Examine the Long Run Relationship between Financial Development and Economic Growth in India: Evidence from Vector Error Correction Model (VECM)

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Abstract
This study examines the relationship between financial development and economic growth in India after the reform. The present study used monthly data from the period January 1994 to December 2011. The empirical result found that there exist two cointegrating equations and the Vector Error Correction Result shows that in the long run the stock market is affecting economic growth negatively but the increase of bank credit affects the economy positively. The result also found that money supply has negative impact on economic growth in the long run, whereas, tread openness has no impact on economic growth in the long run. From the policy implication point of view the study suggest that the evolution of financial sector tends to or is more likely to stimulate and promote economic growth when monetary authorities adopt liberalised and openness policies, to improve the size of the market intone with the macroeconomic stability.
Keywords: Finance, Development, Cointegration, Error Correction, Economic Growth, Correlation

JEL Classification: E_{44}, F_{36}
1. Introduction
Financial development plays a key role in the economic growth in an economy. Some economist holds that financial development is a precondition for achieving high economic growth. Patrick (1966) analysed the notion of "supply leading" in the role of financial development emerged in the literature. In the same prospective a reverse view has also emerged in that literature "demand following" in the role of financial development. The notion of demand following hypothesis basically argues for a reverse causation from real economic growth to financial development. The crucial role of financial development in any process of economic development has been subject to numerous debates in the economic and financial literature. The relationship between financial development and economic growth is a controversial issue. The early studies of Gurley and Shaw (1955), Moreover Jung (1986) and King and Levine (1993) Argued that financial intermediation is a good indicator of economic growth and that financial development is an important key to economic growth. Spears (1992) examined the finance and economic growth relationship for ten Sub-Sharan countries and suggested that financial development causes economic growth. Munrinde and Eng (1994) studied the relationship between financial development and economic growth in the context of Singapore. The study concluded that the relationship between financial development and economic growth support the supply leading hypothesis for Singapore. Levin and Zervos (1996) found a positive partial correlation between both stock market and banking development and GDP per capital development. Cheng (1999) investigated the relationship between financial development and economic growth for South Korea and Taiwan. The study found that there is a unidirectional causality runs from financial development to economic growth with feedback in post-war. In this line of thinking, Ang (2008), concludes that a well developed financial system positively contributes to achieving higher economic growth rates through the increase of savings and private investments. Similarly, Baltagi, et al. (2009) advocates that bank development, sustained by a liberalisation process, is an important mechanism of long term growth in developed and developing countries.

The main objective of this present study is to examine the long run relationship between financial development and economic growth in India. The financial market in India, which plays a dominate role has undergone a metaphoric transformation in the mid eights dealing with multidimensional growth. The magnitude of growth has been higher in terms of expansion of investor's population, high amount of market capitalisation, the turnover in the stock exchange and fund mobilisation. In the 1980's debentured emerged as a powerful instrument of financial resource mobilisation in the primary market, which signifies to widening and Deeping of the market. Moreover, the introduction of public bonds in 1985-86, imparted an additional dimension to the financial development in India. In the same period the growth in the secondary market was also remarkable because of the increase in number of financial institutions. Again, the recent institutional activities have a vital role to play in expanding and widening the securities and money market in India. The major important issue is that Indian financial market face basic infrastructure problems which creates a big hindrance in the well functioning of financial development and economic growth in India. The Motivation of the present study gives

importance that if financial development and economic growth are bidirectional related how far it will exist for a long run time period.

The layout of this paper is following. Section 2 provides a brief review of the literature on the relationship between financial development and economic growth. Section 3 analyses variable description and period of study, section 4 discusses empirical results and 5 offers some concluding remarks.

2. A Brief Review of Literature

The nexus between financial developments an economic growth is a debatable issue. Some others define that finance an important component of economic growth (Schumpeter, 1934; Goldsmith, 1969; McKinnon, 1973; Shaw, 1973; King and Levine (1993), others like (Robinson, 1952; Lucas, 1988). Schumpeter (1934) consider as a minor growth factor. Greenwood and Jovanovic (1990) financial development helps for generate better information and improve resource allocation. A broad system of financial intermediation is able to allocate more capital to efficient investments and leads to faster economic growth. Taimi, et al (2001) investigated the relationship between financial development and economic growth for the selected Arab countries. The findings of the study suggest that there is no clear evidence that financial development affect or is affected by economic growth. Bencivenga and Smith (1991) examined that financial development, financial intermediaries boost productivity, growth and capital formation by improving corporate governance. Al-Youssif (2002) examined the relationship between financial development and economic growth for 30 developing countries. The findings suggest that there is no bidirectional relationship between financial development to economic growth and economic growth to financial development. This study also emphasised that the finance growth relationship can't be generalised across countries. Arestis (2002) studied the impact of financial liberalisation on 6 developing countries. The study found that financial liberalisation is much a more complex process, the effect of financial development are ambiguous. Shan Jordan and Qi (2006) examined the impact of financial development and economic growth on China. The study concluded that financial development is the second force (after the contribution from labour) affects the growth. Rachdi H and Hussene (2011) concluded that financial development and real GDP per capital are positive and strongly linked. Kilimani N (2007) analysed that the removal of distortions in the financial sector stimulates economic growth for the country like Uganda. Demetriades and Hussein (1996), Demetriades and Luintel (1997), Luintel and Khan (1999) and Singh (2008) discovered bidirectional causality between financial development and economic growth. Arestis, et al. (2002) reported that financial development was promoted by economic growth but there was no feedback from economic growth to financial development in India.

3. Variable Description and Period of Study

The choice of the data period for the empirical analysis of the study is taken from the RBI Handbook of Statistics on the Indian Economy on the basis of a monthly series from January 1994 to December 2011. In order to measure the level of financial development of India, banks and stock markets are considered to be the two important vehicles of the financial system. The banking sector in the economy affects the growth by channelizing liquidity in the system and helping to take the edge off informational frictions. Stock markets can have effects upon economic growth by affecting capital allocation. Thus, we have used both the stock market development and banking sector development indicators to measure the development of the financial sector.

As measures of stock market development, we use stock market capitalization of listed companies as a percentage of Gross Domestic Products (GDP), which is referred to as MC in our regression, and turnover ratio of stocks traded in percentage (R). Stock market capitalisation ratio (MCR) is defined as the total value of market capitalisation of the stock market as a percentage of Gross Domestic Products (GDP) of the currency. This is also considered as a better proxy to measure the size of the stock market. Increased stock market capitalisation may improve an economy's ability to mobilize capital and diversify risk. The basic assumption behind this indicator is that the size of the stock market is positively correlated with the ability to mobilize capital and diversify risk. Arestis and D emetriades (1997) use stock market capitalization as ratio of stock market value to GDP as an indicator of stock market development.

Turnover ratio, a measure of stock market liquidity, is the total value of shares traded on major domestic stock exchanges relative to total market capitalization (high turnover indicates low transaction costs). The turnover ratio compliments the ratio of value traded to GDP, because the turnover ratio is related to the size of the market and the value traded ratio to the size of the economy. A small, liquid market will have a high turnover ratio, but a low value of shares trade ratio. Liquidity is an important attribute of stock markets because, in theory, liquidity markets improve the allocation of capital and enhance prospects for long-term economic growth. A more comprehensive measure of liquidity would include trading costs and the time and uncertainty in finding a

counterpart in Setting a trades. Conceptually, Liquidity of financial markets is taken to be inversely related to the costs of transacting with them. Turnover ratio (R) is expected to indicate the level of transaction costs as a high turnover ratio implies low transaction costs. The study by Beck and Levine (2004) is an instance where a measure of stock market development is the turnover ratio.

In the case of banking development indicators we have considered the ratio of bank credit to nominal GDP (BC). In underdeveloped countries, bank credit is mainly used to finance investment activities of the firms and it represents the single most important source of invisible funds. Thus bank credit is considered to be an important productivity enhancing financial service, which is crucial for achieving a high rate of economic growth King & Levine, 1993). The aggregate deposit (AD) represents the demand and time liabilities of a bank, and it includes the demand deposits, term deposits and saving bank deposits.

Another indicator which can measure the depth of the financial system is broad money supply (M_3), this defined as the ratio of the total assets of the financial system to nominal GDP and is calculated as the ratio of the liquid liabilities (M_3) to the nominal GDP. M_3 is a broader measure of money stock in accordance with the inside money model of mckinnon (1973) where the accumulation of real money balance is a required condition for investment. An increase in this ratio may be interpreted as an improvement in financial deepening in the economy.

In the case of a measure of economic growth this study has taken two indicators of economic growth. The first indicator is Index of Industrial Production (IIP) and represented in the systematic form as 'Y'. It is need less to mention here that as the monthly data on GDP is not available in the context of Indian economy, we have considered IIP as the proxy for GDP. The second indicator is the effect of international trade on growth and this is captured by the openness variable, this is measured as the sum of imports and exports as a percentage of nominal GDP (O) (Levine et al 2000). Theoretically, the effects of trade can be negative or positive; as such the net effects can only be determined empirically.

The study is based on the monthly data covering the period from January 1994 to December 2011. The data in the market capitalisation ratio and turnover ratio are collected from the Bombay stock exchange (BSE) official website and all other considered variables data are sourced from issues of Handbook of Statistics of Indian economy, the variable report on currency variance, Reserve Bank of India (RBI).

4. Empirical Results
Summary Statistics
The Table: 1 depicts that an average growth rate was 4.52 percent whereas the minimum and maximum growth rate was 3.72 percent and 5.26 percent from 1994 to 2011. The average financial development (m_3) was 14.35 percent. The minimum and maximum financial development was being 12.94 and 15.79 percent respectively. The table also reveals that minimum market capitalisation, bank credit, aggregate deposit, turnover ratio and openness were 12.76, 12.00, 12.64, 7.61, 0.77 percent, whereas the maximum was 15.80, 20.20, 15.60, 12.20 and 2.69 percents. The skewness was negative for turnover ratio (R) that is (-0.75).

Table-1: Summary of Statistics

	Y	MC	BC	AD	R	M	O
Mean	4.52	14.06	13.69	14.07	10.48	14.35	1.64
Median	4.44	13.54	13.45	14.05	10.71	14.34	1.55
Maximum	5.26	15.80	20.20	15.60	12.20	15.79	2.69
Minimum	3.72	12.76	12.00	12.64	7.61	12.94	0.71
Std.Dev	0.38	1.02	1.43	0.85	1.04	0.82	0.54
Skewness	0.17	0.47	2.32	0.06	-0.75	0.06	0.23
Kurtosis	1.86	1.59	11.14	1.81	2.76	1.86	2.01
Jarque-Bera	12.69	25.68	789.09	12.79	20.87	11.76	10.72
	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: IIP-Y, Broad Money Supply-M, Trade Openness-O, Bank Credit-BC, Aggregate Deposit-AD, Market Capitalization-MC and Turnover Ratio-R, All the data set are natural logarithm of monthly values.

Correlation Matrix

Table-2: Correlation Matrix

Variables	Y	MC	BC	AD	R	M	O
Y	1						
MC	0.96 (0.00)	1					
BC	0.83 (0.00)	0.80 (0.00)	1				
AD	0.98 (0.00)	0.94 (0.00)	0.83 (0.00)	1			
R	0.80 (0.00)	0.77 (0.00)	0.58 (0.00)	0.82 (0.00)	1		
M	0.98 (0.00)	0.93 (0.00)	0.84 (0.00)	0.99 (0.00)	0.81 (0.00)	1	
O	0.96 (0.00)	0.93 (0.00)	0.884 (0.00)	0.97 (0.00)	0.80 (0.00)	0.97 (0.00)	1

From this table, it can be summarised that, there is a high positive pair wise correlation between the pairs of market capitalisation and IIP, Broad money supply and IIP, and trade openness and IIP. The strong and significant positive correlation is also found between aggregate deposits and market capitalisation, broad money supply and market capitalisation, trade openness & market capitalisation, broad money supply and aggregates, trade openness and aggregate deposits and broad money supply and trade openness. From this result, it can be concluded that as the economy increased towards more trade openness, the market capitalisation, aggregate deposits and broad money supply are increased in trend with each other. This increased trade openness attracts more channelization of the flow of funds in the domestic economy and significant contributes to raise the economic growth.

Multicolinearity generally results in abnormally large and volatile regression coefficients. The table-1 presents the correlation matrix and the corresponding value of all the variables. The correlation between turnover ratio and other variables are comparatively low, whereas, the market capitalization to broad money supply, trade openness, aggregate deposits and IIP is high correlation having more than the money supply, which is highly correlated with IIP and Trade openness. The IIP is also highly correlated to market capitalization and aggregate deposits but turnover ratio and total bank credit have less correlation 0.58. The broad money supply and Trade Openness have the highest correlation (0.99). All the variables in the correlation matrix are statistically significant. Therefore, all the variables are strongly positively correlated each other.

Test of Stationarity
The literature in the past has experienced an explosion unit root for stationary of time series data as the choice of technique and produce for further analysis depends on their order of integration. Hence, without taking into account the presence of a unit root in the variables, the analysis may produce spurious regression results. Therefore, the Augmented Dicky-Fuller (ADF) and Phillis-perron (PP) tests are conducted to check the stationary property of the data as well as to check the order of integration.

The results of unit root tests are presented in Table-2, which shows that all the variables are stationary at their corresponding first difference level. This is because that the estimated values of all seven variables at different lags exceeds the critical values at 1 and 5 percent significance level in both the ADF and PP test. Hence, we reject the null hypothesis of a unit root and conclude that all the seven variables are stationary.

Table-3: Unit Root Test

Variables	ADF Test		PP Test	
	Level	FirstDifference	Level	First Difference
Y	-1.543	-9.026*	-2.59	-25.56*
M	-1.494	-10.055*	-1.89	-14.91*
R	-2.336	-8.965*	-2.65	-16.90*
O	2.346	-8.785*	-2.55	-25.93*
MC	-1.948	-6.564*	-1.99	-13.02*
BC	-0.535	-7.795*	-1.12	-15.14*
AD	-1.496	-5.824*	-0.70	-16.20*

Note: denotes no unit root in the series, the Mackinnon critical values For ADF and PP test are -3.9736, -3.4173, -3.1307 with intercept and trend at 1%, 5% and 10% significance level respectively.

Cointegration Test

In econometric analysis, if two or more variables are found to be cointegrated, it implies that there is a long run relationship between them or that they will interact with each other. Thus all the variables are integrated of the same order, we can say that a co-integrating relation exists if a linear combination of these variables is of a lower order (in this case it has to be I(0), that is, a stationary series).

We now carried out the computation required for finding the cointegrating rank 'r' and then estimating the cointegrating vector β for the system of equations involving these seven I (1) variables. Using Johansen's ML – based reduced rank (RR) regression procedure test statistics was computed to determine the number of cointegrating vector. At first, we calculate the number of endogenous lags including in the VECM analysis. We have taken into consideration different information based criteria like AIC, HQC and SIC to determine the lag length.

The study considered the value suggested by AIC, HQC AND FPE criterion since it has suggested the lowest number of lag (4) values to be included in the VECM specification. The study estimate the rank 'r' because, we need lag values as well as the rank to estimate VECM model in Johansen's procedure. We applied trace test as suggested by Johansen to determine the cointegrating rank. We thus represented below the values of the two test statistics under the assumption of a constant term and a liner trend term in the cointegrating equation. We allow for both intercept and liner trend term to have a more general model.

Table-4: Results of Johansen- Juselius Cointegrating Test

		λ Trace Test			
Null Hypothesis	Alternative Hypothesis	λ Trace Statistics	5 Critical Value	P Value	
r = 0	r > 0	186.49*	125.61	0.00	
r ≤ 1	r > 1	113.00*	95.75	0.00	

		λ Maximum Tests			
Null Hypothesis	Alternative Hypothesis	λ Trace Statistics	5 Critical Value	P Value	
r = 0	r = 0	73.49*	46.23	0.00	
r = 1	r = 1	48.47*	40.07	0.00	

Note: * Denotes statistical significance at 5% level. r indicates number of cointegrating vectors. Linear Deterministic trend with intercept and trend in CE assumption is assumed.

The Table-3 indicates the result of Johansen- Juselius cointegration test, Where the λ Trace values higher than the respective 5 percent level critical values for the null hypothesis of r=0 against r > 0 and r ≤ 1 against r > 1 suggesting at least three cointegrating vectors among these variables IIP (Y), Broad Money Supply (M), Trade

Openness (O), Bank Credit (BC), Aggregate Deposit (AD), Market Capitalization (MC) and Turnover Ratio (R). However, the tabulated λ-Max value is higher than its 5 percent critical values for the null hypothesis of r = 0 against r = 1and r = 1 against r = 2 implying that there is only two cointegrating relationship between the variables. From the above result we can observe that there is only two long run relationship among these variables. Therefore, we have move to next step to estimate VECM for these cointegrating equations.

Analysis of Vector Error Correction Model:
In Error Correction Model, We incorporated the Lagged value of the residuals from the cointegrating equation that describes the long run equilibrium relationship between all indicators. We could also incorporate the lagged first difference of the predictors. Combining short run and long run relationship, all the indicators ECM is calculated. We have obtained the number of endogenous lags and the cointegrating rank, and we can now carry out the Vector Error Correction Mechanism (VECM) analysis with lag value 4 and cointegration rank equal to 1.

Table-5: VECM Results

	MC	BC	AD	R	M	O	Constant
Coefficient	-0.69*	2.99*	8.07	0.24**	-11.55**	-0.82	
t-statistics	-3.62	8.69	1.55	2.37	-2.13	-1.52	15.22
P-value	0.00	0.00	0.12	0.01	0.03	0.12	

Note: Dependent variable is IIP-Y; the explanatory variables are Broad Money Supply-M, Trade Openness-O, Bank Credit-BC, Aggregate Deposits-AD, Market Capitalisation –MC and Turnover Ratio-R. Estimated coefficients are reported in this table. T-statistics are in parenthesis. * Significant at the 1% level, * Significant at the1% level, ** Significant at the 5% level.

The Table-4 illustrates the long run relationship between IIP with the other variables. The result indicates that the aggregate deposits and trade openness is not significant in the long run. The market capitalisation (MC) and money supply (M) affects the IIP (Y) negatively in long run, but bank credit (BC) and the turnover ratio affects the IIP (Y) positively in long run.

In the Error Correction Model, consequently, the short run dynamics of the variables are seen as fluctuations around this equilibrium and the ECM indicates how the system adjusts to converge to its long run equilibrium state. The speed of adjustment, to the long run path is indicated by the magnitudes of the coefficients of α vector, The values of R2 and the significance of F-statistic model denoted that the fitted model explains the data well in the long run as well as in the short run. The crucial parameter of interest is an Error Correction coefficient and its significance. The sign and the magnitude of this coefficient capture the direction and speed of adjustment towards long run equilibrium. From the above Table-4

5. Concluding Remarks
The above study examines the relationship between financial development and economic growth in India after the reform. This study shows the Indian financial system developing in compared to the pre reform period, basically the banking expansion and stock market development is the measure clue to the development of Indian financial system.

From the empirical analysis this study is enabling to explain the relationship between financial development and economic growth. To examine the relationship between financial development and economic growth in the short run and the long run, this study applied the vector error correction model. Before estimating the VECM, we checked the prerequisite of the vector error correction model, that is to check the long run relationship between all these variables, we have checked their order of integration of all these variables are non-stationary and also tested for Johanson cointegration test. Where the result found that there exist two cointegration equations. The result of VECM shows that in the long run the stock market is affecting economic growth negatively, because the market capitalization has negative effects on IIP, but the banking development, the increase of the bank credit affects the economy positive and money supply has negative growth impact on economics the long run, whereas trade openness has no impact on economic growth on long runs.

The short run stock market has a positive causal relationship to economic growth, and also bank development has also causal relationship to economic growth. Increasing of the money supply also cause to economic growth positively in the short run. From the VECM model we can conclude that stock market intervention has negative

impact on economic growth in the long run whereas in the short run the stock market has a positive impact on economic growth, same as the in the case of broad money supply as well. But in intervention of bank development has a positive growth effect on both long run and short run.

The financial infrastructure development indicators for the overall economy have a highly positive causation coefficient with the economic activity implying that they have developed together. The findings of the study suggest that the evolution of the financial sector tends to or is more likely to stimulate and promote economic growth when monetary authorities adopt liberalised investment and openness policies, improve the size of the market intone with the macroeconomic stability. Development of financial infrastructure can do a good job of delivering essential services and can make a huge difference to country's economic growth. Ensuring robust financial sector development with the minimum of crises is essential for growth and reducing transaction cost and inefficiencies as has been repeatedly shown by recent research findings.

To conclude an enhanced economic growth is responsible for financial development in the economy. This is quite obvious as with enhanced economic growth, the country opts for financial development. Hence, the dynamism of economic growth in the country will foster financial development and dynamism of financial development. Will foster economic growth in the economy. The policy implication of this result is that financial development is considered as the policy variable to accelerate economic growth and economic growth could be used as the policy variable to accelerate economic growth and economic growth could be used as the policy variable to generate financial development in the economy. Hence, to maintain sustainable economic growth, the government has to deepen the financial sector and undertake essential measures to strengthen the long run relationship between financial development and economic growth. These measures include more financial integration, minimise government intervention in the financial systems, increase the status of financial institutions, etc. these are very crucial and useful for strengthening the relationship between financial development and economic growth. The lack of same not only affects the finance-growth nexus but also overall socio-economic development in the country. Hence, government has to take the initiative with greater caution.

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