Relationship between Stock Market Development and Economic Growth

Empirical Evidence from India

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Abstract: This study has been undertaken to investigate how stock market development affects economic activity which is a question of both policy and academic significance. This study makes an attempt to analyze the direction of relation between securities market development and economic process in the Indian economy. Authors employ ADF and PP check to search out the order of integration of the variables used in the study. The paper applies ARDL bound testing approach to search out the proof of cointegration and to analyze the long-run and short run relation between the variables. Results indicate that there is a unidirectional causality flowing from stock market growth towards Indian GDP. These results are validated by studying impulse response function and variance decomposition exercise.

I. INTRODUCTION

The relationship between stock market development and economic growth is multi-faceted and researchers have not come to any consensus over this relationship. There are various theories that try to explain the nature of interaction between stock market development and economic growth. These theories fall under four rubrics:

i) SUPPLY-DRIVEN HYPOTHESIS

This view acknowledges that financial markets largely affect the economic functioning of a region; they competitively allocate financial resources that are mobilized from savers and investors among users in the economy of that region. A well-functioning financial market facilitates movement of funds from financial surplus areas to financially deficit area. Adequate financial resources in the most productive sector of the economy are pivotal for the economic development and this is where the role of a well-functioning stock market and financial market comes into the picture. Without financial markets they would have to buy entire pieces of capital. Stock markets allow investors to hold a small share in a large number of firms, thereby allowing risk associated with individual project investment to get spread over a large number of small investors. By facilitating diversification, financial intermediaries allow the economy to invest relatively more in the risky productive technology. This spurs economic growth.

ii) DEMAND-DRIVEN HYPOTHESIS

Another perspective can be that the relationship runs from economic growth towards stock market development. This hypothesis states that as an economy develops, economic agents start participating more in equity markets will lead to an increase in demand for the stock market services, which leads to an increase in stock market valuation.

iii) BI-DIRECTIONAL RELATIONSHIP BETWEEN ECONOMIC EXPANSION & FINANCIAL SECTOR

This view stresses on the bi-directional relationship between stock market development and economic growth. It recognizes that while stock market development facilitates the fund movement in the economy hence spurring economic growth, at the same time it acknowledges that economic growth provides the required economies of scale to make financial intermediation a profitable venture.

iv) NIL OR NEGATIVE EFFECT OF STOCK MARKET DEVELOPMENT ON REAL SECTOR

The view was propagated by (Keynes, 1936) which state that as stock market health improves it can turn stock market into a casino due to excessive speculative behavior by investors. These kinds of speculative behaviors can lead to excessive fluctuations and can deteriorate economic health. This was witnessed in India in two major scams caused by stock brokers in 1992 and 2000 by Harshad Mehta and Ketan Parekh respectively.

Hence stock market development and economic growth have a complex relationship; it may vary for different economies. This paper is trying to understand the relation between the two from Indian context. To resolve the issue the paper applies ARDL bound testing approach to search out the proof for cointegration and to analyze the long run and short run relation among the variables. The paper is organized as follows: section 2 reviews the existing literature on finance and economic growth, paying particular attention to the empirical methods. Section 3 discusses the methodology applied to causality testing which we adopt for the empirical analysis and lays down the variables and data sources employed. Section 4 presents the empirical evidence. Paper ends with concluding remarks.

II. LITERATURE REVIEW

The debate on whether or not or not monetary markets promote economic process has been a remarkable topic that has prompted tremendous empirical studies. Financial markets played pivotal role in emergence of, not only modern economies, but also of European imperialism in the 15th century (Harari, 2011). Christopher Columbus after repeated rejection by Portugal, Italy, France, managed to lobby Queen Isabelle of Spain to finance his fleet that would sail westward to find a new route to East Asia.

Columbus' discoveries enabled the Spaniards to conquer America and rest is history. (Gurley, 1955) studied the relationship between financial markets and real activity. They argue that financial markets help borrowers extend their financial capacity and improve trade efficiency and concluded that financial markets contribute to economic development through enhancing physical capital accumulation. Further studies by (Goldsmith, 1969), (McKinnon, 1973) found that development of financial market spurs economic activity. This argument for stock market development is supported by various empirical studies, such as (Levine, What we have learned about policy and Growth from Cross Country Regression?, 1993), (Atje, 1993) (Levine, Stock Markets, Banks and Economic growth, 1998). Similarly, (Rousseau, 2000) and (Beck, 2000) demonstrated that stock market development is strongly correlated with growth rates of real GDP per capita. (Olweny, 2011) investigated the relationship for Kenya and found that causality is unidirectional from financial markets to economic performance.

The demand-driven hypothesis proposed by Friedman (1963) argues that economic growth gives rise to financial centers and hence concluded that financial development is endogenously determined by the real economy. Similarly, Chakraborty (2007) showed the causality runs from growth rate of real GDP to stock market capitalization. Mishra (2016) found that the economic growth spurs development of stock market for China's B share market. On the other hand, studies like Prakash (2012) for India economy found bi-directional causality between the financial sector and the real sector. Further, Arestis (2001), Demetriades (1996), Luintel (1999) found that economic growth causes the stock market development and vice-versa. Tuncer (2000) investigated the nexus between stock market and economic growth for 21 countries and demonstrated bi-directional relationship between stock market development and economic growth. Shahbaz (2008) found similar results for Pakistan.. The empirical results show bidirectional causality between market capitalization and economic growth.

Some studies like that of Lucas (1988) suggested that there is no causal relationship between financial sector and the real economy. However, the assumption of no transaction costs and perfect information paved way for such result which is not possible in the current world. Prakash (2012) scrutinized Indian Stock Market and found that the market is marred by excessive volatility; he conjectured that the oligopolistic manipulations and scams were the driving factors behind high volatility in Indian Stock market. Similarly, Demirgüç-Kunt (1996), argued that too much liquidity would increase investment returns and reduce savings rates, this will cause precautionary savings to decline caused by uncertainty brought by the greater liquidity. Singh (1997) investigated the role of stock markets towards long run economic growth in the 1980s and 1990s for developing countries and found that long run economic growth does not show dependency towards the stock market. A study by Harris (1997) on forty-nine countries for the period 1980- 1991, found out that there is no significant relationship between the stock market and economic growth. There is therefore varied literature about the relationship which does not point in one direction, the relation therefore varies from economy to economy and has to be studied for specific cases.

III. METHODOLOGY

This paper has adopted the methodology from Shahbaz, Ahmad and Ali (2008) paper, which studied the causality between stock market development and economic growth for Pakistan. The paper studies the dynamic relation by finding the direction of causality between GNP per capita and market capitalization as a share of GDP over a period of 1971-2006. They first used the Augmented Dicky Fuller and Ng-Perron test to find the order of integration of the two variables. ARDL bound testing techniques are applied along with Engle-Granger causality to investigate causal linkages in the long-run and short-run dynamics are captured through ARDL Granger-Causality tests.

The findings suggested that there is a long-run relationship between stock market development and economic growth for Pakistan. Engle-Granger-Causality estimation confirms the bi-directional causality between stock market development and economic growth in case of Pakistan in the long-run, but in the short-run, the causality runs only one-way, i.e., from stock markets development to economic growth. This paper uses the methodology to study the relationship between stock market development and economic growth for the Indian economy. Given below is a short description of the techniques used in the paper.

Augmented Dickey Fuller (ADF) test is used to test stationarity of the variables, which tests for a unit root. Following equation checks the stationarity of time series data used in the study:

$$\Delta y_t = \beta_1 + \beta_2 \mathrm{t} + \delta y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta y_{t-1} + \varepsilon_t$$

Where $y_t$is the variable under consideration and$\varepsilon_t$is white noise error term.

If the value of the calculated ratio of the coefficient is less than the critical value from the cumulative distribution table provided by Fuller (1976), then y is said to be stationary. However for small sample data set, these tests seem to over-reject the null hypothesis when it is true and accept it when it is false, hence the test is not reliable (Dejong et al, 1992 & Harris, 2003). Two new tests, i.e., Dicky-Fuller Generalized Least Square (DF-GLS) and Ng-Perron could solve the problems of data size and power properties. In this paper we use the Ng-Perron test where the null hypothesis is unit root, same as ADF test.

There are various econometric techniques to investigate cointegration among macroeconomic variables in the literature. With regards to univariate cointegration some techniques like Engle-Granger (1987) and FMOLS procedures of Phillips and Hansen (1990) can be used. For multivariate cointegration, techniques of Johansen (1988); Johansen & Juselius (1990); and Johansen (1995) has been used. More recent studies have indicated that the ARDL approach (Pesaran and Shin, 1995, 1998; Pesaran et al., 1996; Pesaran et al., 2001) to cointegration is preferable to other conventional techniques such as Engle and Granger (1987), and Gregory and Hansen (1996) as it is applicable irrespective of the underlying variables are purely I(0), purely I(1) or mutually co-integrated. Another reason being that it performs better for small sample sizes (such as in this study) as compared to other techniques.

The ARDL approach has two steps for estimating the long run relationship (Pesaran et al,2001). The first step is to investigate the existence of a long run relationship among all the variables. The ARDL method estimates $(p+1)^n$ number of regressions in order to obtain optimal lag length for each variable, where p is the maximum number of lags to be used and n is the number of variables in the equation. The second step is to estimate the long-run relationship and short-run bidirectional causality. If the computed F-statistics is greater than the upper bound critical value, we reject the null hypothesis of no cointegration and conclude that there exists steady state equilibrium between the variables. If the computed F-statistics is less than the lower bound critical value, then we cannot reject the null of no cointegration. If the computed F-statistics falls within the lower and upper bound critical values, then the result is inconclusive. The equations involved are given by:

$$\Delta y = \alpha_o + \sum_{i=1}^{m} \alpha_2 \Delta Y_{t-i} + \sum_{i=0}^{m} \alpha_3 \Delta X_{t-i} + \alpha_4 Y_{t-i} + \alpha_5 X_{t-i} + \varepsilon_1$$

$$\Delta x = \beta_o + \sum_{i=1}^{m} \beta_2 \Delta X_{t-i} + \sum_{i=0}^{m} \beta_3 \Delta Y_{t-i} + \beta_4 X_{t-i} + \beta_5 Y_{t-i} + \varepsilon_2$$

ε_1& ε_2 are error terms in the models. The first part of both equations with α_2 , α_3 andβ_2, β_3 represents the short-run dynamics of the models whereas the second part with α_4, α_5, and β_4,β_5 represent the long-run phenomenon. The null hypothesis in the equation α_2=α_3= 0, means the non-existence of the long-run relationship in first equation and vice versa, while the null hypothesis in the equation β_2= β_3= 0, means non-existence of the long run relationship in the second equation and vice versa.

The third stage is conducting the standard **Granger causality tests** augmented with a lagged error-correction term. The Granger representation theorem suggests that if there exists a cointegration relationship among the variables (integrated of order one) there will be Granger causality at least in one direction. Engle-Granger (1987) cautioned that if the Granger causality test is conducted at first difference through vector auto-regression (VAR) method than it will be misleading in the presence of cointegration. Therefore, an inclusion of an additional variable to the VAR method such as the error-correction term would help us to capture the long-run relationship.

VARIABLES AND DATA SOURCE

As given in Shahbaz, Ahmad and Ali (2008) paper studying the long-run and short-run causality between stock market development and economic growth for Pakistan using two variables i.e. Log of GNP and log of market capitalization, on the similar lines the paper tries to analyze the short run and long run relationship using variables log of GDP and log of BSE 500 index collected for each quarter from the third quarter of 1999-00 till third quarter of 2018-19. The S&P BSE 500 index comprises the large-cap, mid-cap and small-cap companies. It is a comprehensive index that tries to measure the performance of the Indian stock market. This index represents nearly 93% of the total market capitalization of BSE. It covers all 20 major industries of the economy. The data for S&P BSE 500 has been collected from the official website of the Bombay Stock Exchange and for GDP data has been collected from the official website of Ministry of Statistics and Programme Implementation.

IV. EMPIRICAL EVIDENCE AND RESULTS

UNIT ROOT TESTS

First unit estimation shows that both variables are having unit root problems at the level form and are stationary at 1st difference level. We relied on the stationarity evidence of ADF, and PP test.

Variables	ADF-Test		PP Test	
	Level	First Difference	Level	First Difference
Log (GDP)	0.9360	0.0023***	0.9693	0.0001***
Log (BSE 500)	0.7450	0.0000***	0.8421	0.0000***

Table 1: Unit Root Estimation
Note: (***) shows significance at 1%

In Table 1, we see that both the variables, LGDP (Log of GDP) and LBSE (Log of BSE 500 index) have unit roots. We see that we have failed to reject the null hypothesis of non-stationarity, when variables were used in their level forms for both the tests and for both variables. The P-Values for Log (GDP) and Log (BSE) exceed 70% in both ADF test and PP test, when the level form of variables is used. Hence, we can safely conclude that LGDP and LBSE both possess a unit root. On the other hand, when both the variables are put through the unit root tests in first- difference forms, we see that it is safe to reject the hypothesis of non-stationarity in favor of alternate hypothesis that is there is stationarity for both the variables. The P-Values for Log (GDP) and Log (BSE) are well below 0.2% in both ADF test and PP test, when the first difference forms of the variables are used. Hence, we can say that LGDP and LBSE are I (1).

ARDL BOUNDS TEST FOR COINTEGRATION

Dependent Variable	F statistic	Critical Values		
D (Log GDP)	8.149218*** Actual sample size- 77 Lags- 5	Critical values for sample size= 70		
			Lower Bound	Upper Bound
		10%	3.12	3.623
		5%	3.78	4.327
		1%	5.157	5.957
Dependent Variable	F statistic	Critical Values		
D (Log BSE 500)	3.863362* Actual sample size- 77 Lags- 2	Critical values for sample size= 75		
			Lower Bound	Upper Bound
		10%	3.133	3.597
		5%	3.777	4.32
		1%	5.26	5.957

Table 2: ARDL long run form and Bounds test
Note: ***(*) shows significance at 1%(10%)
Critical values are obtained from EViews

We see in the table that when D (LGDP) is the dependent variable the F statistic of bound test exceeds the upper bound of 3.623 at all the levels of significance. Also, when D (LBSE) is the dependent variable we see that F-statistic of the bound test exceeds the upper bound at 10% level of significance, lies between upper and lower bound at 5% level of significance and lies below the lower bound at 1% level of significance. Hence, we can say that at 10% percent level there is a co-integrating long-term relationship between Log (GDP) and Log (BSE).

TEST FOR LONG-RUN AND SHORT-RUN CAUSALITY

	F statistics	
Dependent Variables	**Log GDP**	**Log BSE 500**
Log GDP	-	**20.48396** (0.0004)***
Log BSE 500	**4.375325** (0.3576)	-

Table 3: Granger-causality based on VAR model for long-run
Note: Probability values are given in parentheses. (***) shows significance at 1%

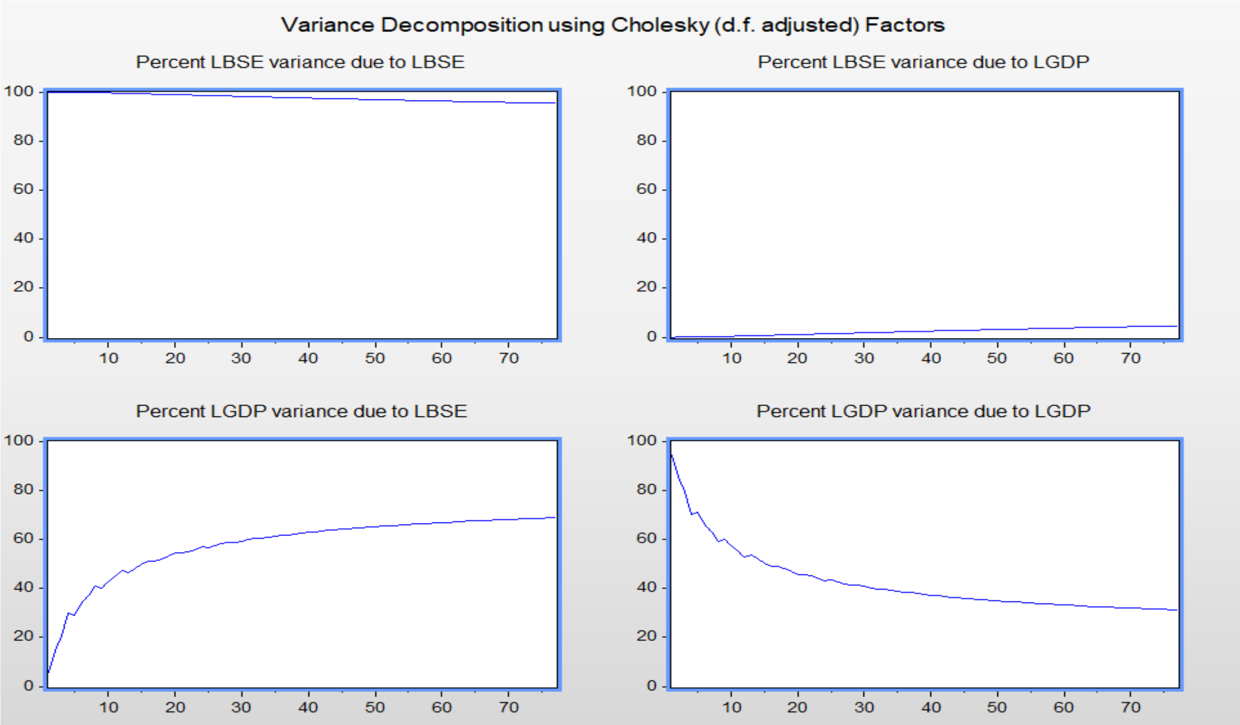
From table-3 we can infer that LBSE granger causes LGDP but LGDP does not granger cause LBSE at any level of significance (p value greater than 35percent). Hence, we can say that there is a unidirectional causal relationship from LBSE to LGDP.

	F statistics	
Dependent Variables	**D (Log GDP)**	**D (Log BSE 500)**
D (Log GDP)	-	**3.628980** (0.4585)
D (Log BSE 500)	**3.190467** (0.5265)	-

Table 4: VEC Engle Granger Causality for Short run

From table-4 we find that granger causality based on VECM model provides evidence for no granger-causality either ways. We see that there is no short-run causality flowing from D(LBSE) to D(LGDP) as is evident from p-value of 45 percent. Similarly in the other case we see that when the dependent variable is D(LBSE), p-value of the F-statistic is 52 percent. Hence we see that there is no short-run causality flowing from D(LGDP) to D(LBSE).

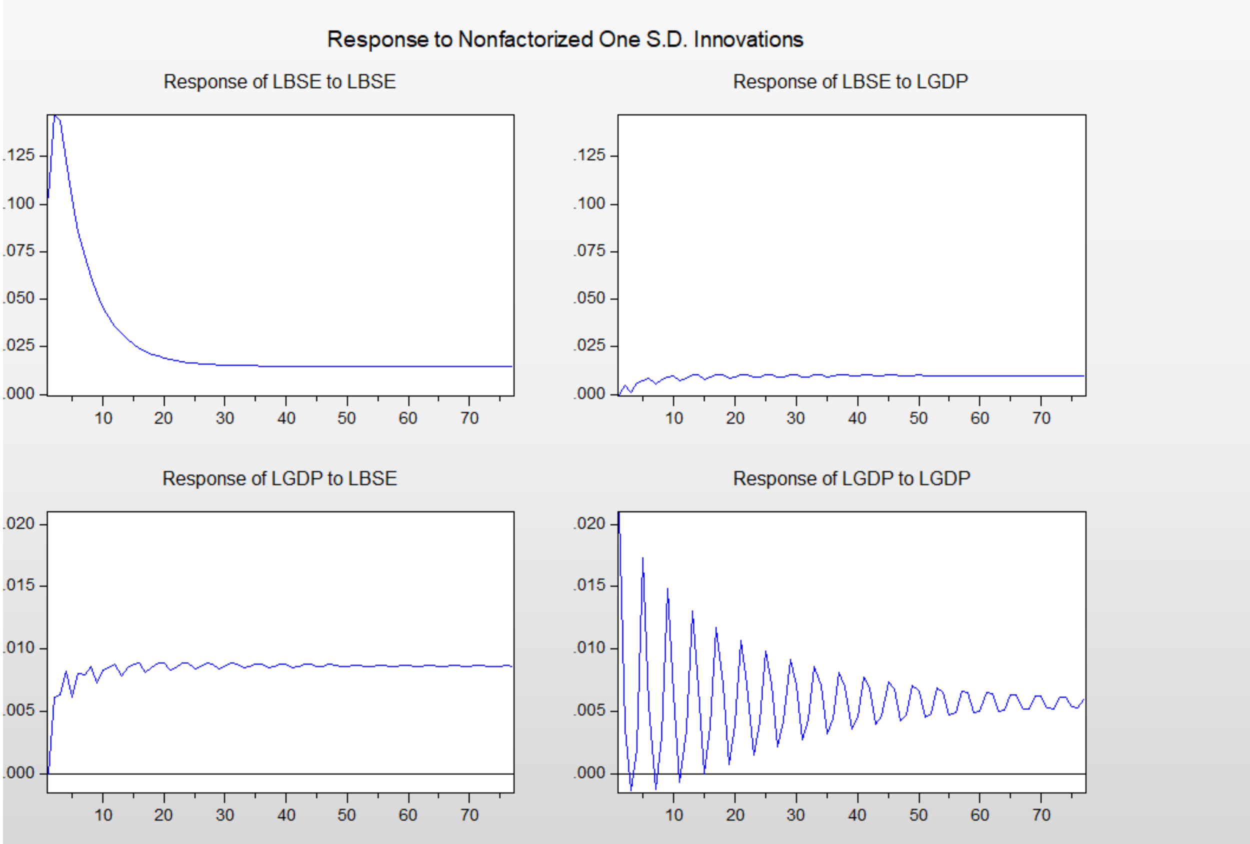
VARIANCE DECOMPOSITION AND IMPULSE RESPONSE FUNCTION



Graph-1: Variance Decomposition analysis

From graph-1 we can infer that percentage of variance in LBSE due to LBSE is almost 100% throughout the 77 quarters in our study but the same percentage due to LGDP is close to zero throughout the period of study. On the other hand percentage of variance in LGDP due to LBSE has constantly increased throughout the period of study and after the 20th quarter the majority of variation in LGDP was due to LBSE while the percentage of variance in LGDP due to LGDP has decreased continuously in our period of study.

This variance decomposition analysis shows that a large percentage of variation in LGDP is being explained by LBSE, this reinforces the results of granger-causality test that there is a unidirectional relationship flowing from LBSE to LGDP.



Graph-2: Impulse response function

We see in Graph-2 that the response of LBSE to one S.D. innovation in LBSE has stayed below .125 throughout the period of study and was reduced to below .025 after 20 quarters but has not completely died. The response of LBSE to one S.D. innovation in LGDP was never very high and has stayed well below 0.01 throughout. Similarly the response of LGDP to innovations in LBSE has stayed well below 0.01 throughout the period of study, while its response to one S.D. innovation in LGDP has followed a "saw-toothed" pattern throughout the period with response falling from .02 to .005 between 1st and last quarter. Hence, we see that innovations in both the variables affect the other variable and effect doesn't die down completely even after 70 quarters.

Impulse Response Function reinforces the idea that there is a co-integrating relationship between log(GDP) and log(BSE 500) evident from that the response of one variable to one S.D. innovation in other variable does not die completely even after 70 quarters. Also, we see that Variance decomposition analysis reinforces the idea that there is one way causality from log(BSE 500) to log(GDP) evident from the fact that the majority of variance in LGDP has been explained by LBSE but not vice-versa. But, the analysis of impulse response functions shows that innovations in both the variables affect the other variable and the response does not die down completely even after 70 quarters.

ECONOMIC INTERPRETATION AND CONCLUSION

One of the most interesting debates in economics is whether stock market development causes economic growth or whether it is a consequence of increased economic activity. The present study investigates the direction of causality between stock market development and economic growth in the Indian economy. Using the cointegration tests and Impulse response function analysis for the period December 1999 to December 2018, the study confirms a well-defined long-run equilibrium relationship among the stock market development indicator and economic growth in India. Besides, the Granger causality test based on VAR model in level form shows unidirectional long-run causality flowing from stock market development proxy i.e. BSE 500 index to economic growth. These findings are confirmed by variance decomposition analysis of the VAR model. By and large, it can be inferred that the stock market development indicators viz. BSE 500 have a positive influence on economic growth in India. Therefore, the present study recommends that the capital market regulators i.e. SEBI should implement effective policy frameworks towards the development of Indian stock market in order to substantially enhance the functioning of the Indian stock market which in turn leads to increased economic activity. Further, the government should prioritize the development of the stock market through relaxing laws and of the listing requirements for investors so as to encourage more market participants on the stock exchange and thus increases competition and quality of securities investments resulting in a significant influence on economic growth in India.

APPENDIX

Given below are the estimates for VAR model for Causality taken from Eviews:

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LGDP)
Selected Model: ARDL(5, 0)
Case 2: Restricted Constant and No Trend
Date: 05/19/19 Time: 13:23
Sample: 1 77
Included observations: 72

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.458272	0.161600	2.835833	0.0061
LGDP(-1)*	-0.045889	0.016455	-2.788816	0.0069
LBSE**	0.025599	0.008903	2.875265	0.0055
D(LGDP(-1))	-0.444746	0.103447	-4.299270	0.0001
D(LGDP(-2))	-0.476047	0.103393	-4.604239	0.0000
D(LGDP(-3))	-0.425709	0.101903	-4.177574	0.0001
D(LGDP(-4))	0.418672	0.101603	4.120669	0.0001

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LBSE	0.557856	0.062725	8.893691	0.0000
C	9.986528	0.511876	19.50966	0.0000

EC = LGDP - (0.5579*LBSE + 9.9865)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.149218	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
Actual Sample Size	72		Finite Sample: n=75	
		10%	3.133	3.597
		5%	3.777	4.32
		1%	5.26	5.957
			Finite Sample: n=70	
		10%	3.12	3.623
		5%	3.78	4.327
		1%	5.157	5.957

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