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Research article

Does measure of financial development matter for economic growth in India?

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Abstract: The present study examines the impact of financial development on economic growth in India by using Auto-Regressive Distributed Lag (ARDL) model and the Generalized Method of Moment (GMM) model over 15 years from June 2003 to February 2018. The results of the study indicate that financial development has a positive and significant impact on economic progression both in short run and long run in India. The CUSUM test confirms the long-run stability relationship among them. Therefore, the study proposed that financial sector deepening should push ahead to augment economic growth of India. The outcomes of the study contribute to understanding the factors, which determine the economic and financial development competitive position. To foster economic and financial development, the suitable and harmonizing action required by both firms and policymakers. This study has a substantial impact on global and institutional investors to make better investment decisions in India.

Keywords: financial development; economic growth; ARDL Cointegration Test; GMM Model; CUSUM Test

JEL Codes: C23, C58, E44, E51

1. Introduction

The link between economic and financial development has been a topic of interest for academicians, researchers, and policymakers for the last three decades. Financial progression is essential to economic growth, and economic progress necessitates an efficient sound financial system. A developed financial system is critical for the country to exploit resources efficiently. Supply leading hypothesis postulated that financial development has a positive impact on economic growth (King and Levine, 1993; Patrick, 1966) and argued that financial sector development resulted in inflow of funds, increased savings, resourceful allocation of investments, plummeting the transaction costs, managing risk, improves the efficacy of financial institutions; promote financial innovation and favorable regulatory environment. Eventually, all these factors contribute to the overall development of an economy. Rajan et al. (1998) and Habibullah et al. (2006) also supported this hypothesis. Schumpeter (1911) pointed out that the banking system plays a significant role in the allocation of savings, encouragement of innovation, and funding of productive investments, which is a crucial factor for economic growth. Levine (2005) advocated that financial institutions and markets mobilizing savings from a large number of investors, monitoring expenditure and carrying out corporate governance, processing investment projects for apportionment of savings for productive uses, diversifying liquidity and reducing the intertemporal risk for fostering savings and investment decision of economic growth.

On the contrary, the demand following hypothesis argued that economic growth causes financial development and growth of the financial sector increases with the result of the demand created by the economic development of a country. Financial development responds to economic growth (Robinson, 1952; Gurley and Shaw, 1955; Goldsmith, 1969; Patrick, 1966). Odhiambo (2008) established demand following hypothesis empirically. The feedback hypothesis preached by Lewis (1955) expounded that financial and economic growth are causally related, and supported both supply leading and demand following hypotheses (Demetriades and Hussein, 1996; Greenwood and Smith, 1997). So far, whether financial development causes economic progress or economic growth causes financial advancement is not yet resolved. The empirical evidence found by the researchers is mixed.

Further, the concurrent financial crises increased the importance of research to find out the association between economic and financial development. To fill this gap, a modest attempt has been made to relook the long run relationship between economic and financial progress in India by using Auto-Regressive Distributed Lag (ARDL) model and Generalized Method of Moment (GMM) model. The paper is organized as follows: section two articulates literature review, section three presents the methodology and data used. Section, four divulges the empirical results. The concluding observations and managerial contribution offerings in section five.

2. Literature review

Cheng (1999) applied the Granger causality test and cointegration test to examine the empirical relationship between financial and economic progress in Korea and Taiwan. The result showed that economic and financial development depended on each other. Darret (1999) also used both cointegration test and Granger causality test to document the relationship between economic and financial progress in the middle- east countries, which included Saudi Arabia, Turkey and the United Arab Emirates (UAE). The study found financial development is a leading indicator of economic

growth in three countries and reveals the stable relationship between economic and financial development. Gan (2006) explored the association between macroeconomic factors and the New Zealand stock market, discovered that the New Zealand stock market is not a leading indicator for changes in macroeconomic variables. Empirical evidence found no causality exists between financial and economic development. Kenourgios and Samitas (2007) finding a positive relationship between finance and economic growth for Poland and indicates that credit to the private sector is one of the powerful forces of long-run growth.

Abu-Bader and Abu-Qarn (2008) found a causal relationship occurs between financial and economic progression in Egypt, Morocco, and Tunisia, respectively. Humpe and Macmillan (2009) deliberated the long-term relationship between stock market movements and macroeconomic variables in the United States of America and Japan, indicating US stock prices influenced positively by industrial production while negatively by inflation. In Japan, stock prices positively integrated with industrial production, whereas negatively related to the money supply, the rate of inflation. Regmi (2012) used Johansen and Juselius, and VECM Granger causality method to assess the impact of financial development on economic growth. The study used stock market capitalization as a proxy for financial development. The study established the positive contribution of financial development on economic growth. Bittencourt (2012) explored the association between financial and economic progress of four Latin American countries. The study suggested the significance and impact of financial progress on economic growth. Hsueh et al. (2013) examined the causal relationship between financial and economic development among ten Asian countries. The study found the direction of causality between finance and growth is sensitive to the financial development indicators. Narayan and Narayan (2013) found confirmation that neither the financial sector nor the banking sector contributes to economic growth for the Middle Eastern countries. Zouheir Abida et al. (2015) explored the causal relationship between financial and economic growth in Tunisia, Morocco, and Egypt by using the Generalized Method of Moment (GMM) model. The study found the presence of a robust positive link between financial and economic progress. Dilek Durusu et al. (2017) determine the contribution of the credit market and stock market development on the economic growth of 40 selected countries by using the Solow–Swan growth model. The findings implied that financial development plays a significant role in economic growth for the majority of sample countries. Vassiki and Richard (2017) observed the relationship between financial and economic growth in the Ivory Coast by using a Common Component Analysis (CCA). The study found the unidirectional causal link between economic and financial development.

The paper endeavours to discover the long run association between economic and financial development of India by using the ARDL model. Secondly, the study used the Generalized Method of Moments (GMM) to corroborate the relationship. Thirdly, the CUSUM test employed to check the long-run stability of the relationship between them. The hypothesis articulated as follows: H0: Financial Development does not have a significant impact on Economic Growth, H1: Financial Development does have a significant impact on Economic Growth.

3. Data and methodology

The time series monthly data has taken for the study from June 2003 to February 2018. Since the interest of the study is to find the longer-term effect of financial and economic growth, the present study deals with data covering 15 years. Due to a data availability issue, missing data points,

and need of maintaining a balanced data, data sample year restricted to initiate from June 2003. The selected study period comprises boom period, financial crises period, recessionary period, and experienced a new political regime in economic and financial sector development.

Financial progression involves the interface of many activities and institutions. Both banks and stock markets are playing a significant role in India for financial development. Financial development captured through two perspectives: financial depth and financial efficiency. Financial depth measured through savings and deposits. The banks play a leading and appropriate role in promoting financial development by mobilizing the financial resources of the public and makes them available for investment in productive enterprises. Bank credit increases the speed of the process of economic development of the country by providing loan to the industries in time. On the other hand, economic growth encourages credit expansion through its demand for financial services. The relationship between the bank and economic growth is of practical significance in policymaking. The financial efficiency is the ability to perform as a principal role of transforming deposits to credits. (Asongu, 2012). An improvement in the performance of the stock market is a signal of the growth of the overall economy.

The development of the stock market facilitates channelizing savings into productive investments, which lead to an increase in economic growth. Usually, stock market growth examined with market capitalization and BSE Sensex. BSE Sensex included the top 30 companies according to market capitalization approach and measured as an indicator of the growth of the overall stock market. BSE offered various services to stock market participants and reached to the investors around the globe. Similarly, Volumes of trade considered as an indicator of stock market development since stock prices need volume to move. The high volatility of stock prices arises because of volume volatility and trading activities. Bank credit, bank deposit, BSE Sensex, BSE volume of trades, and BSE market capitalization are used as a proxy for financial development.

The Index of Industrial Production (IIP) measures the changes in the volume of production of industrial products and the growth rate of industry groups. It shows the status of industrial activity such as industrial activity has improved, declined, or remained the same. Indian IIP mainly focuses on the Manufacturing, Mining, and Electricity sector with the most significant weight given to the Manufacturing sector, i.e., 75 percent. It also focuses on use-based industries, namely Basic Goods, Capital Goods, and Intermediate Goods. The objective of IIP is to capture the direction and the trend of industrial production of the country, which in turn has an impact on the policy decision making. The IIP took as a proxy for real economic growth.

The study used two control variables such as inflation and export to import ratio to observe the strength of the association between financial development and economic growth. Inflation is one of the critical parameter concerning policy decisions of the Indian Government. Changes in inflation influences economic policies to tighten that lead to increasing the nominal risk-free rate and affects the bank. The efficiency of the financial sector gets worse due to the high rate of inflation through financial market frictions and slows the economic performance down. The inflation is taken as a proxy for the Consumer Price Index.

The ratio of export to import defines the trade balance of a country. It measured by dividing the value of export of goods and services by the amount of import of products and services. If imports more than exports, it can distort the country's balance of trade and undervalue their currency. The currency value, in turn, is one of the most significant elements of a nation's economic performance.

The financial and economic growth variables calculated as continuously compounded return using the given formula:

$$R_t = \ln \frac{P_t}{P_{t-1}} \quad (1)$$

To evade the problem of heteroscedasticity of the error terms, all the variables in the study are converted to natural logarithms before analysis. Similarly, to check the multicollinearity amongst the variables, the correlations between the explanatory variables examined.

To test the presence of panel unit roots, Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-type tests using ADF and PP tests (Maddala and Wu (1999) and Choi (2001)), and Hadri (2000) statistics are used in the study.

3.1. Auto-Regressive Distributed Lag (ADRL) model

Several latest research studies indicate that the ARDL approach is more superior to conventional co-integration techniques since it allows the co-integration link can be assessed once the lag order of the model is identified. The technique can be used irrespective of whether the underlying regressors are pure I(0) or I(1) or mutually co-integrated. It accepts that it is very robust and applicable, even with the restricted sample size data. Secondly, a dynamic unrestricted error correction model can be derived from the ARDL bounds testing approach, which deals with the combination of short-run dynamics with the long-run equilibrium without losing any long-run information. The present study uses the Autoregressive Distributed Lag (ARDL) bounds testing approach to estimate the short and long-run relationships among the variables which are developed by Pesaran and Pesaran (1997), Pesaran and Shin (1999) and Pesaran et al. (2001). ARDL avoids the potential bias associated with unit roots and cointegration tests.

In the ARDL model, auto-regressive means the concerned variable is assumed a function of the past values of itself and the current and past values of other variables called distributed lag. ARDLs are represented with the symbolization ARDL (p,q), where p represents several lags of the different variable, q is the number of lags of the explanatory variables. At least one lagged term in explanatory variables is called dynamic regressor. Under this method, if the variables cointegrated, there exists a stable long-run relationship between them. The ARDL model involves estimating the following model:

$$\Delta \ln IIP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta \ln IIP_{t-i} + \sum_{j=0}^{q} \alpha_{2i} \Delta \ln FD_{t-j} + \sum_{k=0}^{r} \alpha_{3i} \Delta \text{lnexport to import ratio}_{t-k} + \sum_{l=0}^{s} \alpha_{4i} \Delta \ln INF_{t-l} + \delta_1 \ln IIP_{t-1} + \delta_2 \ln FD_{t-1} + \varepsilon_t \quad (2)$$

where Δ is the first difference operator, t represents time, ln stands for natural logarithm, p, q denote the lag length, αo is the drift, and εt the white noise error term assumed serially uncorrelated, IIP denotes proxy for real economic growth, FD signifies financial development variables, EI ratio represents export to import ratio, INF connotes inflation. α1i, α2i represents short-run dynamics while δ1 and δ2 represents long-run coefficients

F-test conducted for the joint significance of the coefficients to test the long-run relationship between variables. The null hypothesis in equation H0: $\delta 1 = \delta 2 = 0$ suggesting the absence of long-run relationship and an alternative hypothesis of cointegration H1: $\delta 1 \neq \delta 2 \neq 0$

Pesaran et al. (2001) formed two sets of critical variables. It assumed by one set that all variables are I (0), and another set thinks that all variables are I (1). If the F-statistic value is more than the upper critical value of the bound, the null hypothesis can be rejected signifying long-run

cointegration relationship. When the F-Statistic value is less than the lower critical value of the bound, the null hypothesis of no cointegration accepted. The result is inconclusive if the statistic value is in between the lower and upper critical values

Once the long-run relationship among variables established, then optimal ARDL model used to compute the static short-term spillover and long-term spillover coefficients between economic and financial development. This enables to assess whether financial development leads to economic growth or economic growth leads to financial growth. The Akaike Information Criterion (AIC) and Schwarz Bayesian Information criterion are used to select the optimal lag length.

The ARDL model as follows:

$$\Delta \ln IIP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta \ln IIP_{t-i} + \sum_{j=0}^{q} \alpha_{2i} \Delta \ln FD_{t-j} + \sum_{k=0}^{r} \alpha_{3i} \Delta \text{lnexport to import ratio}_{t-k} +$$

$$\sum_{l=0}^{s} \alpha_{4i} \Delta \ln INF_{t-l} + {}_1 ECT_{t-1} + {}_t \quad (3)$$

The Error correction term coefficients capture the speed of adjustment towards long-term equilibrium. If the coefficient is negative and statistically significant, it signposts that the dependent variable changes back to its equilibrium following a shock in the short run.

Due to structural changes in the Indian economy, it assumed that economic variables might be exposed to one or various operational disruptions. Thus, the study used the CUSUM test to check the stability of the long run relation between financial and economic development. The CUSUM test is the stability test usually used to determine the recursive residuals of variables. The test investigates parameter instability if the aggregate sum goes outside the area between the two critical lines.

3.2. Generalized Method of Moment (GMM) model

The study used GMM model developed by Arellano and Bover (1995), to resolve the problems of serial correlation, heteroscedasticity, and endogeneity of explanatory variables. The explanatory variable may correlate with the error term, hence the explanatory variable used as instruments to resolve the problem of serial correlation. The reliability of GMM depends upon the validity of the instruments used in the study. Hence, the study used Sargan Hansen J-a test of over-identifying moment conditions and serial correlation to prove or reject the null hypothesis for the validity of instruments. If it fails to reject the null hypothesis, it gives support to the model. The study also uses AR (1), and AR (2) test to test the error term is not serially correlated and if it fails to reject the null hypothesis, it back to the model.

4. Empirical analysis

The descriptive statistics of IIP, Inflation, Exchange rate, BSE Sensex, BSE market capitalisation, BSE volumes of trade, Bank deposits, Bank credits, Import to Export ratio are presented in Table 1.

Table 1. Descriptive statistics.

Variable	Mean	Median	Standard Deviation	Skewness	Ex. Kurtosis	Jarque-Bera	Probability
IIP	0.004714	0.005470	0.022475	0.387444	4.761354	27.15399	0.000000
Inflation	0.005566	0.005672	0.007782	0.538127	6.162838	81.85372	0.000000
BSE SENSEX	0.012778	0.012487	0.065353	−0.600339	5.725023	65.02743	0.000000
BSE Market Cap	0.017051	0.021271	0.073827	−0.666358	7.031175	132.1944	0.000000
Volumes of Trade	−0.001651	−0.003309	0.343407	−0.213968	14.88559	1037.302	0.000000
Bank Deposits	0.011941	0.008829	0.013351	0.945193	5.335516	72.04525	0.000000
Bank Credits	0.013747	0.011566	0.016992	0.786339	4.695290	39.21369	0.000000
Export to Import Ratio	−0.000611	−0.006879	0.104351	0.113369	3.750281	4.505098	0.055002

The mean, standard deviation, skewness, excess kurtosis, and Jarque-Bera estimates for the given variables are depicted in Table 1. All returns are calculated as the log of the monthly data. It observes that IIP, Inflation, Exchange rate, BSE Sensex, BSE market capitalization, Bank deposits, Bank credits, have depicted positive monthly mean return while BSE volumes of trade and import to export ratio shown negative mean return. The monthly mean return of BSE volumes of trade is negative but taking high risk in the economy. The BSE Sensex and BSE market capitalization are more volatile than other variables since the standard deviation of the variables are high in the study period. The kurtosis for all the variables is more than "3" (excess kurtosis) showing that they are leptokurtic. It shows that the returns are not normally distributed. The Jarque-Bera statistic is much higher than the critical value and significant, rejecting the null hypothesis of normally distributed returns. It indicates that stock returns of all variables are non-normal distribution, confirms thick tails, and indicate the presence of Heteroscedasticity.

The trend analysis of all the variables such as IIP, bank deposits, bank credit, inflation, BSE Sensex, BSE market capitalization, BSE volumes of trade and export to import ratio are presented in figure 1. It is inferred from figure 1 that BSE volumes of trade are highly volatile in comparison to other variables. Export to Import ratio shows an upward and downward trend of average monthly return indicates the existence of volatility in series. However, it is observed that there is no such noticeable variability of returns visible in other variables.

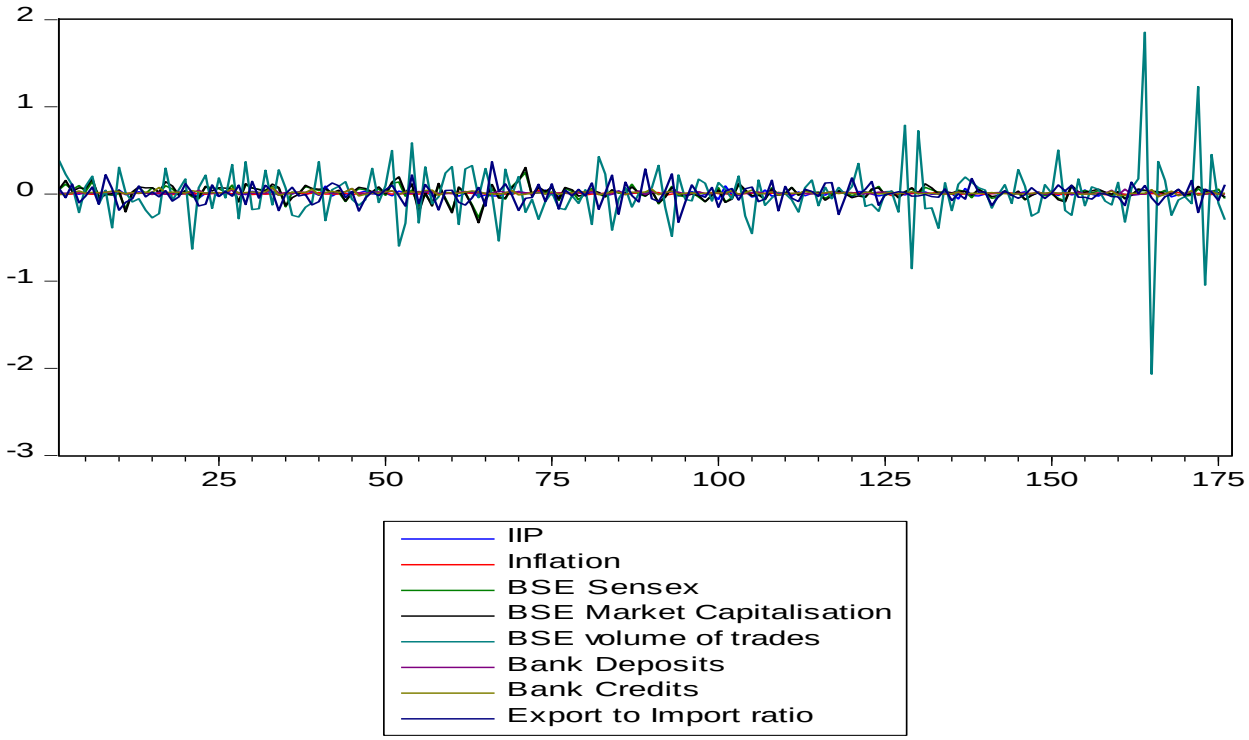

Figure 1. Time Series Plot of all the variables.

Table 2. Correlation matrix and VIF.

Variables	IIP	Inflation	BSE Sensex	BSE Market Cap	BSE VOL	Bank Deposits	Bank Credits	Export to Import Ratio	VIF
IIP	1								
Inflation	−0.0627	1							1.09
BSE Sensex	0.0574	−0.0304	1						1.25
BSE Market Cap	0.0748	−0.0576	0.9578	1					1.26
BSE VOL of trade	−0.1109	−0.0425	−0.0100	0.0086	1				1.06
Bank Deposits	−0.0119	−0.0380	−0.0220	−0.0512	−0.1710	1			1.72
Bank Credits	0.0393	−0.1986	−0.0118	−0.0493	−0.2183	0.6075	1		1.95
Export to Import Ratio	−0.0137	−0.1943	−0.0093	−0.0226	−0.0619	−0.0340	0.2801	1	1.19

Table 2 reveals the correlation between the various variables. A robust relationship is found between the growth of IIP and BSE Sensex, IIP and BSE market capitalization, and bank credits. The reason is due to increase production and investment activity, which typically financed by borrowings from banks. Therefore, if industrial production and capital spending are rising, there is an increase in the banking sector growth. If industrial production increases, investor and stock market become more

optimistic because companies' performance increases, which ultimately lead to an increase in the country's economic growth.

IIP is interrelated negatively with bank deposit, BSE volumes of trade, export to import ratio, and inflation. The reason is that an increase in inflation leads to rising prices, declining the purchasing power of money, reduces consumption and economic growth. Fluctuation in the exchange rate is an essential factor that affects economic performance, due to its impact on outputs, imports, export prices, interest rate, and inflation rate. Depreciation of domestic currency is distressing industrial output increasing the cost of imported raw materials, lead to doubling the cost of production and increase the unit cost. Higher unit cost makes manufacturing uncompetitive, which may ultimately lead to reducing the industrial output of firms.

Similarly, inflation is related adversely to BSE Sensex, BSE market capitalization, BSE volumes of trade, bank deposits, bank credits, and export to import ratio. Inflation curbs consumer savings, spending, and corporate profits. The negative relationship between inflation and bank deposits attributed to the fact that inflation increases the cost of living. People need more money for expenses, hence more withdrawals and lead to a reduction in the level of deposits. BSE Sensex is negatively related to bank deposits, bank credits, and export to import ratio. The results indicate that increasing investors' savings in banking activities affecting the stock market price. To overcome the problem of multicollinearity, the Variance Inflation Factor (VIF) is used. It indicates that VIF is less than eight, so no multicollinearity problem arises among variables.

Since there are a large number of interrelated variables, Principal Component Analysis employed to reduce the dimensionality of a data set and maximize the variance of a linear combination of variables.

Table 3. Principal components analysis.

Eigenvalues: (Sum = 5, Average = 1)			
Principle Component	Eigen Value	% of Variance	Cumulative %
1	1.957897	0.6526	0.6526
2	1.000183	0.3334	0.9860
3	0.041920	0.0140	1.0000
Eigenvectors (loadings):			
Variables	Factor Lodgings	Communalities	Factor score
BSE Sensex	0.707111	−0.009071	0.707044
BSE Market Capitalisation	0.707101	0.010534	−0.707034
BSE Turnover	−0.001035	0.999903	0.013863

Table 3 reveals the results of the Principal Component Analysis. From the eigenvalues, the first PC shows 65.26 percent of the standardized variance; the other PC labels approximately 33.34 percent, the third PC explains about 1.4 percent. BSE Sensex is the leading indicator that demonstrates the variation of dependent variables. Hence, the study restricted to BSE Sensex as proxies for stock market development.

Before cointegration analysis, it is essential to test the order of integration of all variables whether they are stationary. Hence, the panel unit root tests are performed on the level data series.

Table 4. Panel unit root tests.

	Statistic	Prob.**
Levin, Lin & Chu t*	−34.6879	0.0000
Breitung t-stat	−16.1238	0.0000
Hadri Z-stat	4.64918	0.0000
Im, Pesaran and Shin W-stat	−33.3712	0.0000
AD-Fisher Chi-square	581.963	0.0000
PP-Fisher Chi-square	573.654	0.0000

The study employs unit root tests, and the output presents in the Table 4. All the variables are tested for stationarity using Levin, Lin and Chu, Breitung, Hadri, Im, Pesaran and Shin, ADF-Fisher $\chi 2$, and PP–Fisher $\chi 2$ tests. Levin, Lin and Chu, Breitung, Hadri unit root tests assume common unit root process and autocorrelation coefficients of the tested variables across cross-sections are identical whereas Im, Pesaran and Shin, ADF-Fisher $\chi 2$ and PP–Fisher $\chi 2$ tests based on individual unit root process assumption and autocorrelation coefficients are vary across cross-sections. The lag values are selected using the Akaike information criterion (AIC) criterion. The results of unit root test signpost that the first difference of all the variables used in the study are stationery, the null hypothesis is rejected and support the contention that variables under analysis are all I(1) variables.

Autoregressive distributed lag (ARDL) model or bounds testing approach is estimated to test the existence of a long-run relationship between financial and economic growth.

Table 5. Bounds Test for Co integration (Dependent variable Δ ln IIP).

K	F-Statistic	Level of significance	I (0)–Lower Bound	I (1)–Upper Bound
5	23.71408	1%	3.06	4.15
		5%	2.39	3.38
		10%	2.08	3

Note: *, ** and ***denote statistical significance at 1%, 5% and 10% respectively.

Table 5 shows that F-statistics value is 23.71408, which is higher than the upper bound value at one percent level of significance. Hence, the null hypothesis rejected, indicating the presence of a long-run relationship among variables (co-integration). Therefore, industrial production, which acts as proxies' for real economic growth, integrated with financial development, suggesting that if the financial development upsurges, it leads to economic growth.

Table 6 presents the estimated long-run coefficients. It indicates that the stock market and bank credit are positively affecting economic growth while bank deposit, inflation, and export to import ratio negatively influencing economic growth. Bank credits are positive and statistically significant related to economic growth in the long term. The estimated coefficients reveal that 1 percent upsurge in bank credit causes 18.49 percent increase of economic growth specifying that an increase in bank credit increase the demand for production of goods in the economy, which in turn leads to augmented borrowing, increased consumption and positive impact on the economy. The result shows that 1 percent increase in stock market growth leads to boost economic growth by 5.4 percent suggesting that higher industrial production, in turn, implying higher demand, increase firms' sale

and generate better profits. Hence, economic growth has a direct influence on the rise in stock prices and a positive effect on financial development.

Table 6. Long-run coefficients model.

	ARDL (2, 1, 0, 0, 3, 4) selected based on Akaike info criterion (AIC) Criterion IIP is Dependent Variable		
Variable	Coefficient	t-Statistic	Prob
BSE Sensex	0.054277	2.663205	0.0086⋆
Bank deposit	−0.092660	−0.971243	0.3329
Bank Credit	0.184948	2.200409	0.0292⋆⋆
Inflation	−0.058334	−0.274146	0.7843
Export to Import Ratio	−0.003667	−0.096702	0.9231
C	0.002960	1.585180	0.1150

Note: *, ** and ***denote statistical significance at 1%, 5% and 10% respectively.

However, 1 percent rise in bank deposit leads to a decrease in economic growth by 9.2 percent signifying that bank deposits move in the opposite direction during the weakening of economic growth. Weaker economic growth leads to reduce short-term interest rates. The result also exhibits that the economic growth related negatively to inflation and export to import ratio. The Table 6 presents that 1 percent increase in inflation leads to a decline in economic growth by 5.8 percent implying that increasing inflation decreasing the purchasing power of money, which reduces consumption level and shrinkage the economic growth.

Similarly, the growth in the value of the exchange rate causes contraction of economic growth, possibly due to the increasing inflation rate, interest rates, the weak domestic currency, and high import price. As a result, the demand for imported goods reduces and shift to consumption of local products. The aggregate demand increases lead to demand-pull inflation. Industrial producers witness an improvement in competitiveness and push them to reduce their costs, and it leads to inflation over the long run. Hence, depreciation on the exchange rate causes both cost-push inflation and demand-pull inflation that affects economic growth. The result specifies that 1 percent increase in export to import in India lead to decline the economic development by 0.3 percent. This adverse effect is due to steadily imports are more than the value of exports over the sample period. Export has a direct impact on domestic investment, but the influence is not able to transfer to economic growth due to increasing trends of imports.

4.1. Short run dynamics model

The study used Error Correction Model to determine the short run relation among them based on ARDL approach.

The short-run dynamics of the ECM version of the ARDL model presented in Table 7. The results confirm that the error term is negative and significant at 1 percent level, indicating the presence of a short-run relationship between finance and economic growth. The error correction term is −1.59, suggesting that 15.9 percent of errors of economic growth of the previous year corrected within the current year and speed of adjustments towards long-run equilibrium is breakneck.

Table 7. The short run impact of financial development on economic growth.

	ARDL (2, 1, 0, 0, 3, 4) selected based on Akaike info criterion (AIC) IIP is Dependent Variable (IIPt)		
Variable	Coefficient	t-Statistic	Prob.
D(IIP)	0.141546	1.921460	0.0565⋆⋆
D(BSE Sensex)	0.010054	0.571487	0.5685
D(Bank Deposits)	−0.111585	−1.069465	0.2865
D(Bank Credits)	0.255803	2.554546	0.0116⋆
D(Inflation)	−0.367630	−1.891370	0.0604⋆⋆⋆
D(Export To Import Ratio)	−0.014550	−1.039164	0.3003
CointEq(−1)	−1.598371	−13.189643	0.0000⋆
Diagnostic Tests			
R-squared	0.742653		
Adjusted R-squared	0.717908		
Akaike info criterion (AIC)	−4.903833		
Schwarz info criterion (SIC)	−4.611043		
Hannan-Quinn criter.	−4.785041		
Durbin-Watson stat	2.058212		
Ramsey RESET Test	2.143554(0.0336)		
Heteroskedasticity Test	9.397667(0.8558)		

Note: ***, **, and * shows significance at 10%, 5% and 1%, respectively.

The Table 7 demonstrates the insignificant relationship between economic growth and bank deposits in the short run. The reason may be attributed to higher economic activities that require more money for working capital. Export to Import ratio and inflation is having a negative relationship with economic growth in the short run, whereas the stock market positively influences the economic progress in the short run. The bank credit has a positive and significant impact on economic progression in the short run. The reason is that bank provides credit to various productive sectors of the economy and uplift the priority sector, which raises income and provides employment to the people of lower-income group and improving economic activities of the nation.

The coefficient of BSE Sensex shows positive sign but statistically insignificant, indicating a 1percent increase in stock market development, increasing the economic growth by 1 percent in the short run. Similarly, inflation and export to import ratio are negative, and it indicates that if India's inflation and export to import ratio increase by 1 percent, economic growth decrease by 36.76 percent. Inflation is statistically significant at 5 percent level of significance.

Error correction statistically significant at 1 percent level signifying unidirectional causal relation running from financial development to economic growth. Hence, it suggested that financial development leads to economic advancement and supports the supply-leading hypothesis. The entire diagnostic test endorses the short-run results.

Table 8. Breusch-Godfrey Serial Correlation LM Test.

	value
F-statistic	1.089304
Prob. F(2,154)	0.3390
Obs*R-squared	2.399307
Prob. Chi-Square(2)	0.3013

Breusch-Godfrey Serial Correlation LM Test establishes about no serial correlation found, and the model used in the study is good as per Table 8. The results of diagnostic tests display that the prediction errors from the model are normally distributed, and there is no problem of heteroscedasticity. Therefore, it suggests that the long run model well designed.

Table 9. Impact of Financial on Economic Development- GMM estimates (Dependent Variable IIP).

Variable		Coefficient	t-Statistic	Prob
BSE Sensex		0.051532	1.996843	0.0474⋆
Bank deposit		−0.099037	−0.618989	0.5368
Bank Credit		0.180683	1.694481	0.0920⋆
Inflation		−0.088991	−0.488198	0.6260
Export to Import Ratio		−0.027650	−1.412349	0.1597
C		0.003279	1.555097	0.1218
R-squared	0.175037			
AR(1) test	0.0000			
AR(2) test	0.0002			
P-value Sargan test	0.312935			

It is seen from the Table 9 that IIP is having a positive statistically significant relationship with BSE Sensex and bank credit. Therefore, it indicates that rising industrial production not only enhances companies' performance, which augments the stock market growth but also mounting the banking sector growth since production activity are financing by banks. The results also exhibit that Bank deposits, export to import ratio, and inflation negatively related to IIP. The reason is that high inflation makes investments less desirable, and exports become more expensive, which affect the balance of payments. As a result, economic growth decreases. The Sargan Hansen J-test p-value is 0.312, which prove the hypothesis that instruments variables are not correlated with the set of residuals. It cannot reject the hypothesis. AR (1) and AR (2) test with associated p-value is accepted in order and established that there is no serial autocorrelation in the second order in the error terms.

To confirm this, the study used a CUSUM stability test to verify the stability of long-run association between financial and economic progression. The model is stable, if the CUSUM line falls in between the lines of the level of significance.

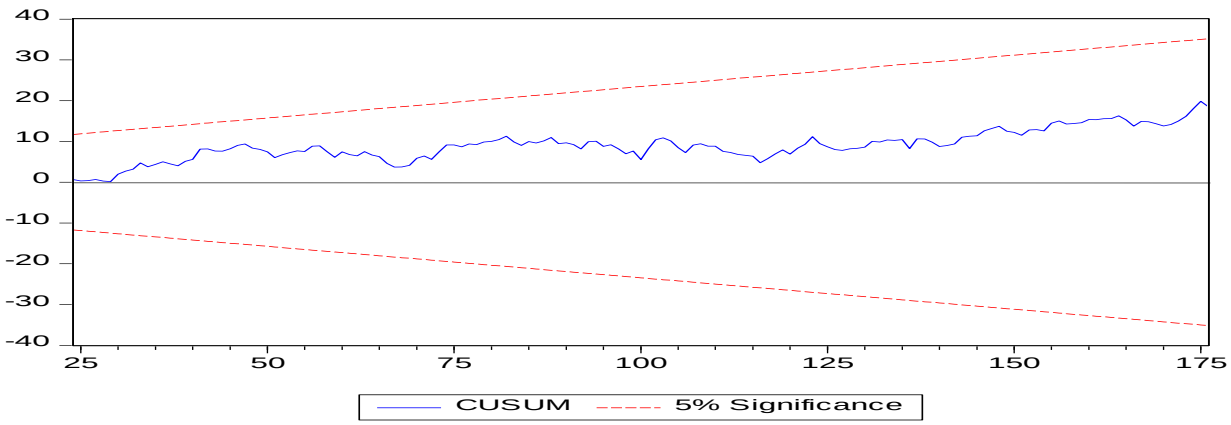

Figure 2. CUSUM stability test.

It observes from Figure 2 that the plot of CUSUM line stay within the critical 5 percent bound and does not exceed the critical boundaries for IIP, bank deposits, bank credits, BSE Sensex, inflation and export to import ratio suggesting that the long-run stability relationship exists between economic and financial development.

5. Concluding observations and managerial contribution

The study examines the relationship between the financial and economic progression of India from June 2003 to February 2018. The time-series data is used in the study comprised of monthly observations of IIP, inflation, bank credits, bank deposits, BSE Sensex, BSE market capitalizations BSE volume of trades, and export to import ratio. IIP indicator represents economic development whereas BSE Sensex, bank credit, and bank deposits used as a proxy for financial growth. Inflation and import to the export ratio are used as control variables. The study uses a correlation technique to find the association among all the variables.

Further, the study employs PCA analysis to reduce the dimensionality of a data set and maximize the variance of a linear combination of variables and accordingly, restricted to BSE Sensex as proxies for stock market development. The study employs the ARDL model to determine the long and short-run relationship between financial and economic development. The study also uses a GMM model to establish the relationship among variables. The analysis of the correlation specifies that there is a robust association exists amid the growth of IIP, BSE Sensex, BSE market capitalization, and bank credits while negative relation exists among IIP, bank deposit, BSE volumes of trade, export to import ratio and inflation.

ARDL cointegration results observe a healthy relationship between economic and financial development. The study finds a positive correlation among growth of IIP, BSE Sensex, and bank credits while adverse correlation exists between economic growth and bank deposits, inflation, export to import ratio.

The results of the study also find short-run integration between economic and financial development. The findings of the analysis show that the stock market and bank credit is positively related to economic growth. However, economic growth is negatively associated with bank deposits, inflation, and export to import ratio in the short run as well. This undesirable effect found may be due to the value of import more than the cost of export. The GMM model also finds a positive relationship between financial and

economic growth. The findings of the study indicate that higher industrial production leads to higher corporate sales and profits, which directly influences the increase in stock price. The increasing production activity is usually financed through bank borrowings. Hence, the growth of industrial production is having a positive influence on the banking sector development.

The analysis further indicates that when inflation goes up, the interest rate hikes causes liquidity squeeze in the market resulted in less spending in the economy. As a result, the demand falls, supply less, induced less industrial production, less long-run financial activity, and decrease the economic performance. It is suggested that Inflation should always be kept under control, strengthening the banking system following an effective monetary policy. The findings of the study postulated that there is a unidirectional causal relation running from financial development to economic growth signifying that financial development leads to economic advancement and supports the supply-leading hypothesis. Hence, financial development delivers an essential plausible mechanism for the long-run economic growth of India. The findings of (Kenourgios and Samitas, 2007; Bittencourt, 2012; Dilek Durusu et al., 2017) are consistent with the results of the present study. The CUSUM test also confirms the long-run stability relationship exists between economic and financial development.

Though the study finds the long-run relationship and it is a good sign, still there is some scope need for improvement as economic growth unfavourably interrelated with bank deposits, inflation, and export to import ratio. In terms of policy implication, controlling the inflation rate becomes significant for financial development. It is proposed to evade financial repression by setting a ceiling on the interest rate and allow resourceful apportionment of funds for productive investments. The export to import ratio also has significant implications and proposes that thrust need to be taken for export and capital formation of the economy. The increase in capital formation leads to a rise in exports, thereby raising the industrial production of the economy. The study also suggests maintaining the stable exchange rate and operationalization of Export Processing Zones to surge capital formation in the marketplace.

The outcomes of the study have a significant contribution to policymakers, investing community, and companies at large. The research findings are vital for the country since a positive long-run correlation indicates to take needed footsteps concerning the development of both economic and financial sector. It is important for the companies because companies need to surge the production activity by bank borrowings which not only increasing the output; generating employment; diversifying the revenue base, raising per capita income but also snowballing foreign exchange earnings of the economy. If industrial production increases, there will be a related increase in the service sector as well. Higher industrial production implies higher demand, which in turn will lead to higher corporate sales and greater profits lead to rising stock prices of the companies. Therefore, the government should uphold the harmonized development of bank and stock market activities for economic growth.

The findings of the study will also help to investors, institutional investors, portfolio managers, and foreign investors to take pertinent investment decision to minimize their risk, earn profits, and enhance their investments worth considering all those macroeconomic stirring variables. Therefore, the study provides vital information to the market regulators to take requisite steps for supplementing the economy considering improvement in the functioning of macroeconomic variables and nourishment of policies to stimulating financial growth to attract international investors in the country.

For policymakers, the findings of the study contribute to understanding the factors, which determine the economic and financial development competitive position. Policymakers need to aim at financial

sector deepening and increasing access to credit lending to enhancing economic performance. As financial deepening is playing a great role in transferring created funds to the real sector for economic growth, policies should be complemented with strategies to enhance the efficiency of the real sectors of the economy. The study provides insight into the policymakers to balance the macro-economic policies to increase savings culture, which can feed investments in the economy to advance the efficiency of all production activities of the country. If savings accumulated, it will create demand for goods and services produced in the economy, which ultimately increase the bank credits.

Another contribution of the study is that it is high time for the policymakers to understand the investments lending dynamics and not mortgage lending to boost economic growth, particularly in the long run. Financial lending not only having long-lasting effects on economic growth but also, in turn, economic growth will promote the development of the banks and stock markets.

Precisely, the results of this study add to the knowledge of the Indian economic growth nexus financial progression phenomenon. To foster economic and financial development, the suitable and harmonizing action required by both firms and policymakers. This study has a substantial impact on global and institutional investors to make better investment decisions in India. However, the future research study can be undertaken to study the persistence and long memory behavior in exploring the financial-economic growth nexus.

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Conflict of interest

I herewith declare that the submitted paper is not associated with any kind of conflict of interest.

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