ROLE OF FINANCIAL DEVELOPMENT IN ECONOMIC GROWTH OF INDIA: AN EMPIRICAL ANALYSIS

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ABSTRACT

The paper investigates the co-integrating relationship between India's Financial Development & its Economic Growth. Whereas Economic Growth has been taken to be Per Capita GDP, Pvt. Sector Credit to GDP is the Financial Development Variable used in the study. The paper also includes three additional regressors namely Consumer Price Index (CPI), Call Money Rate and Trade to GDP. The methodology used for this purpose has been Autoregressive Distributed Lag (ARDL) Bounds Testing Co-integration Approach. To test this hypothesis of co-integration between variables, we have analysed log transformed yearly data for the thirty year period i.e., 1986 -2016. First the model optimality was checked using AIC & SC as the criteria and the model with two lags was found to be optimal. The results of the study revealed positive co-integrating relation between India's Financial Development & its Economic Growth as shown by 'F' Statistics from Partial F Bounds test with computed value as 4.917 which is greater than the upper bound limit as given in both Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)) & also Narayan (2004) tables. The test also passed the model pre-requisite of Stationarity of Variables where all except one were found to be stationary at first difference ; I(1) while one variable was I(0). Also there was no serial correlation as the null of no serial correlation was accepted using BG LM test. Model was found to be stable using CUSUM Stability plot. The lagged Error term (ECM) coefficient was found to be significant and also negative showing that long term equilibrium was achieved if there was short term disequilibrium and the speed of adjustment was also fast @ 48 % per period

Keywords: Co-integration, Partial 'F' test, ARDL,CUSUM, Serial Correlation

Introduction

Does Financial Development leads to economic growth? There has been a lot of empirical research investigating the role of financial development on economic growth. However whether economy's growth is preceded by delivery of financial services or it is the financial development which is a pre-condition for sustained economic growth is still not very clear. There have been a lot of empirical papers pointing out to both the above possibilities. Researchers including Schumpeter (1911), Ghirmay (2004), Agbetsiafa (2004), Levine & Zervos (1993), Abu-Bader & Abu-Qarn (2008) and others accept that financial development causes economic growth (also termed as *supply leading* by many researchers)

while Robinson (1952), Odhiambo (2004 & 2008) and others demonstrated that sustained economic growth leads to financial development (also called *demand following*). On the other hand Akinboade (1998), Greenwood & Smith (1997) and others speak in terms of bilateral causality between financial development and economic growth and finally Atindehou et.al. (2005) and others report no relation between the two.

Another important question which arises in connection with the relation between Financial Growth & Economic Development is: Even if we believe that financial development does indeed result in economic growth what is the mechanism of financial development impacting growth? Levine (1997) & Islam et.al (2004) discuss this mechanism whereby financial development induces reduction in information cost, increases savings rate thereby promoting markets, institutions and payment mechanism resulting in efficient allocation of resources and hence economic growth. However this being so , it would just be incorrect to generalize the impact of financial development on growth on all countries as each economy differs from another on account of unique set of factors it possesses. Moreover the effectiveness of financial system also varies quite sharply across countries. All these differences are quite significant in playing an important role in deciding the strength and direction of relationship between the two variables. Hence while studying the relation between the financial development and economic growth for each country detailed time series data analysis becomes extremely important (see Gautam, B.P (2014)).

The focus of our present study is on India's Financial Development and its role in country's economic growth. The Financial Sector comprises of Financial Institutions (banking/non-banking institutions), financial Markets (capital markets, money markets, foreign exchange markets etc.), financial instruments (equity, Bonds & other debt instruments) & financial services (leasing, credit rating, merchant banking etc.) The entire financial sector was quite traditional till 1990 with problems like lack of competition, low productivity, lack of use of IT and other applications, low profitability & poor service to customers. Starting 1991, a series of reforms were initiated in this sector at different levels which included making the field competitive, strengthening supervision, making interest rates market oriented, introduction of technology on a large scale etc. Various Research Studies have shown that there has been a significant impact of these reforms and it has also resulted in cessation of most of the problems associated with this sector (see Gupta and Verma (2012))

In the context of above, the present study attempts to explore the empirical relation between financial development and economic growth using autoregressive distributed lag (ARDL) Co-integration approach with time series data for India for the period 1986 to 2016. The rest of the paper is structured as follows: Section II: reviews the existing literature on the relationship between financial development and economic growth. Section III: describes the research objectives of the study, Section IV: gives the Data Description & a note on the variables used in the study. Section V: discusses the methodology employed along with hypothesis to be tested Section: VI provides empirical results of the study & its interpretation & finally Section VII: gives the conclusion, policy implications & scope for further research.

Review of Literature

The evidence of developing a relation between financial developments could be seen as early as in the work by Schumpeter, (1911); however extensive analytical approach was initially adopted by Goldsmith (1969). Under the literature review, we analyse some of the recent works in developing the relation between financial development and economic growth , the tools used to test the relation and the conclusions drawn by different researchers on the basis of their study.

Sehrawat, M., & Giri, A. K. (2017) tested the impact of sectoral stock indices on sector specific India's GDP. The results obtained from ARDL Bounds test showed both long and short term impact of sector's stock index on economy's sector specific GDP. In a way this was also the test for stock index causing economic growth. The sectors chosen were manufacturing, utility (electricity, gas and water) & services sector. The unidirectional causality was also seen from sector specific index to sector specific GDP. Some additional regressors used were WPI, Crude Prices, T Bill rate & Real exchange rate. **Sehrawat, M., & Giri, A. K. (2015)** examined the relation between economic growth and financial development and the results confirmed long term relation between the variables. Financial Development variable was represented by three ratios; ratio of private credit to GDP, ratio of Market Cap to GDP &ratio of the sum of private credit & Market Cap to GDP. Three control variables were also added and these included call rate, trade as a percentage of GDP and CPI. Two models were tested; first model tested GDP per capita as a function of ratio of private credit to GDP, ratio of Market Cap to GDP and all control ratios while the second model tested GDP per capita as a function of sum of private credit & Market Cap to GDP and all control ratios. The ARDL test results showed that both bank and market based indicators impacting economic development. The ECM term was negative in both models and significant at 10 % level showing slow return to equilibrium.

Ghildiyal, V., Pokhriyal, A. K., & Mohan, A. (2015) investigated the impact of financial deepening on GDP Per Capita. The period of study was from 1990-91 to 2013-14. Financial Deepening included four variables stated as four ratios: M2 to GDP, Stock Market Cap to GDP, credit to private sector to GDP & finally total trade to GDP. The ARDL Co-integration approach was applied and the results showed that financial deepening did cause the economic growth both in short and long run. **Bayar, Y. (2014)** developed for Turkey a relation between four variables namely economic growth, unemployment, FDI and exports using ARDL approach. The unit root for variables was tested using ADF, PP & KPSS Statistics. The results proved long run relation amongst variables. The results also showed that there was a negative

relation between unemployment and economic growth & positive relation between unemployment and FDI flows.

(ii) ADRL Specification

ARDL Co-integration Model is applied as VAR Specification. We first determine the long term relation between our variables namely *Per Capita GDP, Pvt Sector Credit to GDP, CPI, Call Money Rate and Trade to GDP*. These variables have been log transformed & relationship being tested is LPGDP = f (LFDV, LCPI, LCMR, LTGDP) where LPGDP is per capita Gross Domestic Product, LFDV is the financial development variable which is Pvt. Sector Credit to GDP, LCPI is Consumer Price Index, LCMR is the Call Money Rate &LTGDP is the Trade Openness Variable which is Trade as a percentage of GDP; 'L' denotes Natural Logarithms.

ARDL Co-integration shows not only long term relation but also dynamic interaction between the variables. The Model was originally developed by *(Pesaran & Shin 1999)* & was later modified by *(Perasan et.al 2001)*. This approach has four major advantages over traditional approaches of co-integration, first it can be applied using OLS after selecting the appropriate model with lags, second it does not require unit root pre-testing of variables, third the test can be applied to small samples with a great efficiency, fourthly it avoids the omitted variable bias by estimating short and long run relationship simultaneously thus long run information is not lost while establishing the dynamic relation &lastly the test can be applied even if some of the regressors are endogenous *(Srinivasan & Prakasam (2014), Sehrawat & Giri (2015))*

$$\Delta \text{Per Capita GDP}_t = \beta_1 + (\beta_2 - 1)\,\text{Per Capita GDP}_{t-1} + \sum_{i=1}^{m} \beta_{3i}\,\Delta \text{Per Capita GDP}_{t-i} + \beta_4 t + u_{1t} \ldots\ldots eq.(i)$$

$$\Delta \text{Pvt Sector Credit to GDP}_t = (\Psi_2 - 1)\,\text{Pvt Sector Credit to GDP}_{t-1} + \sum_{i=1}^{m} \Psi_{3i}\,\Delta \text{Pvt Sector Credit to GDP}_{t-i} + \Psi_4 t + u_{2t} \ldots eq.(ii)$$

$$\Delta CPI_t = \alpha_1 + (\alpha_2 - 1)\,CPI_{t-1} + \sum_{i=1}^{m} \alpha_{3i}\,\Delta CPI_{t-i} + \alpha_4 t + u_{4t} \ldots.eq.(iii)$$

$$\Delta \text{Trade to GDP}_t = \theta_1 + (\theta_2 - 1)\,\text{Trade to GDP}_{t-1} + \sum_{i=1}^{m} \theta_{3i}\,\Delta \text{Trade to GDP}_{t-i} + \theta_4 t + u_{3t} \ldots.eq.\ (iv)$$

$$\Delta \text{Call Money Rate}_t = \sigma_1 + (\sigma_2 - 1)\,\text{Call Money Rate}_{t-1} + \sum_{i=1}^{m} \sigma_{3i}\,\Delta \text{Call Money Rate}_{t-i} + \sigma_4 t + u_{5t} \ldots. eq.(v)$$

(i) Run the above equation at different lags to identify the best model.

(ii) Test for the long term relationship by applying OLS on the best model from equation (i). The 'F' Wald which tests the Null of No Co-integration i.e. $Ho_{1:}\ \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ is computed which is compared with critical at 10, %, 5 % or 1 % levels.

(iii) If Long run Co-integration is established , then carry out the diagnostic tests or the test for no serial correlation & stability test

(iv) Obtain the Error Correction Term by running a simple multiple regression model i.e. $LPGDP_t = \beta_1 + \beta_2 LPGDP_t + \beta_3 LFDV_t + \beta_4 LCPI_t + \beta_5 LCMR_t + \beta_6 LTGDP_t + u_t$

(v) Once again consider the best model, remove all the long run (first lag) variables and include the ECM (-1) term, run OLS, the ECM coefficient should be negative signifying the speed of adjustment to equilibrium.

(iii) Test for Serial Correlation

Considering autoregressive equation of any variable (say NSE), we obtain the residuals i.e.

$PGDP_t = \beta_1 + \beta_2 PGDP_{t-1} + \beta_3 PGDP_{t-2} + \ldots\ldots\ldots + \beta_p PGDP_{t-(p-1)} + u_t$ ..... **eq (vii)**

Further let the residuals u_t follows the following structure:-

$ut = \theta_1 u_{t-1} + \theta_2 u_{t-2} + \theta_3 u_{t-3} + \ldots\ldots\ldots + \theta_n u_{t-n} + \ldots\ldots\ldots e_t$ **eq (viii)**

Next we substitute eq.(viii) in eq.(vii) and we re-write our new equation as : error term as a function of variables of new equation. Next we focus on the R Square of this new equation (ix);

$u_t = \beta_1 + \beta_2 PGDP_{t-1} + \beta_3 PGDP_{t-2} + \ldots\ldots\ldots + \beta_p PGDP_{t-(p-1)} + \theta_1 u_{t-1} + \theta_2 u_{t-2} + \theta_3 u_{t-3} + \ldots\ldots\ldots + \theta_n u_{t-n} + e_t \ldots\ldots\ldots$ **eq (ix)**

Define our Null as (No Serial Correlation): $\theta_1 = \theta_2 = \theta_3 = \ldots. \theta_n = 0$

Accept/Reject Criteria: Accept the Null if $R^2 (n-p) < \chi^2_n$.

(iv) Partial 'F' Bounds Co-integration test :

Under this 'F' test first we establish the Null or Long run Co-integration between variables is not established i.e. $Ho_{1:} \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$

To test this Hypothesis we follow accept/reject criteria given by *Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)*). Alternatively we can use Narayan (2004) tables.

Accept/Reject Criteria:

Accept the Null, if $'F'_{computed}$ < Lower Bound critical (3.79Pesaran or 3.116 Narayan level)

Reject the null if $'F'_{computed}$ > Upper Bound critical (4.85Pesaran or 4.094 Narayan level)

No Inference: If $F_{Computed}$ is between the two bounds .Pesaran (3.79 - 4.85) or Narayan (3.116- 4.094)

(v) Test for Model Stability

For checking the stability of our model we look for plot of Cumulative Sum of Recursive Residuals (CUSUM) against the time period of study. Our Model is Stable if the cumulative sum is within the limit $\mu \pm 2$ SE i.e. (5 % level).

(vi) The ECM Dynamics

Run OLS; obtain the error term (v_t) from equation... (v)

$LPGDP_{,t} = \beta_1 + \beta_2 LFDV_t + \beta_3 LCPI_t + \beta_4 LCMR_t + \beta_5 LTGDP_t + v_t$.....(x)

The lagged error term (v_{t-1}) from above equation (x) is put in eq. (xi) given below

$\Delta LPGDP_t = \pi_1 + \pi_2 v_{t-1} + (\pi_{3,i} \Delta LPGDPT_{t-i}) (\pi_{4,i} \Delta LCMR_{t-i}) (\pi_{5,i} \Delta LFDV_{t-i}) (\pi_{6,i} \Delta LCPI_{t-i}) (\pi_{7,i} \Delta LTGDP_{t-i}) (\pi_{8,i} \Delta LCMR_{t-i}) + u_t$.....(xi)

(*Where* π_3, π_4, $\pi_5 \pi_6$, $\pi_7 \& \pi_8$ *are the short run parameters to be estimated,* π_2 *isthe parameter of error correction term(ECM) term.)*

Empirical Results and Interpretation

To begin with we discuss the results of the stationarity of our variables; a pre-requisite of either I(0) or I(1) for the ARDL Test. The results given in Table 1 ('p' values) clearly show that Per Capita GDP, Pvt Sector Credit to GDP ,CPI, &Trade to GDP are stationary at I(1) while Call Money Rate is stationary at I(0) , therefore since we have a mixture of I(0) & I(1) variables the ideal co-integration test procedure to be followed is ARDL Having established the stationarity of our variables & also convinced that ARDL procedure is to be applied , we now proceed to find out the optimal lag length model for our regression. We identified that AIC & SC were lowest (hence optimal) at Lag 3(see Table II), however according to Pesaran and Shin (1999) for annual data use of maximum two lags is recommended, therefore we shall have to decide the optimal from Lag 1 &Lag 2 only and since Lag 2 is better model (in terms of lower AIC & SC) we consider this as our lag length for further analysis.

Table I: ADF *(Unit root) test results of our variables*

Table II: Optimal *Lag determination for our ARDL Model*

Next we checked for Long term Co-integration between the variables using ARDL Partial 'F' Bounds approach. The results are reproduced in Table III. The results clearly show that Long term Co-integrating relationship is established amongst the variables as the computed 'F' Statistic value of 4.917 is greater than our critical values of both Pesaran & Narayan. The long term results of each individual variable are displayed as coefficients and its significance by't' statistics in Table IV. As we see that three of our independent variables; Pvt. Sector Credit to GDP, Call Money Rate & Trade Openness have significant 't' values & 'p' values at 5 % level of significance. The Consumer Price Index (CPI) is however not significant. Further all the variables except Call Money Rate are positively related to dependent variable GDP per capita. The Model is also an excellent fit as given by adjusted R Square & over all 'F' Statistics. BG LM Serial Correlation test (Table V) shows no serial correlation where we accept the Null as the Prob. of Chi-Square is 0.159 which is greater than 0.05.Also Model Stability using CUSUM plot (See: Fig 1) showed that the model was stable as the CUSUM line was within upper and lower limits of 5 %.

No. of Lags	*AIC*	*SC*
Lag 3	-2.575524	-2.575524
Lag 2	-2.531705	-2.531705
Lag 1	-2.338481	-2.338481

Variable	'p value' at level	'p value' at First Difference
	0.9223	0.0012
Call Money Rate	0.0435	0.0028
CPI	0.6597	0.0006
Pvt. Sector Credit to GDP	0.5713	0.04924
Trade to GDP (Trade Openness)	0.9801	0.0039

Table III: ARDL *Co-integration Partial 'F' test Results (for model with Lag 2)*

Model Specification	*'F' Bounds Value Computed*	*Inference*
LPGDP = f (LFDV, LCPI, LCMR, LTGDP)	***Computed F = 4.917 > 4.85 (Pesaran) > 4.094 (Narayan) 5 % level Upper Bound*** **Chi Square value is 9.836 with probability 0.0073**	**Co-integration is Established**

Table IV: ARDL *Model Long run results for optimal model (Lag 2)*

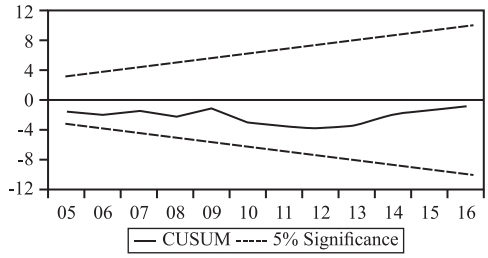
Independent Variable	**Coefficient**	**t-Statistic**	**Prob.**
CREDIT(-1)	0.753928	3.102006	0.0092
TRADE_TO_OPENNESS(-1)	0.329410	2.469089	0.0295
CALL_MONEY_RATE(-1)	-0.132958	-2.297820	0.0487
CPI(-1)	0.025974	0.427830	0.6764
Robustness Indicators			
R-squared		0.995908	
Adjusted R-squared		0.990793	
Durban Watson		2.206282	
F-statistic		194.7089	

Table V: Results of the Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.391489	Prob. F(2,19)	0.2527
Obs*R-squared	1.978922	Prob. Chi-Square(2)	0.1595

Fig 1 : CUSUM *Plot for the Optimal Model*



In our final analysis, we established the short run equilibrium and also error correction between the long and short run **(Table VI)**. The coefficient of the lagged error term which shows that speed of adjustment between dynamics of short and long run is negative & significant. The interpretation of the error term variable for this coefficient whose value is **-0.482133**shows that there would be a fast adjustment backwards towards equilibrium and in one period the adjustment factor is 48 %.

Table VI : Regression *results for Error Correction and Short run Co-integration for our Optimal Model*

Variable	Coefficient	t-Statistic	Prob.
D(PER_CAPITA_GDP(-1))	0.226186	0.984092	0.3397
D(PER_CAPITA_GDP(-2))	0.629273	2.627893	0.0183
D(CALL_MONEY_RATE(-1))	-0.105828	-1.965244	0.0670
D(CALL_MONEY_RATE(-2))	-0.068465	-1.238796	0.2333
D(CPI(-1))	0.141412	2.430121	0.0272
D(CPI(-2))	0.109386	1.767234	0.0963
D(CREDIT(-1))	0.066355	0.192524	0.8498
D(CREDIT(-2))	-0.041216	-0.111036	0.9130
D(TRADE_TO_OPENNESS(-1))	-0.390800	-1.332575	0.2013
D(TRADE_TO_OPENNESS(-2))	-0.136827	-0.426649	0.6753
ECM(-1)	**-0.482133**	-2.890789	**0.0106**

Conclusion and Policy Implications

The present study tried to develop a co-integrating relationship between India's Financial Development & its Economic Growth for the period of 30 years (1986-2016) by taking log transformed yearly data. Whereas Economic Growth has been taken to be Per Capita GDP, Pvt. Sector Credit to GDP is the Financial Development Variable used in the study. The paper also includes three additional regressors namely CPI, Call Money Rate and Trade to GDP. The methodology employed was ARDL Bounds Partial 'F' Test .The results of the study revealed positive co-integrating relation between India's Financial Development & its Economic Growth as shown by 'F' Statistics from Partial F Bounds test which was 4.917 and could easily satisfy both *Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)*) & Narayan (2004) upper levels. Also pre-requisite of Stationarity of Variables was also satisfied with four variables at I (1) and one variable at I (0). Further the optimal Model as shown by AIC & SC was identified and this model showed no serial correlation. Further Optimal Model was also found to be stable using CUSUM Stability plot. The lagged Error term coefficient was significant and negative at had a value of - 0.4821, showing that long term equilibrium was achieved if there was short term disequilibrium and the speed of adjustment was also fast @ 48 % per period.

There can be few policy implications of the study, first since it is now clear that India's Financial Development does have a co-integrating relation with the economic growth in-spite of having short term disequilibrium, lending by banks and institutions at even lower rates than existing rates becomes very crucial and these low rates must be sustained by further reformative policies of the Government and Central Bank. This would require taking fresh challenges and bold steps for further deepening of the entire financial system both in terms of size and level of activity especially to the identified productive sectors. Also since the country's financial development has strong linkages with the real sector, Government must keep a close monitoring on all the macro indicators as slippage on any account can have a multiplier effect which can derail the entire complex process of economic growth.

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