

**TO ANALYZE THE CAUSALITY BETWEEN
FINANCE AND ECONOMIC GROWTH? THE CASE OF INDIA**

By

SAJWAN, Surender Singh

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF PUBLIC POLICY

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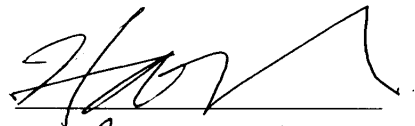
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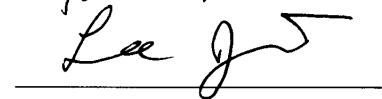
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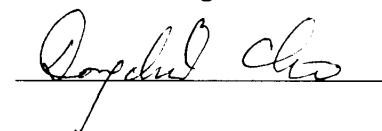
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ABSTRACT

TO ANALYZE THE CAUSALITY BETWEEN FINANCE AND ECONOMIC GROWTH? THE CASE OF INDIA

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This study investigates the causal relationship between financial sector development and economic growth in time-series format for India. The relationship examined empirically for the time period from 1952 to 2011. Recent studies favor undeniable importance of financial development and economic growth in cross-section and time series format. In this study the close association first will be investigated econometrically by augmented production function with financial development variable by using Ordinary Least Square Estimation Method (OLSEM). Secondly, the multiple variables will be checked for the causality between the growth rate of financial variables and economic growth. The regression results shows that the negative and meaningful relationship between one of the finance variables and economic growth. The Granger-causality tests show the bi-causality between finance variables (BRY and DEP)¹ and economic growth. However, there is also an evidence of one way causality between economic growth and finance variable (LOA)². Thus the empirical results do not clearly shows the positive and meaningful relationship between finance variables and rate of economic growth under isolation as there are some other external factors which can also result in economic growth such as investments, openness of the economy, population etc.. These control variables also studied empirically and was found that there is the significant relationship between control variables and economic growth. Thus, my empirical results do not clearly support the clear and positive relationship between financial development and economic growth.

1) BRY: - BRY is the broad money i.e. M3/Real GDP and DEP: - DEP is the quasi money or time deposit/Real GDP.
2) LOA: - LOA is the commercial loan given to private sector excluding government sector.

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Dedicated to Shalini Sajwan

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1. INTRODUCTION

There are numerous studies pertaining to causal relationship between finance and growth either in time series pattern or in cross-section format. These studies became obsolete when we are looking at the country specific dynamics as it is difficult to generalize the effect of financial development on growth or vice versa. There were some earlier studies done on India specific which was more focusing on the effect of financial variables on growth after the economic liberalization in the structure of endogenous growth model (Chakraborty, 2008). The debate on “financial development and economic growth has received the significant attention in both theoretical and empirical literature”(Esso, 2010) and it is still a very hot topic both for academics and for policy makers as the past result is still mixed and there is no common consensus on the effect of financial development on growth.

The main objective of this paper is to analyze the causal relationship between financial structure and economic growth in India. The empirical study will be in time series format where the periods under analysis will be from 1952 to 2011. This is an important issue in terms of its policy implications as various other studies have mixed results which is mainly due to the model and the variable they had used in analyzing the effect of financial and growth conjecture in time series format.

There are different views on the link or causality between the finance and growth. As per the supply leading view the financial sector penetration leads to economic growth. According to Levine (1997), “financial development provides efficient allocation of capital and helps in mobilizing savings and investment and also easy exchange of goods and Services”. According to Schumpeter (1911) the “full functioning financial system encourages technological innovation which results in growth”. There are also contrarian views which states that “financial repression by interest rate ceiling, exchange rate controls result in

negative real deposit rate of interest which reduces the supply of loanable funds which effectively means the slower down the productivity and efficiency which in effect slower the economic growth” (McKinnon (1973) and Shaw (1973)).

The demand leading hypothesis says that economic growth is the root cause of financial development. As Robinson (1952), and Friedman and Schwartz (1963) claim that the “development of financial sector is induced by economic growth due to higher demand of financial services”. Levine (2001) argues that economic growth may results lower fixed cost of joining financial intermediaries and causes financial sector to grow. Accordingly, some may argue that there is a two-way causality between financial development and economic growth (Patrick (1966)). Finally, Lucas (1988) argues that economist puts unnecessary overly emphasis on the causal relationship between the finance and growth.

So there are so many divergent views on financial development and economic growth and less convincing analysis on time series format. I will research on supply leading hypothesis that financial intermediation or financial liberalization leads to growth in India. Firstly, I will check the unit root in all the variables under consideration and then I will proceed for further analysis. Secondly, I will use time series data for longer period (1952 to 2011) which will incorporate the financial sector development before and after the liberalization (1991) of the economy in India. Lastly, I will perform the multivariate causality test to check the direction of causality. If the empirical analysis proves that financial sector intermediation leads to economic growth (one-way causality) then it has a straight away policy implication which in turns means that better financial structure will leads to better mobilization of capital, increases transactions and enable economy to increase the real GDP. This will enable policy makers to work more on financial sector reforms, better regulation and governance in order to enhance the flow of capital to those industrial sectors which are in

need and thus policy makers can implement better financial sector policies to increase the real GDP in India.

The remainder of this paper will proceed as follows. Section II will give a complete overview of financial development in India. Section III will give detail literature review. Section IV will introduce the methodology and Section V will provide empirical strategy. The remaining Section VI would explain main results and then it followed by conclusion in Section VII.

II: FINANCIAL DEVELOPMENT IN INDIA OVERVIEW

At the time of independence in 1947, there are around 600 commercial banks operated in India. However due to colonial baggage it was believed that these banks will favor only commercial loans and will not cover the entire population so “government of India (GOI) created State Bank of India (SBI)³ in 1955”(Joshi and Little 1997). Despite the creation of SBI, still the coverage was low as most of the lending was channeled to industries and corporate houses and negligible to agriculture and small medium businesses. This was due to the fact that there were still existing close ties between banks and business houses (Reddy, 2002b, P.338). There was also common widespread understanding that bank should channelize funds to those businesses which are important for economic expansion.

³State Bank of India (SBI) is the largest Indian bank by assets with its headquarters in Mumbai. It had an asset of US\$ 360 billion and 14,119 branches, including 173 foreign offices and 37 countries across the globe.

The nationalization of banking act 1969, due to the nationalization of 14 largest banks the deposit of public sector bank rose from 31% to 86%. The idea behind the nationalization was to expand the credit to other sectors and increase the reach to other section of the society. The

expansion continued and more and more banks were nationalized which has increased the share of deposit to 92%. Moreover the target for priority sector lending has also risen to 40%.

Having the right policy of distribution of funds in place could not hide the possible inefficiencies in the banking system in India. The second wave of liberalization started in Mid-1980 by introducing Treasury bills, money markets instruments and the deregulation of interest rates. However, most of the time before 1991, the government policy were repressonist thereby controlling credit and interest rate for financing the fiscal deficits. The CRR and the SLR level has seen a sharp increase from a level of 2% (CRR) and 25% (SLR) in 1960 to 15% (CRR) and 38.5% (SLR) in 1990.

The Narasimhan committee report 1991⁴, had initiated the banking sector reform in India. The reform agenda was to ease interest rate regulation, directed credit rules and entry deregulation for foreign banks in India. The objective of the reform was to open up the economy as more market based where prices can be set by market and more and more players can participate. The highlights of the Indian story since 1990 have been:

- 1) An average GDP growth rate of 7.2% achieved over the period 2000-01 to 2008-09 and the percentage share of services over GDP have increased.
- 2) High GDP growth rate was driven by domestic demand, consumption and investment;
- 3) The high average saving rate of 30.3 and investment rate of 30.4 as a percentage of GDP over the 2001-01 to 2008-09 period; and
- 4) The merchandise trade to GDP has increased from 23.7% in 2006-07 to 35% in 2007-08 likewise the two way capital flows as a share of GDP has increased from 41.8% in 1990s to 77.9% over 2000-09.

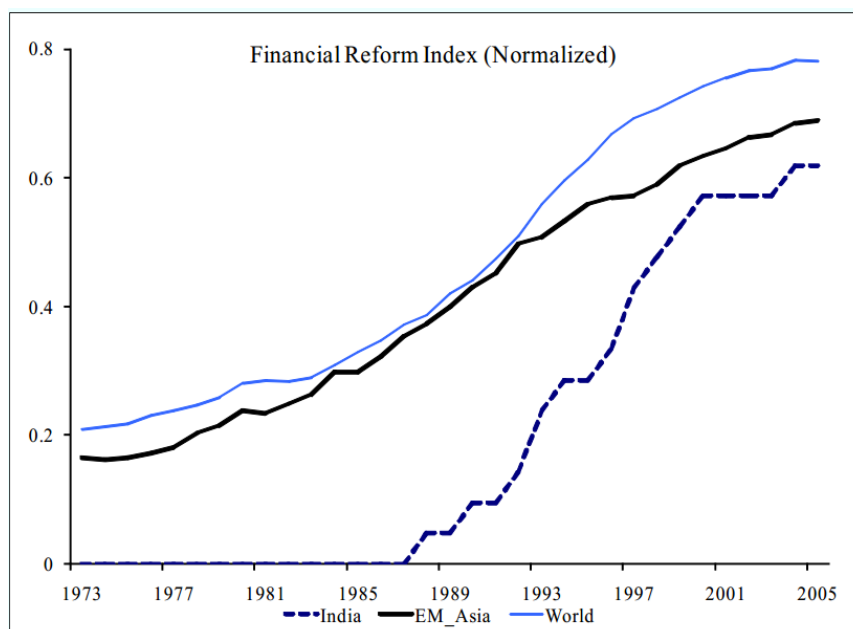
⁴The Narasimhan Committee was set up by M. Narasimhan the 13th governor of RBI in 1991. The objective was to suggest the recommendation to improve the health of the financial institution.

Select Macroeconomic Indicators, India, 1951-2009 (% of GDP)

Indicator	1951-52 to 1959-60 (average)	1990-91 to 1999-2000 (average)	2000-01 to 2008-09 (average)
Average GDP Growth	3.6	5.7	7.2
Agriculture	53.4	28.4	20.5
Services	29.7	51.5	54.4
Gross Domestic Saving Rate	9.8	23	30.3
Gross Fixed Capital Formation rate	11.1	23.6	30.2
Total Foreign Trade	13.3	19.6	35.7
Two-Way Gross Capital Flows	n.a.	41.8	77.9

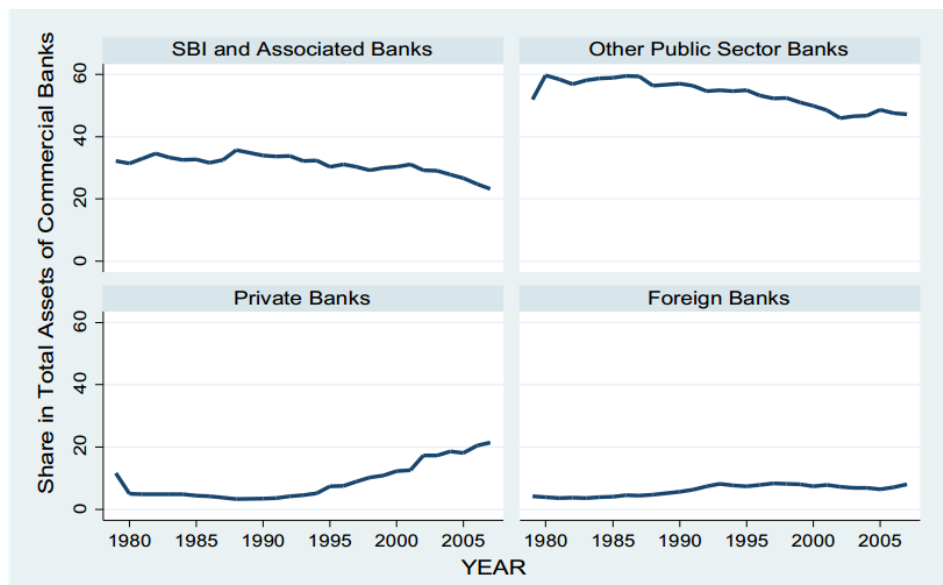
Source: Central Statistical Organization, Reserve Bank of India (RBI)

Financial Liberalization⁵ Upsurge in India compare to Asia and World



Source: - NIPFP-DEA Research Program, September 2010

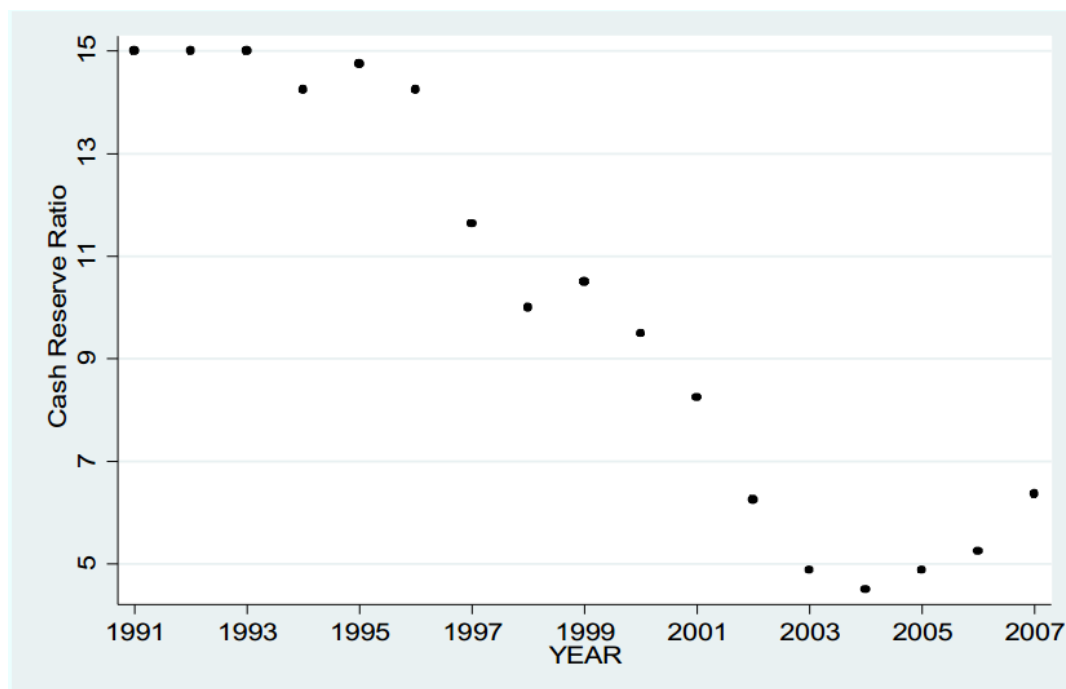
Share of Public Banks have Increased but Still 70 Percent is owned by Government



Source: - NIPFP-DEA Research Program, September 2010

⁵ Financial liberalization refers to reduction of any sort of regulation on the financial services industry of a given country.

Cash Reserve requirement has also decline sharply over the period



Source: - NIPFP-DEA Research Program, September 2010

Post Reforms:

Taxes have been rationalized, post reforms period on the basis of recommendations of Raja Chelliah Committee report⁶ after 1990. The high fiscal activism pre reform period had been curbed by the government through FRBMA⁷ (Fiscal Responsibility and Budget management Act) by tightening the fiscal management. Additionally, the reform in external sector has helped more capital flows in to India either in the form of FDI (Foreign Direct Investment) and FII (Foreign Institutional Investment) and also the exchange rate of India due to alignment with the international currencies had represent the fair value of Indian rupee vis-à-vis other currencies.

The old regulation of foreign exchange i.e. FERA⁸ (Foreign Exchange Regulation Act) has been replaced by more liberalized acts i.e. FEMA⁹ (Foreign Exchange Management Act). However, introduction of such measures were a prior condition by Central Bank of India to allow FDI and FII in India. Not only the foreign capital but private banks were also allowed to start the banking operations in India which was just the reversal of nationalization of banking sector in India – the erstwhile policy adopted pre reform period. Moreover, in 1993 foreign banks were allowed to enter India with more liberal stance.

The RBI (Reserve bank of India) post reform period had introduced various policy measures to strengthen the monetary policy which helped in developing various policy instruments for better and efficient financial management.

⁶ Dr. Raja Chelliah has given recommendations on tax reforms in India. The committee pointed out that indirect taxes should be levied not only on production function but also on consumption function as indirect taxes are neutral at central level and it should cover both commodity and services. The committee also recommended taxes on advertising, insurance, share-broking and telecom etc. on the same pattern as developed economies do. The committee envisaged that objective of service tax regime in India was to broaden the tax base, increase in revenue and broader participation of citizens in the economic development.

⁷ The Fiscal Responsibility and Budget Management Act, 2003 bill was passed by Parliament of India to streamline the financial discipline and look after the macro-economic management.

A Liquidity Adjustment Facility (LAF) was introduced in June 2000, as liquidity management instrument in order to control the short-term and the long-term interest rates. A lot of emphasis was put on this indirect channel of financial instruments as financial intermediary and other players in the financial market make their decision based on the outcome of LAF measures by RBI. Moreover, better financial institutions, better infrastructure and technological upgrade also helped in improvement of financial framework in India.

The influx of financial sector reforms has provided economy enough flexibility to bounce back from untoward events. After the reform period, the average annual growth rate was at above six percent which were not thinkable ten years ago. Even though Asian economic crisis (1997-98) shock didn't affect much the growth rate and the economy withhold the crisis period. Further the economic sanction imposed by western countries post nuclear test by India also didn't impact much the economic growth of India. The current global slowdown due to financial crisis or sub-prime crisis had impacted major banks all around the world but didn't impacted much the Indian economy to that extent.

Overall the financial sector is at zenith and continuing with innovative products to cater the financial needs of the customer. Banking and insurance sectors shows promising growth, private and foreign banks are giving run for the money to the public sector banks and this creates an environment where customer is gaining and benefitting from the better availability of well diversified financial products. The stock market which was regulated

⁸The Foreign Exchange Regulation Act (FERA) was introduced in 1973. FERA deals with strict regulations on checking the foreign exchange transactions inflow and outflow from the country. Post 1991 FERA was replaced by ⁹FEMA (Foreign Exchange Management Act)

by SEBI (Securities and Exchange Board of India) is the one of the best in the world and adopting best practices. RBI has been monitoring and controlling the banking sector reforms and also monitoring efficiently the operations of Non-Banking Financial Companies (NBFCs) in the country. Few reforms are still in process pertaining to legal provisions on fiscal and budget management, public debt, deposits, insurances etc. As per the finance ministry, the future reforms are under consideration related to banking regulations, Companies Act, Income tax, bankruptcy, negotiable instruments etc. However there are some social indicators which need more cautious approach such as availability of doctor per number of population, availability of medical facility, quality of primary schools, literacy rate- are among the area of concern.

The major challenges are the poverty and literacy rate which is the two biggest embarrassments and India is still on 128th position in terms of Human Development Index of the UNDP. Government is facing a serious criticism as the reforms which is more focusing on achieving higher growth rate and monetary management has neglected the more equitable distribution of resources to economically weaker section of the society. In other words, reforms have ignored the common man and mainly benefitted the few. However the future doesn't look bleak, as the planning commission of India while finalizing for the Eleventh five-year plan has done provision for inclusive growth i.e. which means include all those in the growth process which have been left out in the economic growth experienced by the country during past several years.

III: LITERATURE REVIEW

The importance of financial sector and economic growth is not a new buzz word. A large and diverse literature date back to a century can affirm the same view point such as Schumpeter (1912). There are also some recent research backing the same relationship between “financial sector development and economic growth” such as King and Levine (1993a), Levine (1998) and Rajan & Zingales (1998).

In 1911 Joseph Schumpeter argues that financial intermediaries plays an important role in allocating capital through mobilizing savings, assessing diverse projects, managing risks, monitoring managers and also facilitate smooth transactions – these are the key drivers for the technological innovation and economic development. The reason for economic development is that financial development helps entrepreneur’s to get funds to invest in their projects for better productive use. The paper by King and Levine (1993a) represent the cross country evidence with Schumpeter’s view using data on 80 countries over the period 1960-1989. They have found that the level of financial development is the good indicator and strongly associated with real economic growth rate and the rate of capital accumulation or investment. On the other hand, Berthelemy and Varoudakis (1996) claim that lack of banking development lead to “poverty trap” as lack of banking sector development reduces the net savings and investments which lead to fall in capital accumulation and growth. Many economists had questions the relationship between finance and growth. For example, Robinson (1952) shows that when “enterprise leads, finance follows” which states that growth leads to financial development not the other way round. Lucas (1988) has put emphasis on not to look so deeply in to the relationship between financial development and economic growth as this relationship is overly stressed. This has been put in perspective by

Ram (1999, P.164) that the empirical evidence on 95 individual countries shows that there is a “negligible or weakly negative covariance between financial development and economic growth”. This is the sharp contrast to earlier studies which are based on cross-country evidence and have been used in most research data. However, having said that we cannot deny the most theoretical studies which empirically prove that the “first order relationship between financial development and economic growth” (Levine, 1997).

Financial sector helps in screening the creditworthiness of firms, mobilize the savings, allocates resources and also reduce the transaction cost. This way the financial sector provide better platform to both firms and entrepreneurs to access the information and at the lowest possible transaction cost and information asymmetry. Levine (1997) simplified finance and economic activity into five basis functions: “1) facilitate the trading, hedging, diversification, and pooling of risk, 2) allocate resources, 3) monitor managers and exert control, 4) mobilize savings, and 5) facilitate the exchange of goods and services” (Levine, 1997 (P. 691)).

Predominantly there are two different views by theorists on financial development and economic growth: (1) the structuralists and (2) the repressionists. The structuralists view argues that underdeveloped financial market retards economic growth or in other words the developed country has well developed financial markets. The policy implication of this view is to aim at policy to expand the financial systems in order to increase economic growth. The more financial institution and the financial products helps in creating more capital accumulation and hence economic growth (see Goldsmith, 1969, Patrick, 1966, Thornton, 1996, Berthelemy and Varoudakis, 1998).

Therefore, it is of utmost importance to look into size and activity in order to assess the economic growth. The size and activity shows the deepening of financial sector which is the liquid liabilities relative to GDP. Nowadays we are also incorporating stock market development in order to assess the financial deepening by simply calculating stock market

capitalization over GDP. It is also an important measure of financial development. Levine and Zervos (1998) for example, “found that stock market and bank for 47 countries from 1976 to 1993 provide liquidity and promote economic growth”. In their paper, they have shown that stock market liquidity and banking development both positively predict growth, capital accumulation and productivity improvement even after controlling for economic and political factors.

For the less developed countries, “financial liberalization, stock market development and capital flows” play a major role in economic growth (Singh and Weisse (1998)). The policy implications were that the LDC’s should promote bank based systems, influence the scale and composition of capital flows. Rajan and Zingales (1998), examines the relationship between financial dependence and growth. They have argued that the firms which are dependent upon external finance for growth will grow much faster in those countries where financial markets are well developed. Finally, “when the interstate banking restriction is being relaxed, the real per capita GDP will rise significantly”. (Jayaratne and Strahan (1996))

The financial repressionists view, this term was first coined by Mckinnon (1973) and Shaw (1973) and they believe that the return on cash reserves or cash lying in the account is the important factor for capital formation and economic growth. According to their view the financial development on economic growth depends upon the financial liberalization i.e. free to move the interest rate depending upon the market and no government intervention on regulating the interest rates. The contention was that in most of the developing markets the interest rate were kept low in order to finance fiscal deficits without increasing tax or inflation. Such measures reduce the incentive to hold money and other financial assets and restrain investors to invest due to credit availability in the market. Thus financial repressions restrain the competition and reduce the supply of loanable funds available to the investors.

The Mckinnon-Shaw complementary hypothesis (1973) says that the money and capital are complements in developing countries in the absence of efficient financial systems. However there hypothesis has some mixed results. The evidence from Bangladesh by Ahmad and Ansari (1995) found weak support for this hypothesis. However some evidence for Mckinnon-Shaw hypothesis for the period 1970-1999 show some support for India and weak support for Srilanka (Dhakal, Pradhan and Upadhyaya (2002)).

There have been some recent study done by Rioja and Valev (2004) focusing on effects of financial development on growth in developed as well as developing countries. They have tested the hypothesis with panel data from 74 countries to check, whether financial development may affect productivity and capital accumulation differently in developed and developing economies. Rioja and Valev (2004) have found that finance has strong positive influence on productivity growth primarily in more developed economies however in case of less developed economies the effect of finance on output growth primarily happens due to capital accumulation. This recent study has shown the non-linearity in finance and development. During the starting stage of development, the per capita income and financial activity is at the lowest level however as the economy rose, the per capita income rises and increases the capital accumulation. Due to heighten activity, the financial market also becomes more active and started to offer many different types of financial instruments¹⁰.

There have been studies on endogenous growth approach. Greenwood and Smith (1997) develop two models to determine the role of financial markets in allocating capital to the highest use and the second model focuses on the role markets play in supporting economic activity. King and Levine (1993b) used internally derived variables to state that financial intermediaries have the ability to gather quality information about projects which otherwise may not be available to the investors and entrepreneurs.

There are some recent studies focusing on financial development and growth convergence. Aghio, Howitt and Foulkes (2004) states that the country's whose economic growth is in line with the technology growth will have positive financial development and steady state per capita GDP relative to the countries. They did the sensitivity analysis by employing interaction between real per capita GDP and the financial intermediation measure and found that the likelihood of US growth rate increases with financial development at the same level. Kim et al. (2010), shows that "financial development on growth convergence varies with the stage of real development" however such convergence of financial intermediation is more relevant and important for developed countries than for more industrialized.

After looking at all these literatures and empirical studies it has been clear that there is a significant effect of financial development and growth on each other which can also be checked with a causality test and some empirical studies has employed "Granger-Causality test" (1969) to check the direction of the causality. If this can be determine with a good accuracy then it has a policy implication and will help policy makers to design their policy accordingly. For example, Sinha and Macri (2001) did the Granger-Causality test on eight Asian countries for the time period between 1950-1997 and found the mixed results for India, Japan, Korea, Malaysia, Pakistan, Philippines, Srilanka and Thailand. However these results may be distorted due to the time period taken as most of the Asian countries the financial liberalization happened during 1990's and the studies captures only few years in 1990's so the result may not be fully correct. Secondly, in time series analysis it is also very important what kind of control variable are we using and its implication on dependent variable.

¹⁰ A financial instruments is those assets which can be tradable such as cash, stock or ownership in the company, derivatives and long-term debts.

However there was unique in terms of employing multivariate causality tests. My study will not be different from Sinha and Macri (2001) in terms of the approach and it will complement each other however it will be differ in time period analysis (1952 to 2011) and the control variable usage.

Having said that there are various studies on the relationship between financial development and economic growth however each and every study is unique and distinct in its own sense. For example, what works in developed countries may not work similarly in less developed countries as the pattern of growth and financial development is different. However, if policy maker knows the impact and causality direction of financial development and growth from the best case example and their own country empirical analysis then they are in better position to take informed decisions.

Data for these studies have been taken from *Reserve Bank of India website, World development Indicator and International Financial Statistics (2012)* of the International Monetary fund. Annual data is used for India for the Period 1952-2011.

IV: METHODOLOGY

First of all I will perform extensive unit root test on all the variables and if I find there is an existence of non-stationarity on any of the variable then I will take the first difference or lag of that variable and make it stationary. In most of the cases the first difference of growth rate turns out to be stationary. Secondly I will perform cointegration test to check the long-term stable relationship or equilibrium between growth and financial development indicator variable. If these variable are non-stationary i.e. $I(1)$ (as I will check this with unit root test) then there linear combination is stationary $I(0)$, if that is the case then we can say that both the variables are cointegrated. In short, I will check the residuals of both the variables and

perform the unit root test and see whether they are I (0) or stationary. As said by Granger, the test of cointegration is the initial test to avoid any “spurious regressions”.

Lastly, after checking for unit root and cointegration, I will perform multivariate test with the growth rate of all the variables. This is very important test as I am going to check the causality between the variables (all these variables will be converted in to log form so that there first difference gives the growth rates). The validity of causality test is ensured if the variables are stationary or if they are cointegrated, with pre-condition of checking for unit root test and cointegration tests which I will check before proceeding with any analysis. If the variable under consideration has found to have unit root, then I will take the first difference of that variable before proceeding for causality test.

There is no denying fact that it is important to study cross-country regressions to judge the growth effects on financial development. However, it is also possible and important to study the same for individual country level. For the same purpose, I used variable such as DEP, which is the ratio of deposit to ‘GDP’ and LOA, Which is the ratio of private credit to ‘GDP’ are seems to be of prime importance as they are widely used financial development indicator and the data for these variables are available more readily.

In this study the relationship between financial development and economic growth is measured by using the model develop by Rati Ram (1999), which was defined as follows:

$$GY = \beta_0 + \beta_1(GL) + \beta_2(GX) + \beta_3(IY) + \beta_4(DEPY) + \beta_5(LOA) + \beta_6(BRY) \quad (1)$$

Where,

GY = Growth rate of real GDP.

GL = Growth rate of population.

GX = Export-Import to real GDP.

IY = Investment over real GDP.

DEP = Deposits over GDP.
LOA = the ratio of loan to GDP.
BRY = Broad money to GDP

As cited above, DEP and LOA are the standard financial development indicators and the data for the same is collected for the time period 1952 to 2011. Before estimation of the above variable, both dependent and independent variable are subjected to stationary test. Unit root test is used to find out whether the variables are stationary or not. If the time series is non-stationary and if we take the first difference or lag of the series and make it stationary, then we say that the particular series is random walk and integrated of order one or greater.

It has been known from many literatures, the measure of financial development predominantly constitutes from money stock level i.e. M2, to the level of nominal GDP (World Bank, 1989; King and Levine, 1993a). This measure well in line with McKinnon's claim that before any real self-finance investment to take place it is imperative to have the well stock money balances. There is another view which is not similar to McKinnon's view i.e. Debt-intermediation approach which was developed by Gurley and Shaw (1955) and further followed by McKinnon and Shaw. This approach was based on the fact that in developing economies currency is the major portion of broad money which is held outside the banking system. Therefore, if the broad money ratio rises it clearly shows the extensive use of currency in developing economies at initial stage of economic development however the currency portion will drop as economy grows and deposits component starts increasing. In other words, the extensive use of currency is used in initial stages of economic development which would replace by deposits as economy grows. Due to the same reason I will drop currency in circulation from the broad money and specifically measures ratio of bank deposit liabilities to nominal GDP.

The second measure of financial development is the loan given to commercial sector to nominal GDP. This measure provides direct information on financial intermediation in the country. This ratio can provide additional information pertaining to bank deposit liability ratio. For e.g., it might be possible that deposit may be rising but credit off-take is still lower or stagnant. This kind of information may give us an insight and the reason for such behavior as some time government policy are more in favor of increasing saving and put a higher cap on reserve requirement on banks. So in such a case, bank cannot lend more or in the same proportion as deposit increases. This variable is of utmost importance as shown by Mckinnon and Shaw inside money model, which states that” supply of private credit to the market is responsible for quality and quantity of investment and for economic growth”, so this variable can exert some causal influence on real per capita GDP.

Both financial ratios are indicative of stages of financial development. The increase in ratios can be interpreted as financial deepening. Using the standard practice (King and Levine, 1993a, b) the “indicator for economic growth is real GDP per capita”. It is known fact that GDP per capita figures are prone to fewer errors as compared to total GDP figures. The reason is that the errors which affect the GDP figures are somehow offset by population. Also, the national account indicators are less reliable as “compare to other development indicator such as health and education”. (Srinivasan, 1994).

I will drop the stock market analysis due to availability of data from 1980 onwards and the real stock market activity has started from 1991 onwards. Secondly, India has the bank-based financial structure even though the stock market activity has risen considerably but still major credit is being loaned by banks and companies are dependent upon banks for credit supply.

Besides using various financial development and economic growth indicators I will also use control variables which are either associated with financial activity or economic

growth. In this regard, the gross fixed capital formation, population and open-ness of economy i.e. trade ratio will be used.

All the variables in our data set are transformed in to natural logarithms in order to get the growth rate. The data source for all the series is the RBI (Reserve Bank of India) for the finance variables such as broad money, private credit to commercial sectors, deposit ratio and World Development Indicators statistics database is used for GDP, Gross fixed capital formation and trade ratio data.

V: EMPIRICAL STRATEGY

Before estimating the model shown by equation (1) to explain the explanatory variable, I first use the unit root test on dependent and independent variable separately. The test for unit root used is the “Augmented Dickey-Fuller (ADF)” (see Dickey and Fuller (1979) and (1981)) test which estimates the following equation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

In Eqn. (2), $\{Y_t\}$ is a random walk with drift around a deterministic trend. Δ is the first-difference or lag operator, t is a linear trend and ε_t is a pure white noise error term and where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. We can include lag difference term as many which is often determined empirically; the idea is to include the term enough so that the error term in eqn. (2) is serially uncorrelated. By doing this, we can get an unbiased estimate of δ , the coefficient of lagged Y_{t-1} .

In ADF test we test as follows:

Null Hypothesis: $H_0: \delta = 0$ (i.e., there is a unit root or the time series is non-stationary, or it has a stochastic trend).

Alternative Hypothesis: $H_1: \delta < 0$ (i.e., the time series is stationary, possibly around deterministic trend)

For all the variables the unit root tests are conducted with or without a trend. We will further do cointegration test to check whether non stationary time series are cointegrated in same difference and regression is not spurious. One of the objectives of the cointegration test is to check and verify the causal relationship between the economic growth and financial development which will be checked further by Granger Causality Tests (Granger, 1969). Cointegration tests are carried out by well-known Engle and Granger (1987). The Engle-Granger involves testing the null hypothesis of non-cointegration between x_1 and x_2 as follows:

$H_0: a = 1$ and $H_1: a < 1$ where:

$$\Delta u_t = a u_{t-1} + c_1 \Delta u_{t-1} + \dots + c_k \Delta u_{t-k} + v_t \quad (3)$$

and $u_t = x_{1t} - b_1^{OLS} - b_2^{OLS} x_{2t}$

After checking for the cointegration then I will perform the block Granger non-causality test in vector autoregressive model:

$$Z_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^p \Phi_i Z_{t-i} + \Psi \omega_t + \mu_t \quad (4)$$

Where Z_t is an $n \times 1$ vector of jointly determined endogenous variables, t is a linear time trend, w_t is a $q \times 1$ vector of exogenous variables, and u_t is an $n \times 1$ vector of unobserved white noise or disturbances. Let $z_t = (z'_{1t}, z'_{2t})'$, where z'_{1t} and z'_{2t} $n_1 \times 1$ and $n_2 \times 1$ are subsets of z_t and $n = n_1 + n_2$. Now the block decomposition can be expressed as follows:

$$Z_{1t} = \alpha_{10} + \alpha_{11} t + \sum_{i=1}^p \Phi_{i,11} Z_{1,t-i} + \sum_{i=1}^p \Phi_{i,12} Z_{2,t-i} + \Psi_1 w_t + \mu_{1t} \quad (5)$$

$$Z_{2t} = \alpha_{20} + \alpha_{21t} + \sum_{i=1}^p \Phi_{i,21} Z_{1,t-i} + \sum_{i=1}^p \Phi_{i,22} Z_{2,t-i} + \Psi_2 W_t + \mu_{2t} \quad (6)$$

The hypothesis that the subset Z_{2t} do not ‘Granger cause’ Z_{1t} is given by

$$H_G: \Phi_{12} = 0 \text{ where } \Phi_{12} = (\Phi_{1,12}, \Phi_{2,12} \dots \Phi_{p,12}).$$

I will use the test on the variable as mentioned in eqn. (1) and also these variables are used in most of the earlier studies. The following variables are used which are divided as income variables such as GY and GPY, finance development indicator variables such as DEPY and PCY and lastly the explanatory variables such as EXIMY and GL. Now in the next section we will see the results from the regression performed.

VI: RESULTS

The starting steps in the analysis are to check the degree of integration among each of the variables. For this purpose, I test for the existence of unit root in the level and first difference of logarithm of each of the variable in the sample by using well known “Augmented Dickey-Fuller test” (Dickey and Fuller, 1981). The result of unit root is reported in table 1 (which contain all variables in their levels) while in table 2 (reports the test for variable in first differences).

Table 1.

	H₀: Unit root in X
Series	ADF-test results
GY	3.456(-3.566/-2.922/-2.596)
GRM1	-5.326(-3.567/-2.923/-2.596)
GRM3	-4.183(-3.567/-2.923/-2.596)
GRDC	-4.573(-3.655/-2.961/-2.613)

GL	12.117(-3.566/-2.922/-2.596)
GDEP	-4.334(-3.567/-2.923/-2.596)
IY	-0.137(-3.567/-2.923/-2.596)
LOA	2.015(-3.648/-2.958/-2.612)
BRY	2.786(-3.566/-2.922/-2.596)
GX	5.583(-3.641/-2.955/-2.611)

Values within the () are Mac Kinnon critical values according to the 1%, 5% and 10% significantly level respectively.

Here in this case the variable which doesn't show unit root is GRM1, GRM3, GRDC and GDEP i.e. these variables are stationary at level. However for rest of the variables I will take first difference and perform again ADF test, which will make the variable stationary.

Table 2.

	H₀: Unit root in X
Series	ADF-test results
GYD1	-7.375(-3.567/-2.923/-2.596)
GXD1	-3.556(-3.648/-2.958/-2.612)
GLD1	-7.616(-3.569/-2.924/-2.597)
IYD1	-9.043(-3.569/-2.924/-2.597)
LOAD1	-4.524(-3.655/-2.961/-2.613)
BRYD1	-4.442(-3.455/-2.833/-2.598)

Values within the () are Mac Kinnon critical values according to the 1%, 5% and 10% significantly level respectively.

For all those variables which are non-stationary at outset and become stationary by first difference will further subject to co-integration test. If those non-stationary time series or variables are cointegrated in same difference and regression is not spurious and usual t and F tests are valid (Gujarati, 1995). The tests results show that financial development indicator is cointegrated with annual growth rate of GDP. Thus it implies that various policy shifts post

1991 reforms or liberalization which could have created structural breaks haven't impacted much the long-run relationship between financial development and economic growth.

Before we look in to the causal relationship first we will check the result of the regression equation (1) as specified earlier:

- 1) DEP: - the growth rate in deposit over real GDP is not significant in both the regressions even though it has an expected positive sign.
- 2) BRY: - the broad money i.e. M3 is significant at 1% level. There was a significant increase in deposits during 1991 to 2000 as many private banks and NBFC's have floated fixed deposits as the banking norms were eased by the government and gave ample opportunity for private and foreign banks to capitalize their positions in India.
- 3) LOA: - the growth rate in the loan given to the commercial sector variable is not significant even though it has an expected positive sign. The rate of private credit was lower than the rate of deposit simply because post liberalization for the first 10 years, the CRR i.e. Cash Reserve Ratio was pegged very high at more than 10% for most of the time, which was declined from 2000 to 2011 which shows a clear sign of more credit can be given to the market and also increase in investments shows that the commercials sectors used more credit as provided by the banks.
- 4) IY: - the growth rate in investment over GDP is significant at 5% and 10% level and it has an expected positive sign.
- 5) GX: - the openness of the economy i.e. the ratio of export-import/GDP shows a negative sign in all four regressions and it is significant at 1% level. This clearly shows that India is the net importer and which is depicted by negative relationship between economic growth and trade over GDP ratio. The majority of the import is non-food items, which is the crude oil constitutes nearly 70% of the overall import

and the majority of the export is driven by IT services industries rather manufacturing industry as perceived commonly.

- 6) GL: - the growth rate in population has negative sign in all four regressions again contrary to the expectations and it is not significant at any level.

It is very much clear that it is not correct to make any complete analysis on the effects of financial development variables on economic growth. The point here is that these regressions do not say much about causation between the variables. Thus we will examine the causal relationship between the financial variables and economic growth by “Granger non-causality tests” (Granger, 1969). The result of the causality test is shown as below:-

- 1) There is a one way causality between LOA and GY i.e. economic growth causes the ratio of increase in private credit to the commercial sector, which is the financial development indicator variable. However the reverse is not significant as per the test (5% significance level)
- 2) There is a one way causality between IY and GY i.e. Gross fixed capital formation causes economic growth however the reverse is not true (significant at 10%)
- 3) There is no causal relationship between GY and GX at 1%, 5% and 10% significance level.
- 4) There is a bi-causality between BRY and GY and this relationship is significant at 1% level.
- 5) Similarly bi-causality between DEP and GY and this relationship is significant at 1% level.
- 6) There is no causal relationship between GY and GL at 1%, 5% and 10% significance level.

Table3: Granger Causality Test Results

Null Hypothesis	Casual Inference	Test Stat. (*)	Probability(**)
LOA does not Granger Cause GY	Accept H0	3.25 (4)	0.516(4)
GY does not Granger Cause LOA	Reject H0	12.6(4)	0.013(4)
IY does not Granger Cause GY	Reject H0	7.88(4)	0.096(4)
GY does not Granger Cause IY	Accept H0	6.48(4)	0.166(4)
GY does not Granger Cause GX	Accept H0	2.19(4)	0.334(2)
GX does not Granger Cause GY	Accept H0	2.81(4)	0.245(2)
GY does not Granger Cause BRY	Reject H0	18.817(4)	0.001(4)
BRY does not Granger Cause GY	Reject H0	11.68(4)	0.020(4)
GY does not Granger Cause DEP	Reject H0	27.85(4)	0.000(4)
DEP does not Granger Cause GY	Reject H0	33.71(4)	0.000(4)
GY does not Granger Cause GL	Accept H0	6.00(4)	0.199(4)
GL does not Granger Cause GY	Accept H0	5.25(4)	0.262(4)

Note: The test statistic shows the chi-square value. The probability refers to the probability of accepting the null hypothesis of no causality.

* shows the number of lags.

** shows the degree of freedom of chi-square.

In short I have found the bi-directional causality between financial development and economic growth except LOA and one control variable which is IY. This shows that economic growth leads to more credit off-take by commercial sectors obviously for their business expansion. Moreover, one way relationship between IY and GY suggest that economic growth leads to more investment and these increase in investment is initiated by more credit off-take by commercial sectors. So GY leads to more credit off-take and GY also leads to more investments which implies more credit of-take results in higher investments by commercial sectors. However this relationship cannot be interpreted in isolation without the understanding of the other financial development indicator such as BRY and DEP which is significant and has bi-causal relationship with economic growth.

Table 4. Shows the estimated result of the model using OLSEM. All variables have expected sign as formulated in the model. The relationship between GY and GX and BRY and IY are statistically significant however the relationship between GY and GL and DEP and LOA are not statistically significant because the calculated t value of them is lower than the critical t-values.

Table 4: Estimations Results

Variable	Coefficient	Std. Error	T-stat	P-value
GX	-0.1885	0.0459	-4.11	0.000
GL	-0.0355	0.0244	-1.45	0.156
BRY	-0.6496	0.2161	-3.01	0.005
LOA	0.1287	0.1038	1.24	0.224
DEP	0.0566	0.1090	0.52	0.607
IY	0.0900	0.0459	1.96	0.050
C	0.0858	0.00831	10.32	0.000

$R^2 = 0.50$

VII: CONCLUSION

The objective of this paper is to understand the relationship between financial sector development and economic growth in India. The empirical results show that there is a bi-causal relationship between financial development indicators (such as BRY and DEP) and economic growth. BRY and economic growth is significant but has negative relationship because pre-liberalization era i.e. before 1991 the major portion of broad money was constitute by currency circulated in the market which had an impact on economic growth as more and more public was holding cash rather depositing it in banks. However after the 1991 financial sector reforms, the situations reverse which has accounted higher deposit as policy was favorable for depositors and thus for banks to give out more lending to the commercial sector.

DEP has seen an upsurge in post reform period and the same was reflected in the empirical analysis which shows that there is a bi-casual and positive relationship between the growth in deposit and economic growth. However there is a one way relationship between

economic growth and LOA which clearly depicts that economic growth leads to increase credit off-take by commercial sector. Hence it would be improper to conclude that financial development leads to economic growth without understanding the direction of causality and the effect of the other control variables.

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APPENDICES

APPENDICES

Appendix. Descriptive Statistics

A.1. Descriptive statistics at level

Variable	Obs	Mean	Std. Dev.	Min	Max
gy	61	14996.38	13457.14	3025.99	55958.56
gx	42	13.62357	16.91337	.49	68
iy	60	21.87667	6.483313	11.1	39
dep	61	22.33049	17.33771	2.91	60.25
loa	41	26.25805	10.95404	11.37	50.82
bry	61	38.09131	18.66858	18.09	80.19
gl	60	1.9	.3025317	1	2

gy = real GDP

gx = openness of the economy which is measured by trade over real GDP

iy = investment over real GDP

dep = quasi money over real GDP i.e. Time deposit or M2 over real GDP

loa = loan over real GDP i.e. private credit to commercial sector over real GDP

bry = broad money or M3 over real GDP

gl = growth rate in population

A2. Descriptive statistics at growth

Variable	Obs	Mean	Std. Dev.	Min	Max
loggy	61	9.268678	.827003	8.014994	10.93237
loggx	42	1.783041	1.402412	-.7133499	4.219508
logiy	60	3.045851	.2801616	2.406945	3.663562
logdep	61	2.733071	.9351331	1.068153	4.098503
logloa	41	3.186491	.4094686	2.430978	3.92829
logbry	61	3.528035	.472401	2.895359	4.384399
loggl	61	6.524681	.3686158	5.899898	7.091742

loggy = growth rate in real GDP

loggx = growth rate in trade openness of the economy

logiy = growth rate in investment over real GDP

logdep = growth rate in quasi money or M2 over real GDP

logloa = growth rate in private credit over real GDP

logbry = growth rate in broad money or M3 over real GDP

loggl = growth rate in population over previous year.

A3. Correlation, 1952-2012

	loggyd1	loggxd1	logiyd1	logdepd1	logload1	logbryd1	gld1
loggyd1	1.0000						
loggxd1	-0.3439	1.0000					
logiyd1	0.2366	-0.0725	1.0000				
logdepd1	-0.2451	-0.3374	0.0844	1.0000			
logload1	-0.1768	-0.0036	-0.2507	0.3845	1.0000		
logbryd1	-0.3537	-0.3503	0.0408	0.8401	0.5208	1.0000	
gld1	-0.1926	-0.0495	-0.0357	0.0370	-0.2103	-0.0208	1.0000

A4. Trend Analysis Two dimensional

