AT_CONSTANT_PRICES,3)
Method: Least Squares
Date: 04/01/20 Time: 20:44
Sample (adjusted): 6 35
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP_AT_CONSTANT_PRICES(-1),2)	-3.905053	0.108448	-36.00838	0.0000
D(GDP_AT_CONSTANT_PRICES(-1),3)	1.880003	0.079310	23.70457	0.0000
D(GDP_AT_CONSTANT_PRICES(-2),3)	0.949871	0.042537	22.33068	0.0000
C	15770.49	13671.98	1.153490	0.2596
@TREND("1")	-687.8183	640.4377	-1.073982	0.2931

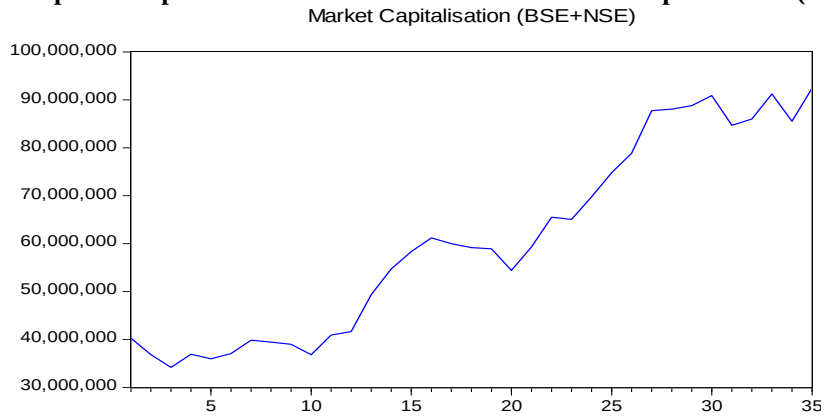
R-squared	0.990582	Mean dependent var	9959.006
Adjusted R-squared	0.989075	S.D. dependent var	290216.9
S.E. of regression	30334.27	Akaike info criterion	23.62896
Sum squared resid	2.30E+10	Schwarz criterion	23.86249
Log likelihood	-349.4343	Hannan-Quinn criter.	23.70366
F-statistic	657.3651	Durbin-Watson stat	2.122298
Prob(F-statistic)	0.000000		

Table 3 represents the results of the ADF test conducted on the second differences of the data on GDP at Constant Prices. The results highlight that the value of the ADF test statistic (36.00838) larger in absolute value than the critical value(s) particularly at 5% level of significance. Moreover, the associated probability with the ADF t-statistic value is less than 0.05, indicating that the null hypothesis is rejected, i.e., there is no presence of unit root. This implies that the data has now become stationary.

Moreover, the second part of the table shows that the trend coefficient (- 657.3651) has become less than 1 and the associated probability of (0.2931) indicates that the null hypothesis of the presence of unit root is rejected.

Thus, the trend in the data has been removed after take second differences, implying that our time series data on GDP at Constant Prices is Integrated of Order 2, i.e., I(2).

Graph 2: Graphical Representation of the time series of Market Capitalisation (BSE+NSE)



Graph 2 represents the time series data on Market Capitalisation in BSE and NSE taken together. This graphical representation indicates that there is not a clear increasing or decreasing trend over time. To confirm the presence or absence of a trend, we again conduct an ADF test, as shown in the following Table 4.

Table 4 : Augmented Dickey-Fuller Unit Root Test of Market Capitalisation (BSE +NSE)

Null Hypothesis: MARKET_CAPITALISATION__B has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.130634	0.0143
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MARKET_CAPITALISATION__B)
Method: Least Squares
Date: 04/01/20 Time: 20:53
Sample (adjusted): 5 35
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MARKET_CAPITALISATION__B(-1)	-0.575779	0.139393	-4.130634	0.0004
D(MARKET_CAPITALISATION__B(-1))	0.230121	0.168147	1.368572	0.1833
D(MARKET_CAPITALISATION__B(-2))	0.261446	0.170315	1.535072	0.1373
D(MARKET_CAPITALISATION__B(-3))	0.517347	0.170231	3.039095	0.0055
C	13789503	3282070.	4.201466	0.0003
@TREND("1")	1160769.	288104.6	4.028983	0.0005

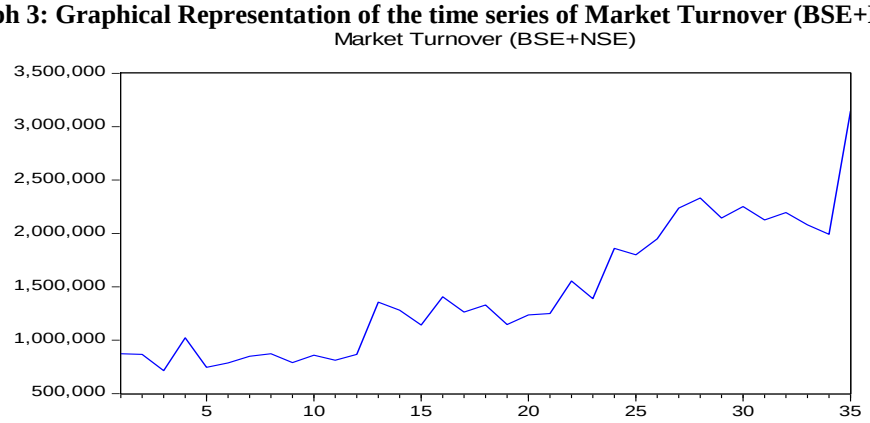
R-squared	0.456397	Mean dependent var	1791464.
Adjusted R-squared	0.347676	S.D. dependent var	3760386.
S.E. of regression	3037135.	Akaike info criterion	32.86271
Sum squared resid	2.31E+14	Schwarz criterion	33.14026
Log likelihood	-503.3720	Hannan-Quinn criter.	32.95319
F-statistic	4.197884	Durbin-Watson stat	1.712339
Prob(F-statistic)	0.006602		

The results of Table 4 represent that the absolute value of the ADF t-statistic (4.130634) is greater than the absolute value of the critical value at 5% level of significance (3.562882), and the associated probability of the ADF t-statistic (0.0143) is less than 0.05. These findings indicate that the null hypothesis is rejected at the 5% level of significance, implying that there is stationarity at this level of significance.

However, the second part of this table indicates that the value of the trend coefficient is still positive, but this is significant only at the 1% level of significance.

Hence, concentrating on the 5% level of significance, we conclude that the time series data on Market Capitalisation (BSE +NSE) is stationary, i.e., there is no presence of unit root or trend. Thus, this series is integrated of order zero, i.e., I(0) at the 5% level of significance.

Graph 3: Graphical Representation of the time series of Market Turnover (BSE+NSE)



Graph 2 represents the time series data on Market Turnover in BSE and NSE taken together. This graphical representation also does not indicate clearly the presence of increasing or decreasing trend over time. To confirm the presence or absence of a trend, we again conduct an ADF test, as shown in the following Table 5.

Table 5: Augmented Dickey-Fuller Unit Root Test of Market Turnover (BSE +NSE)

Null Hypothesis: MARKET_TURNOVER__BSE_NSE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.033452	0.1384
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MARKET_TURNOVER__BSE_NSE)
Method: Least Squares
Date: 04/01/20 Time: 21:07
Sample (adjusted): 2 35
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MARKET_TURNOVER__BSE_NSE(-1)	-0.606731	0.200014	-3.033452	0.0049
C	275020.0	132435.9	2.076627	0.0462
@TREND("1")	36430.43	10825.55	3.365228	0.0021

R-squared	0.268318	Mean dependent var	66886.36
Adjusted R-squared	0.221113	S.D. dependent var	266734.8
S.E. of regression	235405.8	Akaike info criterion	27.66011
Sum squared resid	1.72E+12	Schwarz criterion	27.79479
Log likelihood	-467.2218	Hannan-Quinn criter.	27.70604
F-statistic	5.684065	Durbin-Watson stat	1.743372
Prob(F-statistic)	0.007889		

Like the previous cases, the results of Table 5 indicate that the null hypothesis is accepted and hence there is the presence of a unit root i.e., a trend is present in the data at levels. Hence, we consider the first difference of the data and again conduct the ADF test.

Table 6: Augmented Dickey-Fuller Unit Root Test for First Difference of Market Turnover (BSE +NSE)

Null Hypothesis: D(MARKET_TURNOVER__BSE_NSE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.925309	0.0254
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

*MacKinnon (1996) one-sided p-values.

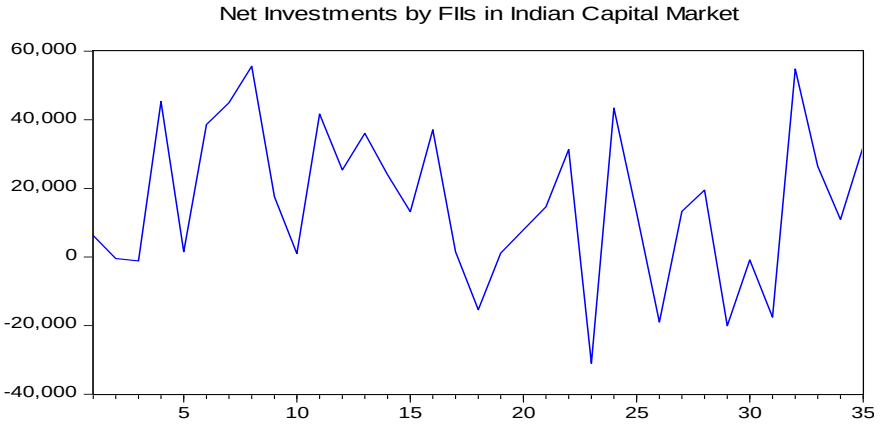
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MARKET_TURNOVER__BSE_NSE,2)
Method: Least Squares
Date: 04/01/20 Time: 21:08
Sample (adjusted): 10 35
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MARKET_TURNOVER__BSE_NSE(-1))	-5.819906	1.482662	-3.925309	0.0012
D(MARKET_TURNOVER__BSE_NSE(-1),...	4.031546	1.349036	2.988465	0.0087
D(MARKET_TURNOVER__BSE_NSE(-2),...	3.563322	1.234396	2.886692	0.0107
D(MARKET_TURNOVER__BSE_NSE(-3),...	3.415520	1.096092	3.116088	0.0067
D(MARKET_TURNOVER__BSE_NSE(-4),...	3.193219	1.019126	3.133293	0.0064
D(MARKET_TURNOVER__BSE_NSE(-5),...	2.637270	0.902758	2.921349	0.0100
D(MARKET_TURNOVER__BSE_NSE(-6),...	1.663138	0.682872	2.435506	0.0269
D(MARKET_TURNOVER__BSE_NSE(-7),...	0.520680	0.373010	1.395890	0.1818
C	-114832.3	161173.3	-0.712477	0.4864
@TREND("1")	21064.42	8439.803	2.495843	0.0239

R-squared	0.745705	Mean dependent var	47595.86
Adjusted R-squared	0.602665	S.D. dependent var	397517.9
S.E. of regression	250573.5	Akaike info criterion	27.98462
Sum squared resid	1.00E+12	Schwarz criterion	28.46850
Log likelihood	-353.8000	Hannan-Quinn criter.	28.12396
F-statistic	5.213240	Durbin-Watson stat	1.808097
Prob(F-statistic)	0.002091		

The results of the ADF test presented in Table 6 indicates that the null hypothesis is rejected at the 5% level of significance because the absolute value of the ADF t-statistic is greater than the absolute critical value at the 5% level of significance (also the probability associated with the ADF t-statistic is less than 0.05). Hence, the data series at the first differences has become stationary and is said to be integrated of order 1, i.e., I(1) at the 5% level of significance.

Graph 4: Graphical Representation of the time series of Net Investments by FIIs in the Indian Capital Markets



Graph 4 gives a clear indication that there is no trend in this time series data on Net Investments by FIIs in the Indian Capital Markets. However, in order to have a confirmation of this stationarity or absence of trend in the data, we need to conduct the ADF test, the results of which are presented below.

Table 7 : Augmented Dickey-Fuller Unit Root Test of Net Investments by FIIs in the Indian Capital Markets

Null Hypothesis: NET_INVESTMENTS_BY_FIIS_ has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.765106	0.0002
Test critical values:	1% level	-4.252879	
	5% level	-3.548490	
	10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NET_INVESTMENTS_BY_FIIS_)
Method: Least Squares
Date: 04/01/20 Time: 21:12
Sample (adjusted): 2 35
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NET_INVESTMENTS_BY_FIIS_(-1...	-1.043849	0.181063	-5.765106	0.0000
C	24833.07	9116.860	2.723862	0.0105
@TREND("1")	-463.1693	410.3368	-1.128754	0.2677

R-squared	0.517470	Mean dependent var	763.2848
Adjusted R-squared	0.486339	S.D. dependent var	32013.28
S.E. of regression	22943.96	Akaike info criterion	23.00359
Sum squared resid	1.63E+10	Schwarz criterion	23.13827
Log likelihood	-388.0611	Hannan-Quinn criter.	23.04952
F-statistic	16.62237	Durbin-Watson stat	1.983203
Prob(F-statistic)	0.000012		

The results of the ADF test presented in Table 7 indicates that absolute value of the ADF t-statistic (5.765106) is greater than the absolute critical values, and the associated probability is less than 0.05 (0.0002). Moreover, the second part of the table indicates that the trend coefficient is significantly less than 1. These results imply that the series is stationary that is there is no unit root or trend; the series is integrated of order zero I(0).

Choice of the Model

These analyses of the stationarity of the time series data of the four variables indicate that the variables are integrated of different orders, as follows:

a) GDP at Constant Prices that is considered as the dependent variable is integrated of order 2, i.e., I(2) at all levels of significance;

b) Market Capitalisation (BSE + NSE), which is one of the independent variables, is stationary, i.e., I(0) at the 5% level of significance;

c) Market Turnover (BSE + NSE), the second independent variable is integrated of order 1, i.e., I(1) at the 5% level of significance; and

d) Net Investments of FII in Indian Capital Markets, the third independent variable is stationary, i.e., I (0), at all levels of significance.

Considering these cases, we consider the Auto-Regressive Distributed Lag Model to determine the probable effects of the independent variables (representing stock market activity) on the dependent variable (representing real economic activity)

Table 8 : ARDL Test

Dependent Variable: GDP_AT_CONSTANT_PRICES
Method: ARDL
Date: 04/01/20 Time: 22:10
Sample (adjusted): 2 35
Included observations: 34 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): MARKET_CAPITALISATION__B MARKET_TURNOVER__BSE_NSE NET_INVESTMENTS_BY_FIIS_
Fixed regressors: C
Number of models evalulated: 8
Selected Model: ARDL(1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP_AT_CONSTANT_PRICES(-1)	0.721618	0.119279	6.049826	0.0000
MARKET_CAPITALISATION__B	-0.001623	0.005415	-0.299759	0.7667
MARKET_CAPITALISATION__B(-1)	0.014642	0.005120	2.859894	0.0082
MARKET_TURNOVER__BSE_NSE	-0.005134	0.079961	-0.064204	0.9493
MARKET_TURNOVER__BSE_NSE(-1)	-0.218568	0.132471	-1.649932	0.1110
NET_INVESTMENTS_BY_FIIS_	2.033316	0.746397	2.724175	0.0114
NET_INVESTMENTS_BY_FIIS_(-1)	-1.507640	0.711640	-2.118545	0.0438
C	361552.7	164540.5	2.197347	0.0371

R-squared	0.980407	Mean dependent var	2877338.
Adjusted R-squared	0.975132	S.D. dependent var	492758.4
S.E. of regression	77705.99	Akaike info criterion	25.56158
Sum squared resid	1.57E+11	Schwarz criterion	25.92072
Log likelihood	-426.5468	Hannan-Quinn criter.	25.68405
F-statistic	185.8580	Durbin-Watson stat	2.138450
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Table 8 represents the results of the Auto-Regressive Distributed Lag Model (ARDL Model), which is the model applied for regression analysis of our time series data. Since our independent variables are not integrated of the same order and moreover our dependent variable is integrated of order 2, we cannot apply the OLS Method or the Co-integration Method.

The results show that GDP at Constant Prices is taken as the dependent variable and the regressors are Market Capitalisation, Market Turnover and the Net Investment by FIIs in Indian Capital Market. The method

used to select an appropriate model is the Akaike info criterion (AIC) and the Eviews software evaluated 8 models before selecting the ARDL (1, 1, 1, 1) model implying that we will consider a lag of 1 period for each of our variables along with their levels data.

The values of the coefficients of the regressors and the associated probabilities indicate the following : GDP at Constant Prices (-1) has a statistically significant positive effect on the dependent variable; it is interesting to note that Market Capitalisation (-1) has a statistically significant positive effect on the dependent variable, but Market Capitalisation of the current time period has no statistical influence; it is also notable that Market Turnover at levels or with 1 period lag, have no statistical influence on the dependent variable, i.e., the GDP at Constant Prices, implying stock market trading does not have any appreciable influence on the real economic activity; Net Investments by FIIs of the current period has a statistically significant positive effect on the dependent variable but Net Investments by FIIs (-1) has a statistically significant negative effect.

The last part of the table indicates that the R-squared and adjusted R-squared values are high and the F-statistic is statistically significant, indicating the goodness of fit of the selected model.

Now, the ARDL test should be accompanied with the ARDL Bounds test the results of which indicate whether a long-term relationship prevails between the variables, i.e., whether the variables are co-integrated. A necessary condition for conducting the ARDL test is that there is no co-integration or long-run relationship between the variables. Table 9 represents the results of the ARDL Bounds Test.

Table 9: ARDL Bounds Test

ARDL Bounds Test
Date: 04/01/20 Time: 22:12
Sample: 2 35
Included observations: 34
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	1.742433	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Test Equation:
Dependent Variable: D(GDP AT CONSTANT PRICES)
Method: Least Squares
Date: 04/01/20 Time: 22:12
Sample: 2 35
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MARKET CAPITALISATION B)	-0.014642	0.005120	-2.859894	0.0082
D(MARKET_TURNOVER__BSE_NS...	0.218568	0.132471	1.649932	0.1110
D(NET_INVESTMENTS_BY_FIIS_)	1.507640	0.711640	2.118545	0.0438
C	361552.7	164540.5	2.197347	0.0371
MARKET_CAPITALISATION__B	0.013019	0.005550	2.345787	0.0269
MARKET TURNOVER BSE NSE	-0.223702	0.157781	-1.417800	0.1681
NET_INVESTMENTS_BY_FIIS_	0.525676	1.030154	0.510289	0.6142
GDP_AT_CONSTANT_PRICES(-1)	-0.278382	0.119279	-2.333873	0.0276

R-squared	0.554451	Mean dependent var	45945.30
Adjusted R-squared	0.434496	S.D. dependent var	103332.4
S.E. of regression	77705.99	Akaike info criterion	25.56158
Sum squared resid	1.57E+11	Schwarz criterion	25.92072
Log likelihood	-426.5468	Hannan-Quinn criter.	25.68405
F-statistic	4.622145	Durbin-Watson stat	2.138450
Prob(F-statistic)	0.001808		

The null hypothesis of the ARDL Bounds Test considers that there is no long-term relationship between the variables. The results indicate that the F-statistic value is less than the I0 Bound values that indicate that the null hypothesis is accepted and this satisfies the necessary condition (no co-integration or long-run relationship between the variables) for conducting the ARDL Test.

III. Conclusion

The results of the analysis indicate that the GDP at Constant Prices of any quarter is positively and significantly affected by the GDP at Constant Prices of the previous quarter, which is quite usual in the context of India, which is one of the EMEs of the world. We observed that increase in Market Capitalisation or Net Investments by FIIs in the Indian Capital Market of any quarter significantly affects the GDP at Constant Prices of the next quarter in a positive manner which is again in alignment with the theoritical findings that whenever there are more listing of the shares in the Stock Exchange (leading to rise in Market Capitalisation) it means either opening of new corporates in the country or expansion of business by existing corporates which are two of the main growth drivers of a country's economy. Also when there is increase in investments by FIIs in India it implies inflow of overseas captal in the country leading to an increased competitiveness and better performance of corporates and this is how this factor also improves the economic growth of India. However, a finding also shows that Net Investment by FIIs in the Indian Capital Markets during any quarter has a significant negative relation with the GDP at Constant Prices of the next quarter, which may be due to the volatile nature of this investment. Now coming to the most important finding, we see that Market Turnover doesn't significantly affect GDP at Constant Prices of the same quarter or the following quarter which empirically shows that stock market trading did not reflect the economic condition in India.

The economic growth in India is thus not being unambiguously affected by the stock market activities. The various stock market activities affect the economic growth in different ways and to different extents. Thus, the study concludes that stock market activities do not exhibit an unambiguous positive relation with the real economic activity.

Recent measures in our economy like cutting of corporate taxes, cutting repo rates and increasing government expenditures have been taken up in an attempt to raise demand but unfortunately these measures are without much success.The problem of rising NPAs of banks, low deposit rates and plans for merger of numerous public sector banks have lead to operational uncertainty and bleeding for the banking sector. Although the government has taken good measures like the introduction of the IBC yet it should focus on sectoral reforms especially of the banking and the NBFC sector. Land and labour reforms should be made and a more decentralised planning approach should be followed. The RBI in December last year, decided not to undertake further quantitative easing but to engage in twin open market operations to increase long term availability of funds so that the long term interest rates fall and the businesses are pushed to pursue long term investment plans. The fundamentals of the economy should develop along with the fundamentals of the stock markets, in which case we can establish a more unambiguos positive relation between the stock market performance and economic growth.

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