Financial Development, Inflation and Economic Growth in India: Issues and Evidences

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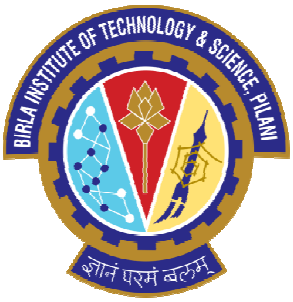
Prof. A.K. Giri



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CERTIFICATE

This is to certify that the thesis entitled, “Financial Development, Inflation and Economic Growth in India: Issues and Evidences” submitted by Madhu Sehrawat ID No. 2011PHXF401P for award of Ph.D. degree of the Institute, embodies original work done by her under my supervision.

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To My Parents

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ABSTRACT

The rate of real GDP growth is considered to be an important macroeconomic indicator for evaluating economic performance of any economy. Thus, it is necessary to investigate the main drivers of economic growth to improve the economic performance of any country. Further, the theoretical literature confirms that the level of financial development is pivot to economic growth (Levine, 1997; Graff, 2003). The relationship between financial development and economic growth has been the focus of an immense body of theoretical and empirical research since the 19th century. The debate over the decades has been whether the financial sector actually leads the economic growth or the vice versa. To date, this view is not conclusive and the debate on the relationship between financial development and economic growth is still on-going.

The empirical evidence suggests that the relationship between financial development and economic growth is sensitive to the chosen proxy for financial development (Adu et al., 2013). The current study investigated the relationship, both at the national (Indian economy: time series data over the time period 1982-2013) and sub national level (28 states: panel data over the time period 1993-2013) for Indian economy. Both the studies confirm a long run relationship in financial development and economic growth for Indian economy. Both the studies support the supply-leading hypothesis and highlight the importance of financial development in economic growth. It is also found that the growth effect of financial development is sensitive to the choice of proxy used to measure financial development. The empirical findings indicate that the Indian bank-centric financial sector has the potential for economic growth through credit transmission. The present study recommends appropriate reforms in the financial institutions to attain sustainable economic growth. The findings will be useful for India's policy makers in order to maintain the parallel expansion of financial development and economic growth.

Another important factor is the relationship between inflation and economic growth. The prime objective of macroeconomic authorities is to achieve high economic growth in combination with low and stable inflation. This is the reason why the relationship between inflation and economic growth has long been an issue of debate among the policy makers and researchers. Further, it is argued in macroeconomic literature that inflation has an adverse effect on economic growth after it crosses a threshold limit, below which inflation has a positive effect on economic growth (Khan and Sehnadji, 2001).

Empirical studies conducted in the last two decades across the world have confirmed the negative and the non-linear impact of inflation on economic growth, which provides the idea of the threshold point of inflation. In view of the structural changes of Indian economy and changes in the methods of calculating price index with 676 baskets of commodities, the present study re-examines the threshold effect of inflation on economic growth. The empirical results would provide new insights to monetary policy makers on crafting appropriate policies for achieving sustainable economic growth. The study estimated the nonlinear regression model to examine the non-linearity between inflation and growth, further logistic smooth transition regression (LSTR) method is employed to find the threshold level of inflation for the period 2004:Q1 to 2014:Q2. The robustness of the results are also checked.

On the relationship between inflation and economic growth, we have strong evidence in favor of nonlinear relationship. The estimated threshold level of inflation is found at 6.75 percent in India. Below this level, there exists a significant positive relationship between inflation and growth, while above this threshold level, inflation retards growth performance. Sensitivity analysis confirmed the robustness of empirical results. The findings suggest that bringing inflation below the threshold level of 6.75 percent should be the goal of macroeconomic policies. The outcome of this study will be relevant to monetary policy makers and academicians interested in the trade-off.

There is a shortcoming of economic growth/performance if we talk about the well being-ness of the people of an economy. Economic growth is a part of economic development; if we are concerned about the reach of everyone for this growth then this gives an idea of inclusive growth. Therefore, the next issue is to examine the relationship between financial development and inclusive growth in India. This relationship consists of three sub categories (i) Financial development, economic growth and income inequality (ii) Financial development, economic growth and poverty reduction and (iii) Financial development, economic growth and Human development.

(i) Financial development, economic growth and income inequality: The study employed the Auto Regressive Distributed Lag (ARDL) bounds testing approach to co-integration to examine the existence of a long run and the short run relationship between financial development and income inequality in Indian economy using the time series data from 1982 to 2013. The study

used ADF, DF-GLS, KPSS and Ng-Perron unit root tests to check the stationarity properties of the variables. The study makes a clear comparison between market based indicator and bank based indicator of financial development in India and those examining the relationship between finance and income inequality nexus. Further, the study used the Gini coefficient as a proxy for inequality and also examined the basic principles of Greenwood Jovanvich (GJ) Hypothesis. The bounds test confirms a long run relationship between financial development and income inequality in India. The ARDL test coefficients suggest that financial development, economic growth, inflation aggravates the income inequality in both long run and short run. However, trade openness reduces the gap between rich and poor in India. The present study recommends for appropriate economic and financial reforms focusing on financial inclusion to reduce income inequality in India.

(ii) Financial development, economic growth and poverty reduction

The issue of financial development, economic growth and poverty reduction linkage has been examined by employing the Auto Regressive Distributed Lag (ARDL) bounds testing approach by Pesaran et. al (2001) and Granger based VECM causality for the annual time series data from 1970 to 2013 for Indian economy. The study attempts to answer the critical question: does financial sector development lead to poverty reduction?. The co-integration test confirms a long run relationship between financial development and poverty reduction for India. The ARDL test coefficients suggest that financial development and economic growth, reduces poverty in both long run and short run. The causality test results confirm that there is a positive and unidirectional causality running from financial development to poverty reduction in India. This study implies that poverty in India can be reduced by financial inclusion and financial accessibility to the poor. For a fast growing economy with respect to financial sector development this may have far-reaching implication towards inclusive growth.

(iii) Financial development, economic growth and Human development.

The next issue of present study is to examine the relationship between financial development indicators and human development in India, uses annual data from 1980-2013. To examine the long run properties and short run dynamics, the study employed the ARDL bounds testing approach to co-integration and Granger non-causality proposed by Toda and Yamanto (1995) is

adopted to investigate the causal linkage among the variables. Further, in order to compare the contribution of financial development indicators to the change of human development in Indian economy, the variance decomposition approach is employed over the sample period. It is used to divide each variable's fluctuated share to react to the shock given to variables pattern, for this reason we can measure a variable share on other variables changes over time.

The results confirm a long run relationship among the variables. The results of granger non causality indicate that unidirectional causality runs from financial development indicators to human development index. The Variance decomposition analysis shows that among all the financial indicators, broad money supply (M3) has the largest contribution to changes in human development in India. The present study recommends for appropriate reforms in the financial market to attain sustainable human development in India. The findings will be useful for India's policy makers, in order to maintain the parallel expansion of financial development and human development.

To sum up it can be deduced that financial development encourages economic growth, whereas it aggravates the income inequality. The indirect channel of financial development helps in poverty reduction, which implies that via the channel of economic growth, financial development reduces poverty. It also helps in the improvement of human development.

Key words: Financial development, Auto regressive distributed lag approach (ARDL), India, Panel Co-integration, Panel Causality, Indian States, Inflation, economic growth, threshold inflation, Income inequality, Gini, Poverty reduction, Human development, Variance decomposition test, fully modified OLS (FMOLS).

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List of Abbreviations

ADB	: Asian Development Bank
ADF	: Augmented Dickey-Fuller
AIC	: AIC Akaike information criterion
ARDL	: Auto regressive distributed lag
BB	: Number of all scheduled commercial bank branches in a state
BSE	: Bombay Stock Exchange Limited
BR	: Domestic credit provided by the banking sector
CREDIT	: Domestic credit to private sector
CALL	: Call money rate
CPI	: Consumer Price Index
CR	: The ratio of credit amount as a share of the state's output (gross state domestic product) in the same state
CSO	: Central Statistical Office
CUSUM	: Cumulative residuals
CUSUMSQ	: Cumulative sum of squares of recursive residuals
DF	: Dickey-Fuller
ECM	: Error Correction Model
FDI	: Financial development index
FINDEP	: Financial deepening
FMOLS	: Fully modified ordinary least squares (OLS)
GGDP	: Growth rate of gross domestic product
GINI	: Gini coefficient
HDI	: Human development index
HQ	: Hannan-Quinn information criterion
IFS	: International Financial Statistics
INF	: Inflation
IPS	: Im, Pesaran and Shin
JJ	: Johansen-Juselius co-integration
KPSS	: Kwiatkowski–Phillips–Schmidt–Shin
L	: Natural logarithm of the variable

LLC : Levin-Lin-Chu

LSTR : Logistic Smooth Transition Regression

Δ : First difference of the variable

M3 : Broad money supply

MCAP : Market capitalization

NCERT : National Council of Educational Research and Training

NSDP : Net state domestic product

NSS : National Sample Survey

NSSO : National Sample Survey Organization

NHDR : National Human Development Reports

OIL : Crude Oil

PCA : Principal Component Analysis

PD : The ratio of deposit amount as a share of the state's output (gross state domestic product) in the same state

PGDP : Per capita gross domestic product (GDP)

PGSDP : Per capita gross state domestic product (GSDP) at factor cost

PSTR : Panel smooth transition regression

PP : Philip-Perron

POV : Poverty reduction variable

RBI : Reserve Bank of India

SADC : Southern African Development Community

SC : Schwarz information criterion

TBDL : Total Bank Deposit Liabilities

TOP : Trade openness

UECM : Unrestricted error correction model

UNDP : United Nations Development Programme

VAR : Vector Auto Regression

WGDPG : World's GDP growth

WPI : Wholesale Price Index

CHAPTER 1

Introductory background, Issues and objectives of the study

1.1 Introduction

The interrelationship between financial development, inflation and economic growth has been considered crucial for any economy. Further the role of financial development is considered necessary for inclusive growth and sustainable development for any developing economy. Therefore, the above mentioned issue has been subjected to empirical scrutiny in many countries over the years.

Empirical research on this area centers around a few interesting issues. They include; (1) role of financial development on economic growth (2) role of market based and bank based indicators of financial development on economic growth (3) threshold effect of inflation on economic growth (4) financial development and income inequality (5) financial development and poverty (6) financial development and human development. Starting from the pioneering work of Schumpeter (1911), Robinson (1952) and Patrick (1966) to the recent attempt by Samargandi et al. (2015), the literature covering various issues has been very voluminous, Nevertheless, most of the issues in general and the issue of financial development and inclusive growth in particular remain unresolved in Indian context. The issues, however, assume importance in the context of the economy experiencing innovations, deregulations, structural, technological and institutional changes in the recent past.

Therefore, in the present context, it is necessary to re-address some of the issues associated with the linkages between financial development, inflation and economic growth in the perspective of Indian economy where the above mentioned changes have taken place in recent years. It is felt that such a study would throw some light on how accurately and reliably the policy makers can take decision to achieve economic growth and sustainable inclusive growth in Indian economy.

1.2 Financial development, Inflation and economic growth: some issues

1.2.1 Financial development and economic growth

It is considered that financial development is a vital factor that influences the economic growth in an economy. Most of the developing countries give great attention to financial sector development to promote economic growth. Financial development can be defined as the policies, factors, and the institutions that lead to the efficient intermediation and effective financial markets. A strong financial system offers risk diversification and effective capital allocation. The greater the financial development, the higher would be the mobilization of savings and its allocation to high return projects. Financial development can be measured by a number of factors, including the depth, size, access, and soundness of the financial system. It can be measured by examining the performance and activities of the financial markets, banks, bond markets and financial institutions. It is observed that higher the degree of financial development in a country, the wider will be the availability of financial services. A well-structured financial system is important to boost the economy.

Further, the relationship between the financial development and economic growth has been one of the most heavily researched topics in recent years among the researchers. Many researchers have tried to conceptualize how the development and structure of an economy's financial sector affect economic growth and what are factors affect domestic savings, capital accumulation, and income growth, or vice versa; and to empirically investigate these linkages, including identifying the causal relationship, several authors have studied this relationship (see, for example, Honohan 2004a, 2004b; Levine 2005; and Andrianova and Demetriades 2008).

There are many researchers who disagree about the relationship between economic growth and financial development, for example, Joan Robinson (1952) argues that "where enterprise leads, finance follows", it means that finance does not cause growth, but rather, it responds to the demands of the real sector. Nobel Laureate Robert Lucas (1988) also dismisses finance as an "over-stressed" determinant of economic growth. Alternatively, Nobel Laureate Merton Miller (1988) argues "that the financial markets contribute to economic growth is a proposition too obvious for serious discussions." Patrick (1966) raised the issue of the difficulty of establishing the relationship between economic growth and financial development. Mackinnon argued that

"although a higher rate of financial growth is positively correlated to real growth, Patrick's problem remains the same. Schumpeter (1911), Gurley and Shaw (1955), Goldsmith (1969), and McKinnon (1973) all saw the importance of the finance-growth linkage in understanding economic growth. Finance has an important role in the endogenous growth theory, through its positive impact on the levels of capital accumulation and savings (Romer 1986) or of technological innovation (Romer 1990, Grossman and Helpman 1991, and Aghion and Howitt 1992).

It is widely accepted that the financial sector is seen as playing a critical role in facilitating economic growth by mobilizing savings, facilitating payments and trade goods and services, and promoting the efficient allocation of resources. A well developed and robust financial system is a key element to maintain financial stability in an economy given that it plays an important role in reducing the risk that distortion in the real economy will develop into a financial crisis. It could even minimize the adverse effects of such a crisis, in the event of it occurring. By mobilization of savings, financial intermediaries also increase the availability of funds in the market for lending, this leads to the expansion of small businesses and generate employment and more income. An efficient financial structure becomes an important element for the development of small and medium enterprises. An efficient financial sector provides better financial services, and thereby accords a greater boost to growth than less efficient ones (Levine, 1996: 161). Further, a sound and well-developed financial market is also an indicator of a sound business environment. It has been accepted that investors choose countries with stable political and economic environments to invest. Amongst others, open markets, good infrastructural facilities and regulations, efficient financial systems and low production costs are key factors in attracting and retaining foreign investments. The importance of foreign direct investment in economic growth has been widely debated and proven in modern economic literature. Thus, to attain a high rate of economic growth, it becomes quite obvious to examine the impact of financial development on economic growth.

The empirical evidences suggest that the strength and direction of the relationship between financial development and economic growth are sensitive to the variables used to measure the financial development. In addition, the findings suggest that outcome between two sectors differs

from country to country over time. Most of the studies on this issue suffer from two limitations (1) Studies are mainly based on cross sectional data, which cannot satisfactorily address the country specific issue. (2) Many previous studies are largely drawn from bi-variate causality analysis and may, therefore, suffer from the omission of variables bias. Therefore, these issues should be taken care of while examining the relationship between financial development and economic growth.

Additionally, the last five decades have witnessed concerted efforts of the Indian government to develop and promote the financial infrastructure in the country. The policy thrust since 1969 and till the early 1980s has been relatively on achieving equity in distribution of banking facilities and institutional credits. However, with the financial sector reforms in the early 1990s, there has been a paradigm shift in the financial sector reforms. At present what is required, is to identify the gaps in the segments, financial infrastructure and devise appropriate policy measures as well as the strategy for implementation.

1.2.2 Inflation and economic growth

One of the main objectives of macroeconomic policy is to maintain high and sustained economic growth in conjunction with low and stable inflation. It is also considered that monetary policy that ensures low and stable inflation over time contributes to long-run economic growth and financial stability (Bernanke, 2011), because low and stable inflation improves the functioning of the markets which results in effective allocation of resources in the economy. The literature on this issue suggests that some important results are still undiscovered and a relatively wide consensus about some facets of this growth-inflation trade-off has been reached. Researchers examined about inflation and economic growth and arrived with different views. It has been a controversial issue both in theory and empirical findings. They showed that there might be positive relationship, negative relationship and no relationship between inflation and economic growth according to different conditions. Therefore, the question of the existence and nature of the relationship between inflation and economic growth has been the topic of considerable interest and debate among the economists both in theoretical and empirical literature.

In the case of Indian economy; inflation has gained momentum after the recent global financial crisis in 2008, as growth steadily recovered. Inflation remained higher and persisted at above the comfort level of the central bank (Reserve Bank of India). The debate about growth-inflation trade-off and the role of monetary policy reappeared and have once again obtained center stage of recent policy debate. Therefore, price stability has become the most important objective of Reserve Bank of India. According to the RBI Report (2010-2011), empirical work on 'Backward bending Phillips Curve', argued that the Phillips Curve is negatively sloped at low levels of inflation, becomes positively sloped at high levels of inflation and turns vertical if inflation expectations converge to actual inflation. This lends support to the hypothesis of the existence of a threshold level of inflation.

In this background, most studies have tried to address three key questions: (i) Is there a robust negative relationship between inflation and growth? (ii) Is there a "kink" in the relationship between inflation and economic growth so that, at low levels of inflation, the relationship is constructive? (iii) Does inflation have to reach some minimum "threshold" before it becomes harmful for the economy? These questions support the non-linear relationship between inflation and economic growth. There are many studies, which used this non-linear framework to explore the trade-off between inflation and economic growth. For example, Sarel (1995), and Bruno and Easterly (1998) showed that inflation turns harmful only after the threshold level of inflation.

1.2.3 Financial development and inclusive growth

The third issue examines whether the impact of financial development on economic growth takes care of inclusive growth or not? Despite some upturns in economic growth rates, poverty is still widespread in Indian economy and in many parts of the country, extremely acute. Financial sector development affects poverty by two channels; directly and indirectly. Indirectly, it does so through its positive impact on economic growth (since evidence suggests that economic growth is usually beneficial for the poor) and directly, by the extent to which it results in increased access to financial services for the poor individuals. Income distribution has always been a tough problem faced by economists for a long time. Kuznet (1955) was the first to explore the relationship economic development and income distribution. He proposed inverted U hypothesis, which states that economic development is associated first with an increase and then a decrease

in income inequality. Later on in 1990's researchers tried to explore the link between financial development and income distribution based on the Kuznets' hypothesis.

According to the literature, there are two conventional approaches on the relationship between financial development and income inequality: (1) the inverted u-shaped hypothesis proposed by Greenwood and Jovanovic (1990) which shows how the interaction of financial and economic development can give rise to an inverted u-shaped relationship between income inequality and financial development (2) the second view was postulated by Banerjee and Newman (1993) and Galor and Zeira (1993) which have shown that financial market imperfections can perpetuate the initial distribution of wealth in the presence of indivisible investments. This can be seen as a negative linear relationship between the two variables.

Financial system can play a vital role in economic development and income inequality, this hypothesis is supported by many researchers (Barro, 2000; Li and Zou, 2002; Westley, 2001; Liang, 2006; Beck et. al. , 2007; Clarke et. al. 2003, 2007; Hafeez et. al., 2008; Ang, 2010; Anna Lo Prete, 2013). The theoretical predictions of the effects of financial development on income inequality are still unresolved (Arestis and Cancer, 2004). Financial development is considered to be an essential aspect in the economic growth of an economy. The relationship between economic growth and financial development has gained increasing attention in the recent literature. The findings of earlier studies suggest that a well-functioning financial system that mobilizes savings, allocates resources and facilitates risk management contributes to economic growth by supporting capital accumulation, improving investment efficiency and promoting technological innovation (Kirkpatrick, 2000, p. 366). However, the relationship between financial development and poverty has not been studied extensively in the literature (some exceptions are Dollar and Kraay, 2002; Honohan, 2004; and Beck, Demirgüç-Kunt, and Levine, 2007). Theory and evidence shows that financial development can impart on poverty directly, to the extent that it widens access to financial services for the poor individual, and indirectly through its positive impact on growth, which in return reduces poverty. But there are conflicting views about the relationship between financial development and poverty.

A number of studies support the trickle-down effect between financial development and poverty reduction through a growth-enhancing effect. Some recent studies stated that financial sector development can only contribute to poverty reduction up to a certain threshold level of economic development (Jeannerney and Kpodar, 2005). Earlier work argue that the poor individuals may benefit from decreased costs to access loans; this may help them to invest in human capital or welfare such as health, education and insurance against the unexpected economic shocks. Therefore, financial development reduces poverty by making it easier to access credit facilities. Other theories suggest that there are significant imperfections in the financial market, resulting from asymmetric information and then the contribution which the financial sector makes to economic growth is impaired (Stiglitz, 1998, 2000). Because of credit market imperfections only rich people will get the benefits of growth in financial markets, which will lead to the unequal distribution of income and wealth (Beck et. al. 2000). Indeed, it is also believed that economic progress that does not necessarily improve the lives of the poor, but usually trickles up to the middle-class and the very rich (Todaro, 1997). There is no generalized consensus on the link between financial development and poverty.

It is generally accepted that strong financial growth can offer more development and progress of an economy. A financial system, which is inherently strong, functionally diverse and displays efficiency, is essential for national objectives of fostering a market-driven productive and competitive economy. Subsequently, this will promote the highest level of investment and economic growth with its depth and coverage. Policies directed towards enacting a strong and vibrant financial sector growth through two channels. First, these policies make credit cheaper, make best available tool to cater financial need and requirements of various participants and different segments of the society, boost entrepreneurial activities, generates employment opportunities and enhance the welfare of the poor. Second, the availability of credit at cheaper cost can provide crucial support to the financially weaker families by allowing them to invest in health, education and improve the life of their children and create and enhance human capital formation of the economy which in turn will improve the income distribution of the economy.

In addition, financial sector development can strengthen the productive assets of the people, by enabling them to invest in productivity enhancing new ‘technologies’ such as new and better

tools, equipment or fertilizers, or to invest in education and health. A poorly functioning financial sector could radically reduce quality of life and productivity. Thus, financial sector development can play an important role in human development also. Human development involves enlarging people's choices. Well educated people have better access to information and are more likely to behave as less risk averse people (Outrivelle, 1999), higher education leads to lower risk aversion and higher savings (Kelly 1980). The relationship between economic growth and human development suggest that nation may enter either into a virtuous cycle of high growth and high growth of human development or a vicious cycle of low growth and low human development (Ranis, 2004).

Economic growth may be one aspect of economic development, but not the same. Economic growth is a measure of the value of output and services during a time period. While economic development is a measure of well being of the society. High economic growth may hide a number of economic problems, i.e. income disparity, poverty, health and social prosperity (OECD, 2009). According to UNCTAD (1999, P.5) "The motivations behind its structure are expressed in the following terms:

"Human development is a process of enlarging people's choices. In principle, these choices can be infinite and change over time. But at all levels of development, the three essential ones are for people to lead a long and healthy life, to acquire knowledge and to have access to resources needed for a decent standard of living. If these essential choices are not available, many other opportunities remain inaccessible",(UNDP 1990, pp.10). The most critical ones are to lead a long and healthy life, to be educated and to enjoy a decent standard of living. Human development is measured by UNDP as a comprehensive index called human development index (HDI) – reflecting life expectancy, literacy and command over the resources to enjoy a decent standard of living".

The present study will complement many previous ones, which have emphasized the importance of the financial development to economic growth, income inequality, poverty reduction and human capital in Indian economy.

1.3 Need for the study

Financial development can be defined as the policies, factors, and the institutions that lead to the efficient intermediation and effective financial markets. A strong financial system offers risk diversification and effective capital allocation. The greater the financial development, the higher would be the mobilization of savings and its allocation to high return projects. Financial development can be measured by a number of factors, including the depth, size, access, and soundness of the financial system. It can be measured by examining the performance and activities of the financial markets, banks, bond markets and financial institutions. It is observed that higher the degree of financial development in a country, the wider will be the availability of financial services. A well-structured financial system is important to boost the economy, but the main question is how to measure financial development.

Further, the relationship between the financial development and economic growth has been one of the most heavily researched topics in recent years among the researchers. Many researchers have tried to conceptualize how the development and structure of an economy's financial sector affect economic growth and what are factors affect domestic savings, capital accumulation, and income growth, or vice versa; and to empirically investigate these linkages, including identifying the causal relationship, several authors have studied this relationship (see, for example, Honohan 2004a, 2004b; Levine 2004; and Andrianova and Demetriades 2008). This issue has attained greater attention in both theoretical and empirical literature, but economists hold different views. Still the relationship is debatable because of no clear or generalized conclusion.

There are two major factors behind the investigation of growth-finance nexus in India, (1) it is experienced that a well developed financial structure encourages savings, which give boost to investment and ultimately it will pass on to the economic growth. A well developed financial sector provides a common platform for lenders and borrowers to fulfill their needs by channelizing savings into investments. It also reduces the cost associated with this channeling and (2) financial development also affects productivity of capital by collecting and processing information needed to evaluate the alternative investment projects which improves the allocation of resources and by diversifying and hedging risks, it will persuade individuals to invest in riskier but more productive investment options. Therefore, the study reflects on filling the gap

created by the deficiency of comprehensive studies investigating the determinants of growth in India.

The Indian economy has undergone tremendous transformation since 1991, when the government had adopted liberalization and globalization policies; financial sector reforms were introduced as a part of the economic reform program. Consequently, interest rates were gradually liberalized, and reserve and liquidity ratios were reduced significantly. These reforms were designed to promote greater efficiency in the economy through the promotion of competition. These reforms are documented very well by Ahluwalia (e.g., Ahluwalia, 2002). During the last four decades, particularly, after the first phase of nationalization in 1969, there have been distinct improvements in the banking activities, which strengthened the intermediation process. The total number of public sector banks was merely 8262 in 1969 and increased to 62,607 in 2011. During this period the deposits have increased from 3896 crore to 4014743 crore and bank credit has increased from 3036 crore to 2996655 crore. These growths indicate the existence of a vibrant bank based financial system in India. Further, the trends and growth of financial development indicators clearly reflect the results of financial sector reforms in India. The growth rate patterns of selected financial indicators are given in table 1.1. It may be observed that private credit as a percentage of GDP has increased gradually over the years from 18.0 percent in 1980 to 51.49 percent in 2012. On the other hand, stock market capitalization as a percentage of GDP increased from 11.8 percent in 1990 to 68.59 percent in 2012.

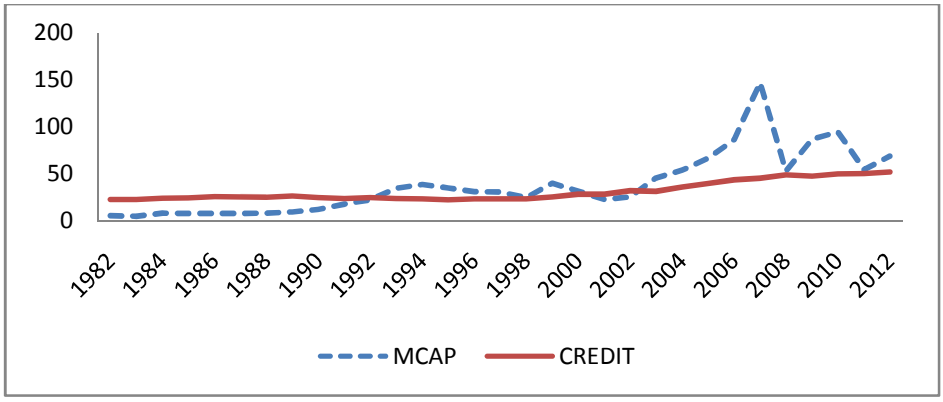
Table 1.1: Financial Development- Selected Indicators

Indicators	1970s	1980s	1990s	2000s	2010s
Private Credit/Total Credit (%)	58.5	58.9	56.8	65.1	68.34
Private Credit/GDP (%)	18.9	28.8	28.6	43.1	50.30
Total credit/GDP (%)	32.1	48.9	50.7	66.3	73.45
M3/GDP (%)	28.4	40.8	50.1	73.6	76.38
Market Capitalization/GDP (%)	-	8.9	36.1	59.8	72.41
Per Capita Real GDP Growth (%)	0.5	3.1	3.6	5.3	5.35
Real GDP Growth (%)	2.9	5.6	5.8	7.1	6.61

Note: Domestic credit to private sector is taken as proxy for private credit.
Source: Handbook of Statistics on Indian Economy, Reserve Bank India and Author's calculations.

It may also be noticed that stock market capitalization as a percentage of GDP increased sharply in 2009 and 2010 due to steep rise in share prices from a very low level in 2008 as the global financial crisis heightened. Broad money as a share of GDP has increased steadily from 28.4 percent to 76.32 percent in 2012. Table 1.1 also reveals that excluding a few years, the total credit to GDP ratio was higher than market capitalization to GDP ratio, which implies that the financial system in India is more biased towards banking sector. Figure 1.1 presents the trend of market based and bank based indicators in Indian economy.

Figure 1.1: Trend of market based and bank based indicators in Indian economy



Source: Handbook of Statistics on Indian Economy, Reserve Bank India and Author's calculations.

Thus, the investigation of growth-finance nexus is important so that the efficacy of policy decisions can be enhanced. The importance of the debate on the concerned issue also has important policy implications. By understanding the causal relationship between financial development and economic growth; policy makers can decide whether they should pursue financial development in sequence to induce higher levels of economic growth or they should focus on the development of the real sector in order to encourage higher levels of financial development or they should focus on both the sectors simultaneously.

Following the oil price shock in 1970s, many developing and oil dependent countries have experienced high inflation. Particularly, Indian economy has experienced the highest inflation of any major emerging markets. Though the rate of inflation was controlled in between by sound

economic policies, but it triggered again in early 2000s with the double digit figure. The main reason behind the high inflation was higher wages, high food prices, raise in international crude oil prices and few supply side shocks among all. The central bank responded by raising the repo rate, number of times, but inflation has defied the Reserve Bank of India and Government of India's predictions and reached double digit figure.

In recent year's issue related to inflation and its impact on economic growth in Indian economy has received a great deal of attention (Samantaraya and Prasad, 2001; Bhanumurthy and Alex, 2008; Tripathi and Goyal, 2011, Mohanty et al., 2011). All these studies had shown the existence of tradeoff between inflation and economic growth in India. One of the features of trend of inflation addressed by these studies is the volatility of the inflation rate. While inflation has been less volatile than other emerging markets, the rate of inflation in India is quite volatile in last three decades (1982-2014, table 1.2).

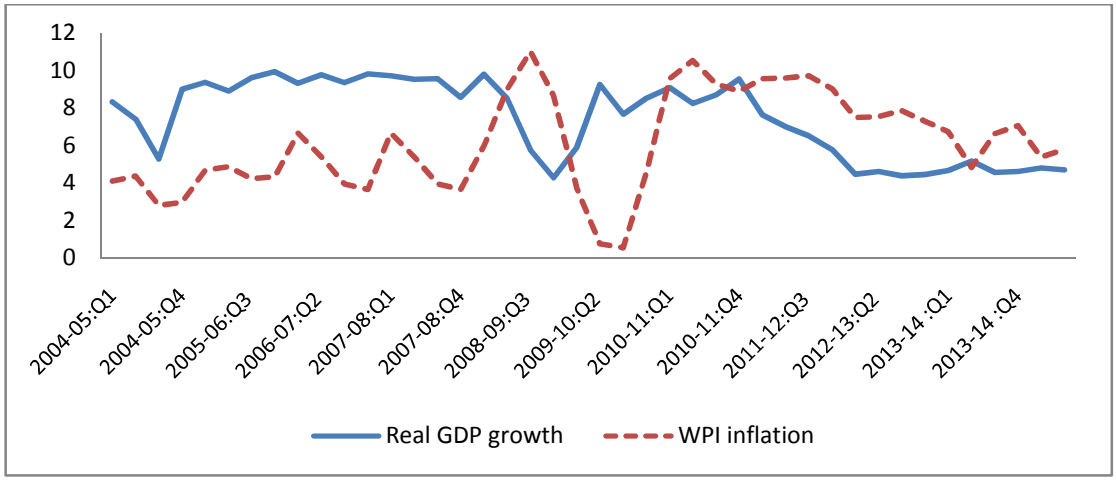
Table 1.2: Economic growth and inflation in India

Year	GDP growth rate	WPI Inflation	Year	GDP growth rate	WPI Inflation
1982-83	2.92	4.90	1998-99	6.68	5.95
1983-84	7.85	7.53	1999-00	8.00	3.27
1984-85	3.96	6.47	2000-01	4.15	7.16
1985-86	4.16	4.41	2001-02	5.39	3.60
1986-87	4.31	5.82	2002-03	3.88	3.41
1987-88	3.53	8.14	2003-04	7.97	5.46
1988-89	10.16	7.46	2004-05	7.05	6.48
1989-90	6.13	7.46	2005-06	9.48	4.50
1990-91	5.29	10.26	2006-07	9.57	6.60
1991-92	1.43	13.74	2007-08	9.32	4.67
1992-93	5.36	10.06	2008-09	6.72	8.06
1993-94	5.68	8.35	2009-10	8.59	3.81
1994-95	6.39	12.60	2010-11	8.91	9.56
1995-96	7.29	7.99	2011-12	6.69	8.91
1996-97	7.97	4.61	2012-13	4.47	7.4
1997-98	4.30	4.40	2013-14	4.74	5.98

Source: Reserve Bank of India

Since 1951, the inflation in India is majorly measured by the wholesale price index (WPI). For most of the year, high inflation was due to supply shock- high prices of food or oil, large fiscal deficit or high cost of production. The WPI series has been available since 1953-54. The WPI is the main measure of inflation in India and considered as the headline inflation rate. The WPI is available for all commodities, major groups, sub-groups and selected individual commodities. The basic advantage of this measure of inflation is its availability in high frequency (on a weekly basis with a two week lag) thereby enabling continuous monitoring of the price situation for policy purposes (Reddy, 1999). WPI is superior to other measures of inflation in India such as consumer price index for industrial workers (CPI-W) because of the wide coverage of commodities and high frequency (Chawdhury, 2014). Figure 1.2 provides the trend of inflation and economic growth in the study period. It can be seen that both the trends are quite volatile during.

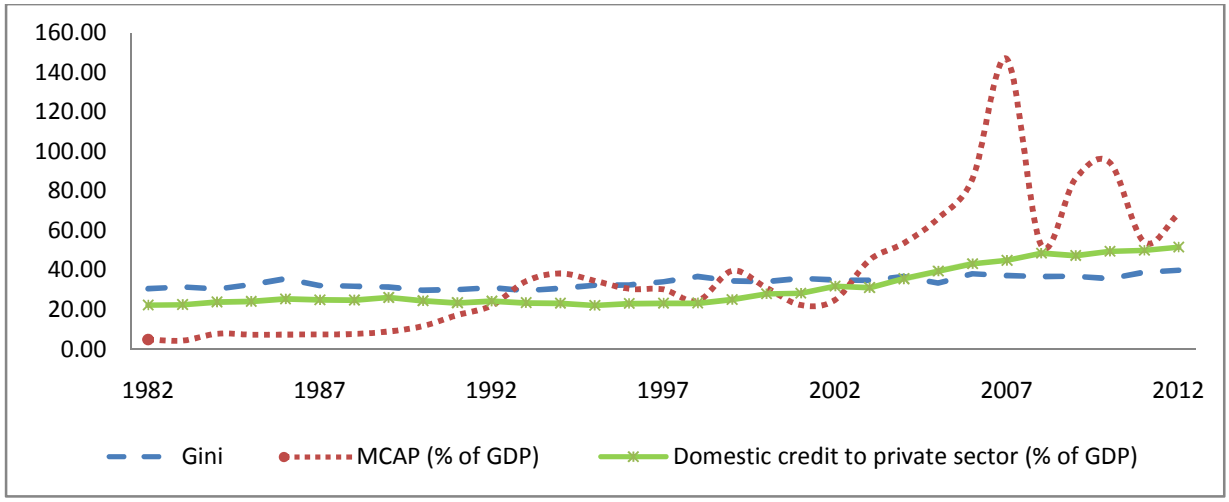
Figure 1.2: Recent Trend of Real GDP Growth and Inflation in India



Source: Reserve Bank of India

But the main issue arises if this how this financial development is associated with inclusive growth? How common individual of Indian economy is getting benefits from this financial development? Are these developments in financial sector results in economic development in the economy?

Figure 1.3: Market capitalization and Domestic credit to private sector and Gini coefficient



Source: World Bank Data Base and Handbook of Statistics on Indian Economy, Reserve Bank India and Author's calculations.

Further, while examining the growth of the indicators of financial development in India, we found that private sector credit to GDP ratio has increased from 22.29% in 1980 to 51.49% in 2011. Market capitalization to GDP ratio has increased from 7.81% to 68.59% during that period, implying the presence of a vibrant capital market in India. Additionally, year wise comparison of these two ratios suggests that the majority of time credit to GDP was higher than Market capitalization to GDP. It implies that the financial sector in India is more biased towards banking sector. But, the level of income inequality has not changed by the same magnitude as the economic growth and financial development (figure 1.3).

Table 1.3: Indicators of Poverty and Inequality

Indicators	1983	1988	1994	2005	2010
Gini Coefficient	31.11	31.88	31.82	33.38	33.90
HCR ($2)	84.79	83.77	81.73	75.62	68.76
HCR ($1.25)	55.51	53.59	49.4	41.64	32.68
The ratio between agricultural to industrial value-added as share of GDP	1.36	1.15	1.07	0.67	0.64

Source: World Bank Data Base

Human Development Report (HDR) (NHDR, 2011) measures the income inequality by tow indicators: (1) income Gini coefficient which determines the deviation of distribution of income (or consumption) among the individuals within a country from a perfectly equal distribution and

(2) the rural-urban gap is defined by the monthly per capita expenditure (MPCE) which is calculated first at household level to assign a value that indicates the level of living to each individual or household is used (Economic Survey of India, 2013). Table 1.4 provides the average MPCE based on Uniform Reference Period (URP) with respect to different NSSO rounds.

Table 1.4: Average MPCE (Uniform Reference Period)

NSS Round	Year	Constant prices (in Rs.)		Current prices (in Rs.)	
		(2004-2005)		(2011-2012)	
		Rural	Urban	Rural	Urban
68th Round	July 2011-June 2012	707.24	1359.75	1281.45	2401.68
66th Round	July 2009-June 2010	599.06	1200.01	927.7	1785.81
61st Round	July 2004-June 2005	558.78	1052.36	558.78	1052.36

Source: NSSO Press release 1 August 2012 (The results of the 68th round of NSS data are provisional).

It can be seen that according to the 68th NSS round, the average MPCE is Rs. 1281.45 and Rs. 2401.68 respectively for rural and urban India (Current prices (in Rs.)). Whereas, the average MPCE is Rs. 707.24 and Rs. 1359.75respectively for rural and urban India (Constant prices (in Rs.)) indicating the rural-urban income inequality. The monthly per capita urban consumption rose by only 13.3 per cent in real terms in 2011-12 over 2009-10, while in case of rural area the monthly per capita consumption rose by 18 per cent. Therefore, the rate of increase in the MPCE of rural areas is higher than the urban areas

Different proxy variables to measure the income inequality and poverty are shown in Table 1.3. The Gini coefficient has increased from 31.11 percent in 1983 to 33.9 in 2010. Both Head Count Ratio (HCR) at $2 per day (PPP) as a percentage of population and Head Count Ratio (HCR) at $1.25 per day (PPP) as a percentage of population showed the declining trend. HCR ($2) has decreased from 84.79 in 1983 to 68.76 in 2010, while HCR ($1.25) has decreased from 55.51in 1983 to 32.68 in 2010. The ratio between agricultural to industrial value-added as a share of GDP represents the rural, urban inequality also showed a declining trend. It has decreased from 1.36 in 1983 to 0.64 in 2010. With the current high level of financial development, the country has succeeded in curbing poverty in India. However, the trend of Gini coefficient shows that disparities have not decreased over the year.

Poverty in India

With the current high level of financial development and economic growth in India, the country has succeeded in curbing poverty to a large extent. According to the estimates of the National Sample Survey Office (NSSO), the percentage of the population below the poverty line has reduced from 54.9% in fiscal year 1973 to 27.5% in fiscal year 2004 and it become 29.8 percent in 2009-10. In fact, the number of poor people has reduced by 52.4 million during this period. This poverty has declined at an average of 1.5 percentage points per year between 2004-05 and 2009-10 (Table 1.5). Meanwhile, Percentage of the population living below the international poverty line, $1.25 (in purchasing power parity terms) a day is 32.7% of the total population in 2012. It came down from 59.8% in 1981 to 51.3% by 1990 or 8.5 percentage points over nine years. Between 1990 and 2005, it declined to 41.6%, a drop of 9.7 percentage points over 15 years, clearly a much slower rate of decline (UNDP Database). The United Nations Development Program (UNDP) Human Development Report 2012 ranks India 136 out of 186 countries in poverty ranking. But it does not possess a good ranking among other developing countries; hence there is a far way to go with poverty alleviation programs to reduce poverty in India.

In India, the planning commission is responsible to calculate the poverty dataset by using data from the large sample surveys by the National Sample Survey Office (NSSO) every five years on the basis of household consumer expenditure. The planning commission describes poverty line on the basis of monthly per capita consumption expenditure (MPCE). The planning commission adopts methodology based on the recommendation of experts of this field. In recent year, Prof. Suresh D. Tendulkar has computed the poverty lines at all India level as MPCE of Rs. 447 for rural areas and Rs. 579 for urban areas in 2004-2005. The survey has conducted again in 2009 2010; by using the data of the NSS 66th round (2009-2010) the Tendulkar Committee revised the poverty lines as MPCE of Rs.673 for rural areas and Rs. 860 for urban areas in 2009-2010. Table 1.5 provides the number and percentage of poor individuals based on the Tendulkar Method of poverty line. It can be seen that the percentage of poor people living below the poverty line in the country has declined from 37.2 per cent in 2004-5 to 29.8 per cent in 2009-2010. In the absolute term, the number of poor people has fallen by 52.4 million during this period. Of this, 48.1 million are rural poor and 4.3 million are urban poor (Economic Survey, 2013).

Table 1.5: Number and Percentage of Poor

Year	Number of poor (million)			Poverty ratio (%)		
	Rural	Urban	Total	Rural	Urban	Total
1993-1994	328.6	74.5	403.7	50.1	31.8	45.3
2004-2005	326.3	80.8	407.1	41.8	25.7	37.2
2009-2010	278.2	76.5	354.7	33.8	20.9	29.8
Annual Average Decline : 1993-94 to 2004-05 (% per annum)				0.75	0.55	0.74
Annual Average Decline : 2004-05 to 2009-10 (% per annum)				1.6	0.96	1.48

Source: Planning Commission (Estimated by Tendulkar Method)

Human development in India

Human development index (HDI) is a composite index used to rank countries by level of human development and classify countries as developed, developing and underdeveloped countries. The key components of HDI include data on life expectancy, education and per capita gross domestic product (GDP). According United Nations Human Development report (UNHDR) 2010 report Norway appears in first position in the list of 169 countries. According to this report India belongs to medium category. India's HDI rose by 1.6% annually from 0.329 to 0.519 (1980 to 2010); improving 6 position ranks from 125 to 119. The HDI of South Asia region increased from 0.319 to 0.516 during the corresponding period. Thus India is having position above the regional average.

According to the latest available report on human development (Human Development Report (HDR), 2011) published United Nations Development Program (UNDP), the HDI was reported 0.547 for Indian economy with a global ranking of 134 out of187 countries compared to 119 out of 169 countries in 2010. The growth rate in average annual HDI of India between 2000 and 2011 is among the highest, it was also supported by the India Human Development Report (IHDR) 2011. According to the Table given below, HDI between 1999-2000 and 2007-2008 has increased by 21 per cent. India is ranked 129 in the context of the gender inequality index (GII) which captures the loss in achievement due to gender disparities in the areas of reproductive health, empowerment, and labor force participation. It can be seen that the gross national income (GNI) per capita ranking minus HDI ranking for India is -10 which suggests that India is better ranked by GNI than by non-income HDI (table 1.6).

Table 1.6: Country wise average annual HDI growth rate

			Average annual HDI growth rate (%)		GNI per capita (constant 2005 $PPP)	GNI per capita rank minus HDI rank	Non-income HDI value	GII	
Country	**Value**	**Rank**	**1990-2001**	**2000-2011**				**Value**	**Rank**
Norway	0.943	1	0.53	0.29	47,557	6	0.975	0.075	6
Australia	0.929	2	0.3	0.23	34,431	16	0.979	0.136	18
Brazil	0.718	84	0.86	0.69	10,162	-7	0.748	0.449	80
China	0.687	101	1.62	1.43	7476	-7	0.725	0.209	35
Sri Lanka	0.691	97	0.81	0.8	4943	12	0.768	0.419	74
Philippines	0.644	112	0.58	0.62	3478	11	0.725	0.427	75
Indonesia	0.617	124	1.19	1.17	3716	-2	0.674	0.505	100
South Africa	0.619	123	0.03	0.05	9469	-44	0.604	0.49	94
Vietnam	0.593	128	1.5	1.06	2805	8	0.662	0.305	48
India	**0.547**	**134**	**1.38**	**1.56**	**3468**	**-10**	**0.568**	**0.617**	**129**
Pakistan	0.504	145	1.12	1.33	2550	-7	0.526	0.573	115
Bangladesh	0.5	146	1.69	1.55	1529	11	0.566	0.55	112

Source: Economic survey of India.

Financial and human developments are a growing apprehension for developing countries like India; hence there is a pressing need to evaluate and analyze the financial indicators and human development nexus and to find out the interrelationship.

1.4 Objectives of the study

The present work is designed to address the above mentioned issues for Indian economy. Accordingly the objectives of the present study are set as follows:

1) The first objective is to examine the role of financial development on economic growth in the context of financial innovation, liberalization and asset market changes.
2) The second objective is to examine the impact of inflation on economic growth and to examine the feasibility threshold level of inflation for economic growth in Indian economy.
3) The third objective is to examine the effect of financial development on income distribution, poverty and human development in India.
4) The fourth and last objective is to evaluate the implications of evidences for framing appropriate economic policies to attain inclusive growth in India.

1.5 Significance of the study

The importance of the debate on the relationship between financial development and economic growth for developing economies is substantiated by the fact that it has important policy implications whether the policy-makers should first pursue financial development in order to induce higher levels of economic growth or whether they should first focus on the activities of real sector in order to encourage higher levels of financial development. Therefore, the outcomes of this debatable issue are useful for policymakers in order to formulate policies regarding efficient resource allocation. An empirical study on the issue of finance-growth nexus is in setting up optimal macroeconomics policies to execute economic growth. Examining the relationship between financial development and economic growth is important as it enhances the effectiveness of policy decisions for a developing country like India.

The cross country empirical studies can provide the wrong notion of the relationship between financial development and economic growth, because these studies assume different economies as homogeneous entities. They also do not capture the time dimensions. In different countries may differ in economic policies which also affect the financial deepening. Therefore, to allocate financial resources and to capture the impact of financial development on growth, an analysis of the relationship between financial development and economic growth in Indian economy is vital for policy makers.

The study contributes to the existing debate by investigating the relationship between financial development and economic growth nexus by investigating the relationship, both at national (country level: time series data) and state level (state wise: panel data) for Indian economy. It takes care of both market-based as well as bank-based indicators as proxies of financial development and analyzes their role in economic growth. At the state level, the study includes all 28 states in analyzing the role of financial development in economic growth for Indian economy by applying latest econometric techniques. So the contribution of the paper is to fill this gap in the literature.

The present study tries to re-examine the non linear impact of inflation on economic growth in Indian economy. The debate on the tradeoff between inflation and economic growth is not new

in economics, but the issue becomes the center of debate when persistent high inflation co-existed with robust economic growth in 2010 in India. It is considered that the one of the most important objective of the macroeconomic policy is to achieve high economic growth in combination with low and stable inflation. Thus, the key question arises that what should be the level of inflation for fulfilling this objective. Most of the empirical studies suggest that inflation itself shows evidence of an inverted U effect on economic growth. Then, the next question is that, what is the threshold point in this inverted U effect of inflation? By solving these questions, the policy makers can formulate appropriate macroeconomic policies to tackle or control the level of inflation till this point of threshold to gain the maximum benefits of price instability in the economy.

Thus, in view of the structural changes of Indian economy and changes in the methods of calculating price index recently, the empirical analysis uses a new dataset in order to capture more recent picture of inflation-growth nexus. This is the first attempt to examine the threshold inflation in India by including the highest number of commodity baskets (676 baskets of commodities) by employing latest econometric techniques, which would provide new insights to monetary policy makers on crafting appropriate policies for achieving economic growth by maintaining a stable level of inflation.

The relation between financial development and income inequality is particularly vital for policymakers in the current environment of economic crises. In the literature, different theoretical models provide different predictions on the linkage between financial development and income distribution. By investigating this relationship, policy makers can use the findings to assess whether financial development will reduce income inequality or vice versa. Therefore, empirical analysis is required to formulate adequate policies to reduce the gap between rich and poor class in the economy. The present study makes a clear comparison between market based indicator and bank based indicator of financial development in India and those examining the relationship between finance and income inequality nexus. Further, the Gini coefficient is used as a proxy for inequality in India and ARDL techniques of co-integration is employed, using the basic principles of GJ Hypothesis and provide short run and long run dynamics for India.

There is also a consensus that financial sector development reduces poverty by both the direct and indirect channels. The major channel is through economic growth. But the question arises whether this is the case of Indian economy, where the largest poor population exists. Thus, it's become important to investigate the role of financial intermediaries on poverty reduction in India. The present study empirically examines the causal relationship between financial sector development and poverty reduction in India.

Since the emergence of the endogenous growth theorists in the early 1990s, the link between Human Capital (HC) and growth has also been widely acknowledged in the literature. Evidences suggest that economic growth enhances human development in the long run. Researchers agreed that financial development is an essential element in economic growth and a well developed financial development has a positive impact on economic performance by enhancing intermediation efficiency through reduced transaction and monitoring costs (Zaman et al., 2012). The relationship between economic growth and human development suggest that nation may enter either into a virtuous cycle of high growth and high growth of human development or a vicious cycle of low growth and low human development (Ranis, 2004). There are also empirical studies that support the argument that financial sector development supports the achievement of the Millennium Development Goals (MDG) targets by improving human development level in the economies.

Therefore, the present study examines the influence of financial indicators on human development in India by using annual data from 1980 to 2012. For the empirical investigation, the study uses Auto Regressive Distributed Lag (ARDL) model of co-integration, Granger's non-causality test and Variance decomposition techniques etc. This study is first of its kind to empirically examine the causal relationship between financial development indicators and human capital development proxied by Human Development Index (HDI) in Indian economy.

1.5 Organization of the study

The rest of the study is organized as follows: chapter two reviews the theoretical framework on the concerned issues of the thesis i.e. section 2.1 presents theoretical framework on financial development and economic growth, section 2.2 provides theoretical underpinnings on Inflation

and economic growth and section 2.3 reviews the theoretical literature on financial development and inclusive growth, again section 2.3 is categorized in three subsections. Subsection 2.3.1 presents theoretical linkages between financial development, economic growth and income inequality, subsection 2.3.2 highlights the theoretical background on the issue of financial development, economic growth and poverty, whereas in subsection 2.3.3 theoretical background of the relationship between financial development, economic growth and human development is provided.

Chapter three discusses the empirical evidence on financial development and economic growth. Section 3.1 provides the empirical evidences on the relationship between financial development and economic growth at national level (time series data evidences), whereas in section 3.2 the panel data evidences (state level) are provided for the linkage between financial development and economic growth.

Section 3.1.1 provides a background of the theory and empirical evidence governing the relationship between financial development and economic growth. Section 3.1.2 gives a brief survey of empirical literature on the concerned issue. Section 3.1.3 provides data, variables and methodology and section 3.1.4 presents the methodology employed in this chapter. Section 3.1.5 presents the empirical results. Section 3.1.6 discusses the findings and conclusion. Section 3.2.1 introduces the issue. Section 3.2.2 presents the review of literature on the relationship between financial development and economic growth. In Section 3.2.3, layouts a brief overview of financial development in Indian states. Section 3.2.4 presents the description of variables and data. In Section 3.2.5 the panel data methodology is discussed such as panel unit root, Pedroni's co-integration, fully modified OLS and panel causality. Section 3.2.6 analyses the empirical results while concluding remarks are presented in Section 3.2.7.

Chapter four discusses empirical evidence on inflation and economic growth. Section 4.1 presents the introduction to the chapter and discusses major issues regarding the impact of high inflation on economic growth. Section 4.2 provides the summary of earlier empirical work on the concerned issue and the summary of the threshold estimation in the context of Indian economy. Section 4.3 discusses data source, variables and estimation of threshold. These estimations approaches include Sarel's method, non-linear investigation and logistic smooth transition

regression (LSTR) method and subsection 4.4 provides the estimation of the threshold inflation in India during the study period. Section 4.5 presents the overview of the empirical findings and conclusion.

Chapter five discusses empirical evidence on financial development and inclusive growth. It has three issues. The first discussed issue is "Financial development, economic growth and income inequality". Section 5.1.1 presents the linkage between financial development and income inequality. Section 5.1.2 analyses the empirical literature review. Section 5.1.3 includes descriptions of data and multivariate time series methodologies applied in the chapter. Section 5.1.4 analyzes the empirical results, and Section 5.1.5 provides conclusions and policy implications.

The next discussed issue is "Financial development, economic growth and poverty reduction". Section 5.2.1 introduces the relationship between financial development and poverty reduction. Section 5.2.2 gives an overview of the empirical studies. Section 5.2.3 provides dataset, variables and model specifications while section 5.2.4 describes the methodology. The corresponding empirical evidences on the concerned issue are discussed in section 5.2.5. Section 5.2.6 provides some policy implications and concludes the discussed issue.

The third issue is the relationship between "Financial development, economic growth and human development". Section 5.3.1 provides an introduction to this issue. Section 5.3.2 reviews the empirical studies on the above mentioned issue. Section 5.3.3 presents data, variable description and model specification. Section 5.4.4 layouts the methodology used in this chapter and calculation of human development index is also discussed while the empirical results are presented in section 5.3.5. Section 5.3.6 presents the summary of the empirical findings.

The last chapter (chapter six) of this thesis presents a brief discussion of the policy implications and empirical findings followed by an overview of the present study.

CHAPTER 2

Financial development, inflation and economic growth: Theoretical framework

2.1 Financial development and Economic growth

Does finance make a difference . . .?
Raymond Goldsmith (1969)

The relationship between financial development and economic growth has received a great deal of attention among the economists in the modern history of economics. Because the most basic challenge for all economists is to understand the nature and causes of economic progress. This section reviews the theoretical arguments which have been advanced on the relationship between financial development and economic growth.

This theoretical relationship dates back to the work of (Schumpeter, 1911), who emphasized that financial services are dominant factors in encouraging economic growth. He supported the view that a well developed financial system can facilitate technological innovation and economic growth through the provision of financial services and resources to investors. McKinnon-Shaw (1973) advanced the explanation given by Schumpeter. He provided McKinnon-Shaw (1973) hypothesis, which is a policy analysis tool for developing countries with strong recommendation for high capital accumulation and decentralized financial intermediation. Boyd and Prescott (1986) developed a model that emphasized the critical role of banks in reducing information frictions and improving resource allocation.

Therefore, theoretical evidence that financial sector development promotes economic growth has been accumulating over many decades. Although Schumpeter (1911), McKinnon (1973), Shaw (1973) Goldsmith (1969), Levine (1999) and advocates the linkage between financial development and economic growth, but they did not come up with a clear explanation of the transmission of financial development in the real sector of the economy. Numerous studies have provided the potential links between financial development and economic growth (Levine, 1997). The endogenous growth theory also tried to explain the link between financial development and economic growth. Levine (1997, 2005) reviewed the theoretical literature on the finance-growth relationship. Diamond and Dybvig (1983) stressed the role of financial

markets as providers of liquidity to investors. They analyzed the economy with a single bank. Based on their model, Bencivenga and Smith (1991) also developed an endogenous economic growth model that analyzed the shift of savings toward capital by financial intermediaries to encourage economic growth.

Greenwood and Jovanovic (1990) also developed another theoretical model that links financial intermediaries and economic growth. The capital is assumed to be scarce in their model. They showed that financial intermediaries speed up economic growth by providing efficient capital allocation and improving information on the firms. According to the endogenous growth model of Levine (1991), stock markets make financial assets less risky by allowing savers to buy and sell quickly and cheaply. Thus, the allocation of capital and economic growth are improved.

King and Levine (1993b) and Acemoglu et al. (2006) argued about the impact of financial markets on economic growth, they stated that financial development may have positive effects on technological innovation activities and, which may promote economic growth. Pagano (1993), developed an endogenous growth model, it showed that economic growth rate depends positively on the percentage of savings diverted to investment. He also argued that better screening of fund seekers and monitoring of recipients leads to more efficient resource allocations, financial services can encourage the mobilization of otherwise idle resources and improvements

Acemoglu and Zilibotti (1997) also developed a model that explains the relationship between cross-sectional risk sharing and economic growth. Boyd and Smith (1998) argued that all external finance takes the form of either debt, such as bank loans or equity, but not both. They analyzed the framework in which capital formation is financed by issuing both debt and equity. They stated that debt and equity markets may be substitutes or complements for financing investments. Allen and Gale (2000) emphasized the importance of financial markets in reducing the inefficiency due to the monopoly of banks and in encouraging economic growth. According to Levine (2005), the liquidity risk is associated with converting assets into a medium of exchange. Levine (2005: 17) states that “liquidity reflects the cost and speed with which agents can convert financial instruments into purchasing power at agreed prices”. Savers are not

interested in long term commitments of capital, therefore there may be a reduction in such investment in which long term commitments are required.

These theoretical links between financial development and economic growth have been translated into real channels. According to the expenditure approach, the real sector of the economy includes household consumption, investment, trade (exports and imports) and government spending which is generally articulated as equation 1 stated below:

$$Y_t = C_t + I_t + (X_t - M_t) + G_t \quad \ldots\ldots (1)$$

Where Y_t Presents gross domestic product (GDP), C_t presents household consumption, I_t presents domestic investment X_t stands for exports, M_t stands for imports and G_t Is government spending. Thus, it can be seen that any factor that affects household consumption, investment, trade and government spending will definitely affect the real sector of the economy. Thus, these channels are also termed as a direct relationship between financial development and economic growth.

Financial development and household consumption

Most of time economic performance of an economy is judged primarily in terms of consumption level and dynamics. It is the largest component in the gross domestic product (GDP) calculation. Consumption does not restrict to tangible goods, it also includes for services such as spending in health, education, and house among others. Households mobilize their savings by buying assets, bonds, which insure them against income shocks, enjoy remittances and so on. Thus, financial development improves household welfare. According to Claessens and Feijen (2006) financial development and household expenditure are highly correlated. According to them, although causality between financial development and household consumption is less clear than in the case of income, there is evidence that financial development is a leading indicator for increases in household consumption. They prove this by estimating the elasticity of household consumption with respect to private credit over a period 1980-2004. They suggested that if private credit increases by 1.6 percent annually in the next 10 years, world household

expenditure would be range between 1.1 and 3.6 percent, which is higher than the current level (Claessens and Feijen, 2006).

Financial development increases investment

Financial plays an important role in investment decisions of corporate, managers and households; it increases investment through the allocation of capital to the private sector. As per the World Bank study (2000), in 80 developing and developed countries the second leading constraint on doing business after taxes and regulation is finance. Additionally, Ayyagari et al. (2005) concluded that finance is the most important constraint on the firm.

Other studies that spotlight on this relationship include Rajan and Zingales (1998), Perotti and Volpin (2004) who found that the number of firms in an industry grew disproportionately faster in countries that have better financial development and also the number of firms in sector that are more dependent on external finance grows 0.7 faster in countries with better financial development. Furthermore, Bencivenga and Smith (1991) and Saint Paul (1992) suggested that financial intermediaries facilitate better risk-sharing, and as a consequence, investors are more willing to put their money in high-risk, high return projects. Black and Strahan (2002) in their study found that the odds of an individual starting business increase by 5.6 percent were that individual to move to a financially more developed region. However Guiso et al. (2004) concluded that GDP is 1.2 percent higher in financially more developed regions. Thus, with greater access to finance firm can grow faster. Financial intermediaries facilitates risk management and as a result

Financial development improves trade

Claessens and Feijen (2006) suggested that the gains from better transaction services can be increased through more developed financial system. By facilitating transactions, financial development improves trade at the national and international levels, because the easier it is to make a reliable financial transaction, the friendlier is the trading environment (Claessens and Feijen, 2006).

Humphrey et al. (2001) conducted a study on the different types of payment system, suggested that many countries, even the developed ones still largely using paper-based system, when they can easily benefit from electronic payment system. According to them, the United States for example, would have saved between 1 and 1.5 percent of their GDP if they migrated from a paper-based to a well functioning electronic payment system. Beck (2003) however, found that an industry in a country with higher levels of financial development has higher export shares and trade balance in industries that use more external finance.

Financial development improves public sector development

Government spending is determined by many factors such as fiscal conditions and political, cultural and economic factors. Herrera and Pang (2005) suggested that Governments of developing countries typically spend resources equivalent to between 15 and 30 percent of their GDP. Thus, any change in public spending could lead to a significant impact on GDP and on the accomplishment of the government's goals.

According to Claessens and Feijen (2006), a large and liquid government bond market could enable the government to raise cheap capital to finance its budget and invest in key infrastructures. This is quite true if these finances are efficiently used by government, if not it can lead to financial crisis. Evidence suggests that in most developing countries, it is misused. In addition, mature government bond market can prevent crowding out of private investments in the banking sector. At the same time, the active bond market can discipline profligate government, thereby reducing the risks of a fiscal crisis and its adverse consequences on the population (Claessens and Feijen, 2006).

Functions of financial institutions

Some theories suggest that the different functions of financial institutions also promote economic growth through different modes. Thus, an overview of these functions provided by financial intermediaries and theoretically tied to enhancing the growth process. Financial development is also defined as the ability of a financial sector to acquire information, enforce contracts, facilitate transactions and create incentives for the emergence of particular types of financial contracts, markets and intermediaries, and all this at a low cost (Rajan and Zingales, 2003:9; Levine,

1999:4). Financial development occurs when financial instruments, markets and intermediaries reorganize the effects of information, enforcement and transaction costs, and hence better facilitate provide financial services. Levine (1997, 1999) has been at the forefront of those who explained clearly this link. Levine's innovation was to consider the financial services as affecting economic growth through five main channels.

Recent literature suggests the emergence of a consensus on the vital importance of financial sector development in facilitating and sustaining growth. The last 2 decades have witnessed an explosion of empirical studies testing the finance-growth nexus using cross-country and other data and new econometric tools. In spite of the absence of complete unanimity of results, a number of observations, backed by empirical evidence, have emerged. Levine (2004) summarizes these as follows: (i) countries with better functioning banks and financial markets grow faster; (ii) simultaneity bias (i.e., the reverse causality) does not seem to derive this conclusion; and (iii) better-functioning financial systems ease the external financing constraints that impede firm and industrial expansion, suggesting that this is one mechanism through which financial development matters for growth.

Thus, financial development includes improvements in the (i) production of ex-ante information about possible investments, (ii) saving mobilization (iii) monitoring of investments and implementation of corporate governance (iv) exchange of goods and services and (v) trading, diversification, and management of risks. These five functions may affect economic growth via two recognized channels, these are: capital accumulation channel and technological innovation channel (sometimes referred to as a total factor productivity channel or Solow residual). Each of these functions is considered to influence the investment decision, hence results in economic growth. But the markets are perfectly not completive, hence frictions exists, apart from these friction laws, regulations and government policies also differ greatly across different time periods and nations. Therefore, the effect of financial development on economic growth has different inferences for resource allocation and welfare in the economy.

1. Producing information ex ante about possible investments and allocating capital

It is difficult and costly to evaluate firms, managers, and market conditions as discussed by Vincent Carosso (1970). Individual savers may not have the time, capacity, or means to collect and process information on a wide array of enterprises, managers, and economic conditions. This will lead to the inefficient allocation of funds by individual savers because Savers will be reluctant to invest in activities about which there is little reliable information. According to Diamond, 1984; and Boyd and Prescott, 1986; Information acquisition costs, create incentives for financial intermediaries to emerge. Financial intermediaries reduce information costs through specialization and economies of scale. The ability to obtain and process information may have important growth implications.

Because many firms and entrepreneurs will seek capital, financial intermediaries, and markets that are better at selecting the most promising firms and managers will induce a more efficient allocation of capital and faster growth (Greenwood and Jovanovic, 1990). Improved information also improves production technologies by identifying those entrepreneurs with the best chances of successfully initiating new goods and production processes (King and Levine, 1993c). Stock markets can also substantially reduce costs associated with acquiring information about firms. As stock markets become larger (Grossman and Stiglitz, 1980), market participants may have greater incentives to acquire information about firms. Therefore, when markets become larger and more liquid agents may have greater incentives to expend resources in researching firms because it is easier to profit from this information by trading in large and liquid markets. Moreover, this improved information about firms should improve resource allocation substantially with corresponding implications for economic growth (Merton, 1987).

2. Mobilizing and pooling savings

Savings mobilization is considered to be the most essential function of capital markets. In the absence of these markets, it is very difficult to find borrowers or investors for individual savers. These savers cannot fund borrower's needs completely without a common platform. Individual savers face high costs of acquiring and processing information on firms, managers, and market conditions, which could result in inefficient resource allocation. Without access to multiple investors, many production processes would be restricted to economically inefficient scales (Sirri

and Tufano, 1995). In the absence of aggregate availability of funds would be restricted to investors since they may require a high booster of capital (Sirri & Tufano, 1995). Here comes the role of financial intermediaries, they provide a common platform for both savers and borrowers. Mobilizing savings involves overcoming informational asymmetry problems and transaction costs. Thus, financial sectors are more able than individuals to aggregate savings with low transaction cost, because they provide financial products and services. Financial intermediaries mobilize savings from many diverse individuals and invest in a diversified portfolio of risky projects facilitate a reallocation of investment toward higher return activities. Thus, savings channelled through financial intermediaries are allocated more efficiently, and the higher productivity of capital results in higher growth. Better savings mobilization also leads to improvements in resource allocation and technological innovations.

3. Monitoring investments and exerting corporate governance

Another function of financial intermediaries is to reduce costs related to monitoring of investment projects, investments. Thus, besides reducing the costs of acquiring information ex ante, financial intermediaries help to mitigate the information acquisition and enforcement costs of monitoring firm managers and exerting corporate control ex post, i.e., after financing the activity. They address the problem of principal-agent by identifying the interests of managers and owners. It has been experienced that good corporate governance has important implications for savings, decisions for allocating the savings, and their utilization. Good corporate governance improves the efficiency of the firms that will lead the efficient resource allocation which makes individual savers more willing to invest in production and innovation activities of these firms. The absence of financial agreements that enhances corporate control may impede the mobilization of savings from disparate agents, and thereby prevent capital from flowing into profitable investments (Stiglitz and Weiss, 1981). Besides monitoring ex post firms, a financial sector can also facilitate corporate control. As Merton and Bodies (1995) argued, the "financial sector also makes possible the efficient separation of ownership from management of the firm. This in turn makes feasible, efficient specialization in production, according to the principle of comparative advantage".

4. Facilitating the exchange of goods and services

Financial intermediaries lower transaction costs as described earlier, this will lead to specialization and technological innovation. These transaction costs are lowered as the financial system provides ways of clearing and settling payments to facilitate the exchange of goods and services. It is widely argued that transaction facilities, specialization and innovation are positively related to the improvement of the productivity of goods and services. Therefore, the financial sector facilitates trading of goods and services, and promotes specialization, technological innovation, and growth.

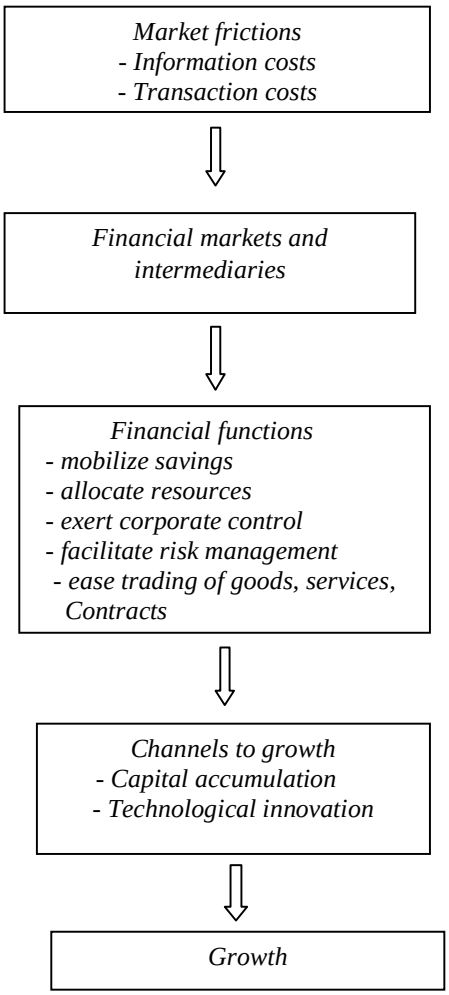
The links between facilitating transactions, specialization, innovation, and economic growth were core elements of Adam Smith's (1776) Wealth of Nations. Smith (1776, p. 7) argued that division of labor—specialization—is the principal factor underlying productivity improvements. Adam Smith argued that lower transaction costs would permit greater specialization because specialization requires more transactions and more transactions lead to greater specialization. In this fashion, financial intermediaries promote exchange which encourages productivity gains. As a result, economic development can stimulate the development of financial markets.

5. Facilitating the trading, diversification, and management of risks

Each and every investment decision is associated with risk because of imperfect information and exogenous events. Financial intermediaries come into view to reduce market frictions such as information and transformation costs, by doing this they mitigate the risks associated with individual projects, firms, industries, regions, and countries, etc. because they provide risk diversification services by improving resource allocation and encouraging savings This ability of financial systems to provide risk diversification can enhance long-run economic growth rates (Obsfeld, 1994). According to Levine (1997), two types of risks can be involved, liquidity risk and idiosyncratic risk. Liquidity risk is defined is the ease and speed with which agents can convert assets into purchasing power at agreed prices. This type of risk arises due to the uncertainties associated with converting assets into a medium of exchange. Information asymmetries and transaction costs may inhibit liquidity and intensify liquidity risk. Thus, financial intermediaries- coalitions of agents that combine to provide financial services-may also enhance liquidity and reduce liquidity risk.

Financial system reduces cross-sectional risk, it stimulates technological innovation given that engaging in innovation projects are usually is risky, and the ability to hold a diversified portfolio of innovative projects reduces risk and promotes investment in growth-enhancing innovative activities. Financial markets that ease risk diversification tend to induce a portfolio shift toward projects with higher expected returns (Saint-Paul, 1992; Devereux and Smith, 1994; Obstfeld, 1994). Additionally, financial systems enhance liquidity, reduce liquidity risks, increase investment in the longer term, higher-return, but illiquid assets, and promote economic growth. Thus, financial system that eases risk diversification can accelerate technological change and economic growth (King and Levine 1993c). By these functions, financial sector development assists economic growth- by promoting technological innovations and capital accumulation. These processes can be seen in Figure 2.1, below.

Figure 2.1: A Theoretical Approach to Finance and Growth (Levine, 1997)



By these functions, financial intermediaries also encourage growth by supporting the public sector to invest in infrastructure and by enabling households to invest in human capital and benefit from consumption smoothing. This process is defined in Figure 7.

• Public sector. Large and liquid bond markets- an integral component of a developed financial sector—enable the government to raise relatively cheap capital to invest in key infrastructure such as roads, power plants, harbors, airports, water supply and sanitation, and telecommunications. These key infrastructure facilities form part of the enabling environment for the private sector to grow. Moreover, active bond markets can discipline the government-thereby reducing the risks of financial crises—and prevent crowding out of private investments. These avenues provide an additional link to growth (Claessens and Feijen 2006).

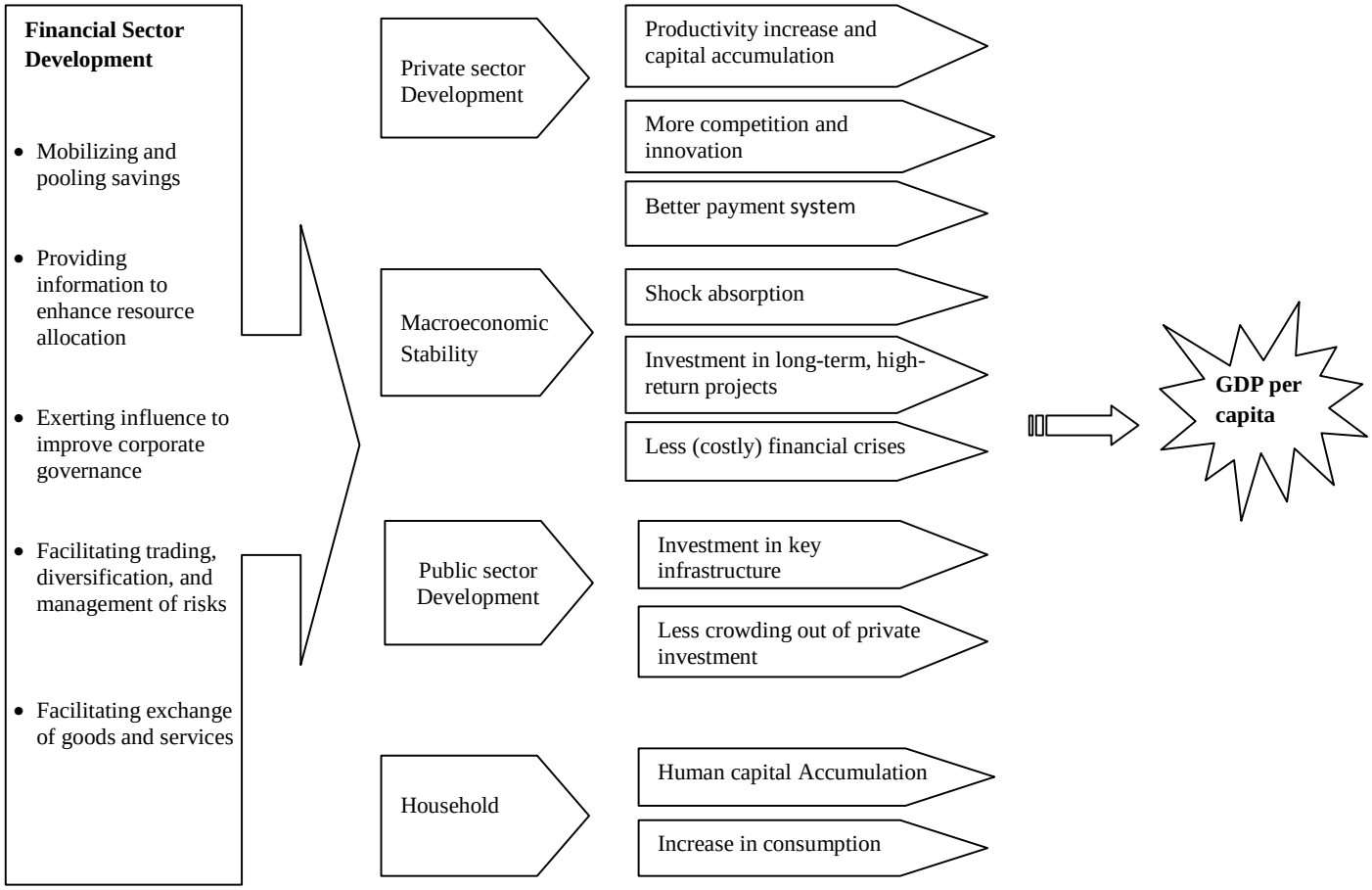


Figure 2.2: Affect of financial development on economic growth, GDP = Gross Domestic Product. Source: Adapted from Claessens and Feijen (2006).

• Households: households play an important role in financial sector, whether they are savers or borrowers. Households get benefits from risk diversification facilities provided by financial intermediaries. They are the one who injects savings into the financial system and these Savings enable households to smoothen their consumption. This increased level of consumption lead to the increase in the demand for goods and services increases, thus stimulating more agricultural and industrial production, leading to more jobs and higher economic growth. Households may also borrow for human capital development, such as education, thus increasing the employability potential and productivity that in turn impacts growth (Zhang, 2009)

2.2 Inflation and Economic growth

The relationship between inflation and economic growth remains debatable in both theory and empirical findings. Theoretical models evaluate the impact of inflation on economic growth, focusing on the effects of inflation on the investment and output. In the literature different possible results of the relationship between inflation and economic growth in these theoretical models are defined. These results can be positive, neutral, negative or nonlinear.

Economists have been studying about inflation and its impact on economic growth starting from the appearance of classical economic theory to modern economic theories. This section provides the theoretical framework on the relationship between inflation and economic growth.

The first result is originally related to the work of Mundell (1963) and Tobin (1965) that concludes positive relationship between economic growth and inflation. They believe increased nominal interest caused by inflation will make people option for investment instead of consumption. This will result in increasing capital accumulation which will encourage economic growth. This is known as the Mundell-Tobin Effect.

Mundell (1963) used the IS-LM curves to show that expected inflation has a real economic effect. The author argued that the money rate of interest rises by less than the rate of inflation. Hence the real rate of interest falls during inflation. He made an assumption that real investment depends on the real interest rate and real saving on real balances and also inflation decreases real money balances. This creates a decline in wealth which in turn stimulates increased saving. The author also argued that anticipation of variations in the rate of inflation has real effects on

economic performance. When prices are expected to increase, the money rate of interest rises by less than the rate of inflation, giving thrust to an investment boom and an acceleration of growth and vice versa.

Tobin (1965) assumed money as a store value in the economy and showed that inflation has a positive effect on economic growth and it has no role other than as a financial asset. The author argued that money and capital ratio is negatively related to inflation rate that's why people prefer to acquire more capital than holding money, which leads to greater capital intensity and encourages economic growth. Tobin effect stated that a higher inflation rate raises the level of output, but this effect on output is not permanent because it occurs during the transition from one steady state capital stock to another steady state capital. He also argued that, because of the downward rigidity of prices, the adjustment in relative prices during economic growth could be better achieved by the upward price movement of some individual prices.

The conclusion of Mundell and Tobin were supported by Drazen (1981), he stated that increases in the rate of inflation will increase the aggregate capital-labor. Drazen studied the effect of inflation on the demand for capital and the aggregate capital, labor ratio in a finite-horizon utility-maximization model. The result of the study concluded that deriving saving and asset choice decisions from utility maximization do not in itself lead to super neutrality and that a finite horizon is crucial in explaining this difference.

Sidrauski (1967) analyzed the super neutrality in the optimal control framework by considering real money balances in the utility function with his seminal work on the context of an infinitely-lived representative agent. Super neutrality holds when real variables, including the growth rate of output, are independent of the growth rate in the money supply in the long-run. The author stated that an increase in the inflation rate does not affect the steady state capital stock because the representative individual's real discount rate is unaffected by inflation. Nevertheless, some of the assumptions made by Sidrauski's in his study are open to criticism such as the infinite horizon of individuals involved, individuals are identical with the same discount rate, individuals like consumption equally in each periods and others. By including uncertainty in the model; Danthine, Doladson and Smith (1987) examined the robustness of Sidrauski result. They found that qualitatively super neutrality fails to obtain in their model. They pointed out that Sidrauski's

(1967) article is important for it derived a proposition on the real impact of an increasing money growth rate, which was completely different from Tobin effect a dominant view at the time.

Lucas (1973) explained that low inflation allows overcoming rigidity of nominal prices and wages. In addition, inflation can realign relative prices in response to structural changes in production during fast modernization periods.

Stockman (1981) developed cash in advance transactions constraint model which considers money as complimentary to capital. Stockman assumed that firms put up some cash in financing their consumption and investment goods. Real purchases of these goods decrease with decreased of money hoarding. The author argued that as inflation rises, individuals reduce their holding of cash and purchase of capital because it reduces the purchasing power of money. In the same way, an increase in the inflation rate results in a lower steady state level of output.

The above model is extended by Cooley and Hansen (1989). They made an assumption that the marginal product of capital is positively related to the quantity of labor. Thus, when the quantity of labor declines in response to a rise in inflation, the return to capital falls, it further reduces the steady-state quantities of capital and output. Additionally, people substitute leisure for work due to the inflation tax on consumption which reduces employment. They showed that as the inflation rate increases the level of output permanently falls.

Gillman, Harris and Matyas (2001) employed a theoretical model with endogenous growth and strengthen Stockman's result of a negative relation between inflation and economic growth. They also specified an econometric model which is consistent with the result obtained in the theoretical model. Haslag (1995) used general equilibrium model to examine the effects that changes in inflation have on inside money and capital accumulation. He argued that a change in the inflation rate will, in general, affect the ratio of inside money to outside money. Additionally, he stated that the presence of a reserve requirement, an increase in the anticipated rate of inflation results in deposits being accumulated at a slower pace.

Hence, an increase in inflation rate decreases the return on deposits because return on deposit is an average of return on money and capital. If saving goes down due to less return on deposits, there is the least amount of capital accumulation which in turn impedes economic growth.

Further, Manuelli and Jones (1995) considered models of endogenous growth with the formulation of supply of effective labor to show the effect of money growth on welfare and economic growth. They made an assumption that demand for money is generated for transaction purpose. They explored two alternative ways via through inflation affects the long run economic growth. First is the nominal rigidities in the tax code and second avenue which is explored in the study is the distortion in the labor-leisure choice. They found that when cash and credit are complementary goods, by using Lucas style effective labor technique, both economic growth and welfare effects of the inflation are quite large. Additionally the real marginal tax rate on investment income is altered by the inflation rate if nominal depreciation is included in the tax code. The discounted value of depreciation tax credits decreases, as the inflation rate rises. Therefore the effective tax on capital income gets higher. Because of lower after tax return on capital, individual slow their rate of capital accumulation due. This results in decreases in the rate of economic growth.

By using the model of endogenous growth with explicit financial intermediation, Espinosa and Yip (1999) reviewed the relationship between inflation and economic growth. The authors used risk preference as their basis for identifying the effect of one variable on another, thus the relation depends on the relative risk aversion of agents. If agents are fairly risk averse, higher rate of inflation decreases economic growth. If agents relative risk aversion low enough, there exists a positive association between inflation and economic growth, which is in order with convectional agreements of Philips curve.

Based on a model with adverse selection and costly state verification problems, Hung (2001) studied the relationship between inflation and economic growth. The author stated that if banking costs shows no externality, there exists a positive association between inflation and economic growth. Though, if economies of scale are present in the banking cost, then the relationship between the two variables depends on the initial level of inflation rate. If the initial inflation rate is high, an increase in inflation rate decreases economic growth and vice versa.

Gillman and Nakov (2003) used cash-in-advance (C-I-A) technology to examine the impact of inflation on the distribution of time between leisure and work. They showed that there exists a negative impact of inflation on the human capital accumulation due to the substitution of an agent's time from work to leisure activities. This behavior of the representative agent translates

into higher real wages compared to real interest rate. All this ends up with a Tobin effect for the accumulation of physical capital and an anti-Tobin effect for the accumulation of human capital.

Gillman and Kejak (2005) advanced a model that nests several theoretical possibilities, i.e. AK model, AH model and a combined model. They demonstrated separate effects of inflation in different cases. The authors supported the presence of a Tobin effect in the AK model and an anti-Tobin effect in the AH model. Consequently, their results for the combine model follow the same pattern.

However, there are arguments for a non-linear relationship, which suggest that inflation has a positive association with economic growth till a certain point after that threshold point it hurts economic growth. The threshold point changes the impact of inflation from favorable to adverse. Some theoretical studies tried to answer the question of how expected inflation impacts the financial system, such as Choi et al. (1996) and Azariadas and Smith (1996) showed that only when inflation exceeds some critical level, then it hurts economic growth, otherwise inflation has a favorable and positive impact on growth. The authors explained this phenomenon by using the so-called “adverse selection mechanism” in the credit market.

The underlying concept suggested that there are two types of agents in the financial system: “natural borrowers” and “natural lenders”. In the financial system natural lenders have funds to invest, whereas borrowers don’t have the funds to support their projects. Here comes the role of the financial system, it provides a common platform to fulfill their needs. If price level increases then it decreases the real rate of return. In this scenario, individuals try to borrow more and save less. At the moment, new borrowers have higher default risk because they were not initially interested in getting credit, creating adverse selection problem for investors, which is called credit market rationing. Because of this risk, investors provide fewer loans, which cause less liquidity in the financial markets.

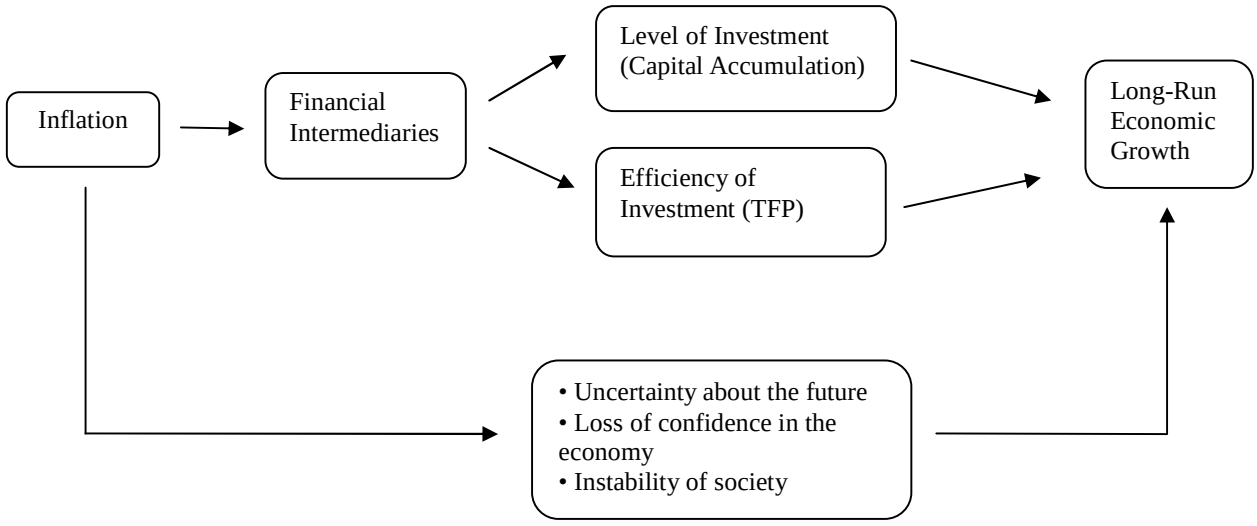
When inflation becomes lower than the credit market follows the Walrasian way and “adverse selection mechanism” will be absent. In this situation the model will generate Mundell-Tobin Tobin effect (Choi et al., 1996, Azariadas and Smith, 1996), which suggests that an increase of inflation rate will cause substitution between resources that is agents will prefer to replace cash with human or physical capital. Hence, economic growth will be promoted (Choi et al., 1996).

However, if inflation becomes higher than the threshold level, then credit rationing in the financial market hampers economic growth.

Additionally, there are different channels defined in the literature through which inflation manipulates economic growth. There are several recent studies, which focused their discussion on the non-linearity in the growth - inflation relationship. For example, Huybens and Smith (1998, 1999) stated that even expected inflation may harm economic growth by impeding financial sector allocating resources effectively.

Thus, once inflation exceeds the threshold level, credit rationing must be observed, and higher rates of inflation can have the adverse consequences as stated above. Theoretical models, which can successfully explain the negative and nonlinear correlation between inflation and economic performance, might differ in their sources of financial frictions and the specifications of an adverse selection problem in capital markets. Though, existing literature suggests the following transmission mechanism from inflation to economic growth (Figure 2.3).

Figure 2.3: Transmission Mechanism from Inflation to Economic Growth (Li, 2006)



According to Figure 2.3, inflation can affect economic growth through two channels, first is via financial intermediaries and second it has a direct effect on economic growth as well. Since the direct effect of inflation on growth is trivial and difficult to model, most theoretical studies have

focused on the main channel, which is through the route of financial intermediaries. To analyze these channels the whole process can be seen in three parts, (1) the inflation- finance nexus, which is the starting point of the channel through which inflation affects economic growth. In the literature this nexus has been well explored, and it has been proved to be that even predictable increases in the rate of inflation can hamper financial market development.

Additionally, the last two links of the channel (2) and (3) from finance to economic growth, empirical studies have found that different measures of financial market development are strongly and positively correlated with the level of investment, the efficiency of investment and real economic growth (King and Levine, 1993a, b; Levine and Zervos, 1996). Furthermore, Xu (2000) demonstrated that investment is an important channel through which financial development affects growth.

Some other studies emphasized the role of physical capital accumulation; financial development plays a pivotal role. A sound financial system helps a country to mobilize savings, allocate them efficiently and facilitate risk management. All these results in a rapid capital accumulation for an economy (Benhabib and Speigal, 2000). Levine (2004) identifies several channels through which financial development can enhance capital accumulation in an economy. A well developed financial system influences the savings rate and investment decision of entrepreneurs. Moreover, and among many other things, financial development improves monitoring of the projects and develops corporate governance along with funds allocation for projects (Cesar and Liu, 2003). It is also found that inflation is negatively associated with financial development because of the misallocation of credit in an inflationary environment (Khan et al., 2006). Thus, with this strong financial development-capital accumulation nexus and the adverse effects of inflation on financial development, Tobin effect is expected to be weak in well developed financial systems.

2.3 Financial development and Inclusive growth

2.3.1 Financial development, Economic growth and income inequality

Income inequality is an important economic issue, which affects both developing and developed countries. Many researchers' have tried to identify a link between economic growth and income inequality in the past. However, the literature does not provide conclusive comments about the

relationship between economic development and income inequality. Furthermore, Theoretical papers on the concept on finance-inequality relationship are few in number. There are two distinctive theoretical hypotheses regarding the finance-inequality link: an inverted U-shaped relationship and a negative linear relationship between financial development and income inequality. Traditional theories suggested that there exists an inverted U hypothesis, where inequality rises during the first stage of development after that it decreases when economy further develops. Alternative view of modern economic theories supported the negative hypothesis; they suggest that higher level of capital market imperfections leads to income inequalities (figure 9).

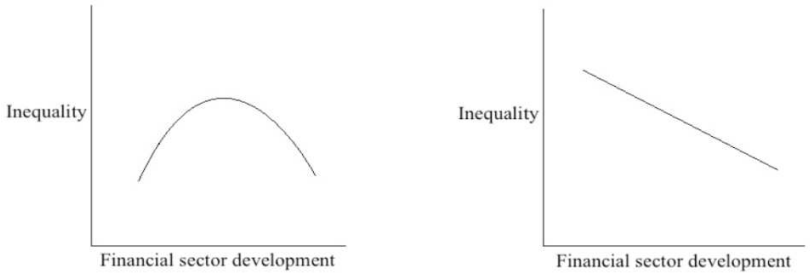


Figure 2.4: The inverted U hypothesis Vs the negative linear hypothesis

The first study on inequality was conducted by Keynes (1936) associated with aggregate demand and income distribution. Kuznets (1955) conducted the first study on the relationship between income inequality and economic growth. In his study, Kuznets introduced the hypothesis of an inverted U, which says that inequality rises with the early stages of economic development. This is reasoned by the sectoral composition of the economy and higher productive capacity of modern economy with respect to the traditional society. He stated that in traditional sectors, income inequality is less because of low productivity. But when the modern sector grows (at the expense of a traditional / agriculture sector), income inequality rises. After that, economy attains new and significant level; more individuals try to shift from the traditional sector to modern sector. During this process of shift the difference in productivity decreases, inequality starts declining. Thus inverted U hypothesis, states a phase of transition from where more people being poor to more people being rich. In other words, it states a situation where a large share of poor and rich people co-exists.

The literature on financial development and income inequality is concentrated around two basic hypotheses: Greenwood and Jovanovic (1990) “inverted u-shaped hypothesis” and Galor and Zeira (1993) and Banerjee and Newman (1993) “negative linear hypothesis”.

Greenwood and Jovanovic (1990) predicted an inverted U-shaped relationship between financial development and income inequality. This means that they expected that at early stages of financial development income inequality will increase and later on it will decrease. Their model was based on the concept of fixed costs that occur when individuals want to use financial intermediaries. They argued that in the absence of financial development they have to face problems like information asymmetries, idiosyncratic risk and maturity gaps, which yields low makes the investment more risky. Here comes the role of financial intermediaries, they minimize these problems, but also charges some fixed costs for providing these services. Hence, the fee charged by these financial intermediaries can’t be paid by all individuals. Therefore, the rich individuals get the benefits of financial development in early stages, since they are able to pay the ‘fixed cost’ required being able to use financial intermediation. The reason for the increase in inequality is that financial intermediaries reduce the imperfections of financial markets and improves the selection of projects, aggregate growth will increase. Thus the nonlinear relationship between financial development and income inequality shed light on the important functions of financial intermediaries during the growth process. First, they provide market information, which allows funds/investments to the most preferable source. Second, they reduce risk of investment by providing a pool of investment opportunities.

Despite the theoretical appeal of inverted U hypothesis, empirical evidences supporting it, especially with regard to developing countries, have been weak. Galore and Zeira (1993) and Banerjee and Newman (1993) proposed the alternative mechanism on the relationship between financial development and income inequality. They presented capital market imperfections as the basic fundamental factor of persisting income inequality. Banerjee and Newman (1993) constructed a model on occupational choice with four different options: subsistence, employment, self-employment, and entrepreneurship. Each individual can allocate himself to one of these sectors. While wealth is an endogenous component and it defines how an individual allocates himself to subsistence, employment, self-employment, and entrepreneurship sector. In order to become self employed/entrepreneur, individual needs to borrow money to invest. For

this they have to provide collateral and poor people can't provide collateral. Thus poor people cannot become self-employed or entrepreneurs. But the transition can take place as self-employed and entrepreneurs can have high or low returns and accordingly become relatively richer or poorer. In a well developed financial market, financial intermediaries reduce problems of moral hazards by providing better monitoring techniques that would reduce the need for collateral. Thus, individuals become independent of their initial wealth to become self-employed or an entrepreneur. Therefore, financial development accordingly helps to reduce income inequality which is based on the unequal distribution of wealth.

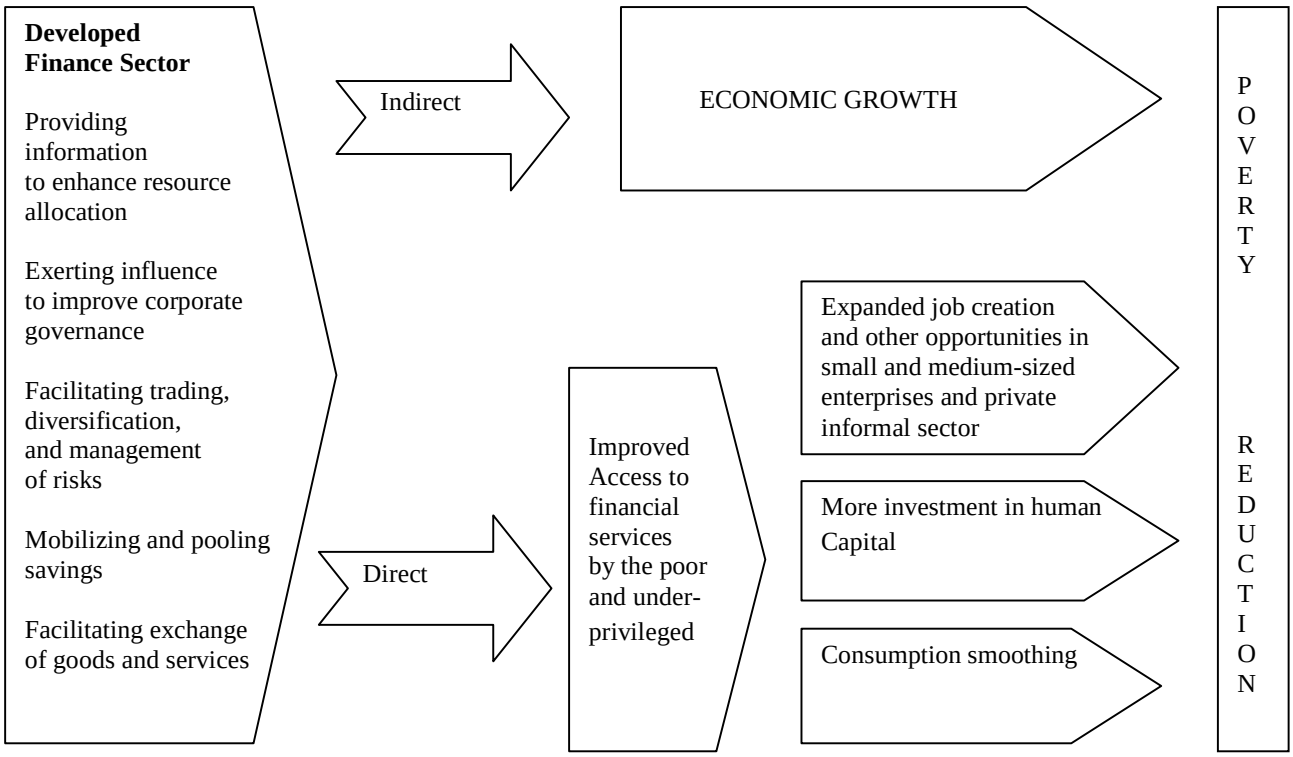
Galor and Zeira (1993) took the same approach by constructing a model of income inequality in an economy with indivisible investments. In their model, income depends on human capital. They argued that higher the investment in human capital, the higher is the return to employment. Again, initial wealth is essential for the level of investment. Based on the initial wealth an individual becomes a skilled or unskilled worker. Individuals without sufficient wealth can borrow to invest in their human capital. The borrowing rate depends on a world interest rate and a surcharge according to the effort the borrower needs to acquire in order to avoid the lender. Credit market imperfections exclude the poor to invest in human capital. Generations are linked through inheritances. Only those with access to external credit or with a large inheritance (rich parents) will be able to invest in human capital. But in developed financial markets, it becomes easy to borrow money. Thus, well developed financial markets lead to more equality in the income distribution.

Rajan and Zingales (2003) argued that the revolution in financial markets is ‘‘opening the gates of the aristocratic clubs to everyone’’. The authors supported the idea that financial development might benefit the poor; several theoretical models suggest that income inequality will be lower when financial markets are better developed.

2.3.2 Financial development, Economic growth and Poverty reduction

There are two channels via financial sector development can impact poverty reduction i. e direct and indirect channel. First, works directly through the poor benefiting from accessing financial services works indirectly through growth. Second, works directly through the poor benefiting from accessing financial services (Figure 2.5).

Figure 2.5: Financial Sector Development and Poverty Reduction



Source: Adapted from Claessens and Feijen (2006).

1. The Direct Channel through Access to Financial Services

Many researchers support the direct channel, which states that financial sector development can directly contribute to poverty reduction by providing or broadening the poor's access to financial services. For investment in human capital and physical capital, borrowing is the only option for poor people. As many authors claim, credit constraints are mainly binding on the poor as they do not have the resources to fund their own projects, nor the collateral to access bank credit (Banerjee and Newman 1993, Galor and Zeira 1993, and Aghion and Bolton 1997). Thus, these credit constraints restrict poor individuals to exercise the available option of investments. In the absence of collateral, capital flow only to wealthy entrepreneurs which will lead to further income inequality.

A well developed financial sector reduces information and transaction costs and, as a result, (i) allows more entrepreneurs—especially those less well-off—to obtain external finance, (ii) improves the allocation of capital, and (iii) exerts a particularly large impact on the poor.

Fields (2001) argued that underdeveloped credit market contributes to continued poverty, higher income inequality, and slower economic growth than developing credit and financial markets exerts a particularly large impact on the poor. Because of better credit facilities, poor people can become the part of productive enterprises. Allowing greater credit access by poor individuals has an especially important impact on poverty reduction.

In a well developed financial system, financial services are easily available and accessible to all individuals. Thus poor people can easily access these services to better respond to economic or health-related shocks, which reduces the likelihood of falling into poverty when such shocks occur. Access to credit can reduce the vulnerability of the poor to shocks in the absence of savings or insurance. According to Eswaran and Kotwal (1990), only the knowledge of credit availability can make the household more willing to adopt more risky technologies, because this credit acts as cushion consumption against income shocks if a potentially profitable but risky investment should turn out badly. Such behavior will increase the use of modern technologies with productivity-increasing, and hence income increases and it directly benefits the poor. For the same reason, access to credit and other financial services is likely to decrease the proportion of low-risk, low-return assets held by poor households for precautionary purposes (such as jewellery), and enable them to invest in potentially higher risk but higher return assets, (such as education, or a rickshaw), with overall long-term income enhancing impacts (Deaton 1991).

There are, however, also skeptical views on whether financial sector development can lead to a broadening of access to finance by the poor, especially at early stages.

Haber (2004) argued that it is primarily the rich and politically connected people who would benefit from improvements in the financial system. As such, greater financial development may only succeed in channeling more capital to a select few. Thus, it becomes an open question whether financial development will narrow or widen income disparities even if it boosts economic growth. Greenwood and Jovanovic (1990) predicted to an inverted U-shaped curve of income inequality and financial intermediary development, which says that at early stages of

financial development, only a few relatively wealthy individuals have access to financial markets and hence higher-return projects. Jalilian & Kirkpatrick (2001) stated that in the same way that financial services increase income growth generally, expanding the supply of financial services which can be accessed by the poor will increase income growth for the poor, thus having a direct impact on poverty reduction.

2. The Indirect Channel through Economic Growth

The alternative channel by which financial sector development supports poverty reduction is through economic growth. Many economists believe that economic growth reduces absolute poverty. Furthermore, there is now extensive acceptance that economic growth is a necessity (though not always sufficient) condition for sustained poverty reduction. Studies on cross-country analysis has shown that, while there are significant differences in the relationship between growth and poverty reduction across countries, the incomes of the poor tend to rise (and fall) proportionately with average incomes (e.g. Dollar & Kraay, 2002; Eastwood & Lipton, 2001).

Economic growth can benefit poor people through a number of possible channels. First, it increases the employment rate by generating new jobs. Second, according to Galor and Tsiddon 1996, higher rate of economic growth could reduce the wage differentials between skilled and unskilled labor at a later stage of development which helps in the reduction of poverty. Third, high growth rate increases tax revenues, which enables the government to spend more on health, education, and social protection which directly benefits the poor people (Perroti 1993). Fourth, because of high economic growth rate, capital accumulation increases, which lead to more funds available to the poor for investment purposes (Aghion and Bolton 1997), thus, increasing their income.

There are different views exists on the relationship between economic growth and poverty reduction. Kuznets (1955) provided inverted-U hypothesis, which states that economic growth may increase income inequality at the early stage of development, but reduces it at the mature stage of industrialization. Another theory was postulated by Todaro (1997), according to the "trickle down" theory; economic growth would either trickle down to the poor through job

creation and other economic opportunities or create the necessary conditions for the wider distribution of the economic and social benefits of growth.

Many researchers used the term of a “growth effect”, to explain the changes in poverty, stemming from a change in average income, and a “distribution effect”, caused by shifts in the Lorenz curve holding average income constant. They found that “growth effect”, explains the largest part of observed changes in poverty (Datt and Ravallion 1992, Kakwani 2000). Fields (2001) argued that 20 years of research have shown that in a cross-section of countries, those with a higher per capita income or consumption has less poverty. He stated that the degree of the effect of economic growth on poverty reduction depends on two things; growth rate itself and income inequality. Growth is necessary but not sufficient for poverty reduction.

Apart from economic growth there are some other facets, which help in poverty reduction. First, poor households need to build up their asset base in order to participate in the growth process. Second, growth needs to be more broad-based and inclusive to reach all segments of society, including the poor. Inequality also matters for poverty reduction and should be “on the agenda” (Kanbur and Lustig 1999). Growth and distribution are interconnected in numerous ways, and the effectiveness with which growth translates into poverty reduction depends crucially on the initial level of inequality (Lustig, Arias, and Rigolini 2002). Third, short-term public assistance measures are needed to protect the vulnerable groups of society, because it takes time for the needy to benefit from the impact of a policy or strategy.

This suggests that economic growth can reduce absolute poverty and financial sector development should therefore serve to reduce poverty through its positive impact on growth.

2.3.3 Financial development, Economic growth and human development

Sustained economic growth along with social development is one of the important macroeconomic objectives of every economy, because by only this the benefits of economic growth can be reached out by common people of the country and in this regard human development is deemed as an essential element. Human development generally is considered an uncertain concept used in different fields of research. It is defined as enlarging people’s choices

in a way which enables them to lead longer, healthier lives, has come to the fore as a fundamental objective of development.

The development of the financial sector can impact the human development in two possible ways. In the direct way, the accessibility to financial services for the poor people can provide the opportunity for them to save and borrow funds allocated to investing in small business and education which in turn improves the level of their lives. This will improve the life expectancy and income of low-income individuals. The indirect channel involves economic growth as an intermediary, i.e. financial development effects economic growth which will again effect the human development. The theoretical model can be described by the below figure 2.6.

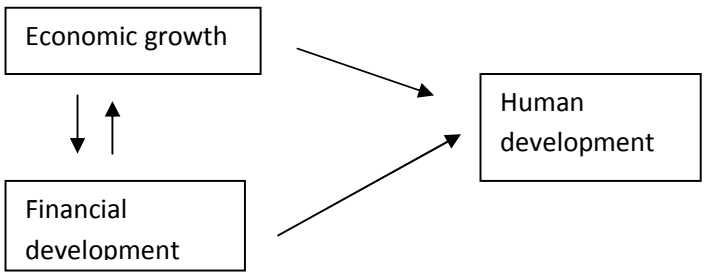


Figure 2.6: Financial sector development and human development

CHAPTER 3

Economic growth and Financial Development: Empirical Evidence

3.1 Economic growth and Financial Development: Time series empirical evidence

3.1.1 Introduction

The relationship between financial development and economic growth has received a great deal of attention in literature. The debate centered around the issue whether the financial sector actually leads the real sector in the process of economic development or the reverse. To date, there has been no universal consensus on the causal link between financial development and economic growth. In theoretical literature, there are three different views on the direction of the causality between economic growth and financial development. The first view states that financial development is a precondition for economic growth; this is known as "supply leading" notion and emerged due to Schumpeter (1911), Patrick (1966). The second view of the relationship between the two variables advocates that real economic growth leads to financial development, this view is known as ''demand-following'' given by Robinson (1952). The third view argues that there exists bidirectional causality between these two variables (Demetrides & Hussein, 1996; Greenwood & Smith, 1997).

The empirical evidences suggest that the strength and direction of the relationship between financial development and economic growth is sensitive to the variables used to measure the financial development. In addition, the findings suggest that outcome between two sectors differs from country to country over time. Most of the studies on this issue suffer from two limitations (1) Studies are mainly based on cross sectional data, which cannot satisfactorily address the country specific issue. (2) Many previous studies are largely drawn from bivariate causality analysis and may, therefore, suffer from the omission of variables bias. The current study, therefore, attempts to re- examine the issue by using multivariate analysis with the help of time series data for a specific country- India.

In the above situation, the main objective of the present chapter is to establish the empirical link between financial development and economic growth, using Auto Regressive Distributed lag (ARDL) Co-integration approach for Indian economy, over the period from 1982 to 2013. The rest of the chapter is structured as follows. Section 3.1.2 provides a review of empirical studies.

Section 3.1.3 describes variables, sources of data and model specifications. Section 3.1.4 provides the methodology. Section 3.1.5 presents empirical results while section 3.1.6 concludes the chapter.

3.1.2 Literature review of the empirical studies

The relationship between financial development and economic growth has long been established both at theoretical and empirical levels. The theoretical linkage has been discussed in Chapter 2, section 2.1. After reviewing the prominent theories underlying the effect of financial sector development on economic growth, it is also essential to review empirical research that has been conducted in the field. These empirical literatures determine whether the theory reflects the reality or not- in other words, to determine the importance of financial sector development for economic growth, hence the implications of the theoretical linkages can be seen by the empirical evidences.

This section provides a brief discussion of the accumulated empirical evidence on this topic. The empirical literature on financial development and economic growth focuses on either the role of the financial system in the economic growth process or examining the causal relationship between these two variables, specifically the existence and direction of causal linkage. Some of the most recent empirical studies consider both issues simultaneously. These empirical studies are divided into three sub-sections based on the direction of the causality between financial development and economic growth. In what direction does the causality between finance and growth run, and at what stage in the development process does which causality prevail? Suggesting first view focuses on finance-led growth, the second focuses on growth-led finance and the third focuses on bidirectional causality between financial development and economic growth.

Finance-led growth (Supply-following Hypotheses)

The finance-led growth hypothesis proposes a supply-leading relationship between financial development and economic growth, which suggests that financial development has a positive effect on economic growth (i.e. McKinnon, 1973; Shaw, 1973; Patrick, 1966; Fry, 1973). According to this view, financial intermediation contributes to economic growth through two

main channels: (1) by raising the efficiency of capital accumulation and in turn the marginal productivity of capital (Goldsmith, 1969) and (2) by raising the savings rate and thus the investment rate (McKinnon, 1973; Shaw, 1973). The notable early works on finance and development along the Schumpeterian lines include Gurley and Shaw (1955), Goldsmith (1969). They argue that the development of a financial system is crucially important in stimulating economic growth. Some relevant studies conducted in this regard, have summarized. The earlier empirical work on the issue is based on the cross-sectional dataset, such as Goldsmith (1969), King and Levine (1993 a, b, c), De Gregorio, Guidotti (1995) and Rajan and Zingales (1998) supported the Supply-following Hypotheses. Goldsmith (1969) examined data on 35 countries spanning from 1860 to 1963. He stated that "periods of more rapid economic growth have been accompanied, though not without exception, by an above-average rate of financial development" (Goldsmith 1969, pp. 48). King & Levine (1993) examined data for 80 countries over the period 1960 to 1989, King & Levine (1993, pp. 719) found a "significant and robust relationship between the level of financial development and both the current and future rate of economic growth." De Gregorio, Guidotti (1995) argued that impact of financial development increases significantly from high to low income countries. Latin America: credit significantly negatively related to growth because of liberalization in the poor regulatory environment. Using data for 41 countries over the period 1980 to 1990, Rajan and Zingales (1998) found that financial development has a substantial supportive influence on the rate of economic growth.

In case of studies based on time series dataset, the "Supply-following Hypotheses" is supported by Odedokun's (1996) findings as well, he used a time-series regression analysis (71 developing countries, 1960-1980) and concluded that financial intermediation encourages economic growth in roughly eighty five percent of the countries and that the growth-promoting patterns of financial intermediation are invariant across various countries and regions. Rousseau and Wachtel (1998) used VAR framework for five economies: USA, UK, Canada, Norway and Sweden for the time period 1870-1929. They stated that that for all countries: (1) financial intensity measures share long-term features with output and monetary base (2) financial intensity measures Granger-cause real output, with little evidence of feedback effects (3) VECMs suggest the positive response of output to increases in financial intensity, not vice versa. Khalifa Ghali (1999), Darrat (1999) and Chloe, Moosa (1999) supported the Finance-led growth hypothesis in

the case of Tunisia (1963-1993), 3 MENA countries (1964-1993) and Korea (1970-1992) respectively. Rousseau & Wachtel (2000) concluded that the strength of the relationship between financial development and economic growth is dependent on the rate of inflation. They estimated a threshold level of inflation (ranges between 13-25 percent) above which financial development no longer increases economic growth. Similar findings are obtained in Rousseau & Yilmazkuday (2009).

Calderon and Liu (2003) analyzed a larger number of countries (one hundred and nine countries from 1960 to 1994) and on pooled data employ the Geweke decomposition test. They suggested that financial development enhances economic growth for all countries. Financial development has larger relative effects in less-developed economies than in more developed ones. Christopoulos and Tsionas (2004) used time series unit root tests along with panel unit root tests for 10 developing countries over the time period 1970–2000 and found that long-run causality runs from financial development to economic growth but do not find any short-run causality between financial deepening and output. Fink et al. (2006) obtained the opposite result in terms of the time point of view. They found a strong finance-growth link in eleven transition countries (1990-2001) and the main growth impact runs through the productivity channel. The empirical results of the study conducted by Hinaunye Eita (2007) suggested that the relationship between financial development and economic growth in Botswana follows a supply- leading pattern over the time period 1977 to 2005.

Liang, Teng (2006) employed multivariate vector auto regressive (VAR) framework and concluded that the financial development act as a necessary condition of economic growth in China over the time period 1952–2001.

Yung Y. Yang, Myung Hoon Yi (2008) argued that that there is a unidirectional causality running from the financial development to the economic growth, which supports the hypothesis that financial development control causes economic growth, but the reverse does not hold true in case of Korea by employing super exogeneity methodology with the time span 1971–2002. The findings of Sisira R.N. Colombage (2009) supported the supply side hypothesis that is the financial markets in Japan, Switzerland, the UK and USA by employing used vector error correction model (VECM).

Uddin et al. (2013) supported the finance led growth hypothesis by employing ARDL bounds testing and Gregory and Hansen's structural break co-integration for Kenya. Furthermore, Levine (1998), Levine (1999), Levine et al. (2000), Beck & Levine (2004), Rioja and Valev (2004), Habibullah and Eng (2006), simultaneously addressed the issue of endogeneity and omitted variable bias. Following these works, the GMM panel estimators have been used in the literature of finance-growth.

Levine (1998) used GMM for 44 developed and developing countries over the period 1982-1995 and found that the exogenous component of banking development- the component defined by the legal environment is positively associated with economic growth. Levine et al. (2000) employed the GMM system estimator, developed by Arellano & Bover (1995) for a panel data set of 74 countries, with the data period from 1960 to 1995 and averaged over seven five-year periods. They concluded that "the exogenous component of financial intermediary development exerts a large, positive impact on economic growth." These results are confirmed by Beck & Levine (2004). They used GMM estimator for a panel data set of 40 countries over the period 1976 – 1998 and found that both stock market and bank development are jointly significant and thus contribute to economic growth.

Rioja & Valev (2004) stated that the growth effect of the financial system differs with the degree of financial development. Examining a panel data set of 74 countries over the period 1961 – 1995, they concluded that a strong positive impact of financial development on economic growth holds only after a certain threshold of financial development is achieved. Habibullah and Eng (2006) supported the contention made by Calderon & Liu (2003) that "financial depth contributes more to the causal relationships in developing countries" for 13 developing Asian countries.

Al-Award and Harb (2005) argued that in the long-term, financial development and economic growth may be related on some level, as suggested by the panel co-integration tests for 10 MENA countries for the time period 1969-2000. By employing panel time series analysis in four Latin American countries: Argentina, Bolivia, Brazil and Peru with time spanning 1980-2007, Bittencourt (2012) argued that both the variable macroeconomic stability and financial development are important in generating economic activity, innovation. Hsueh Jen Shun et al.

(2013) examined the issue by using Kónya's (2006) method of bootstrap panel Granger causality for ten Asian countries over the time period. Menyah et al. (2014) supported the 'supply leading' hypothesis in three countries of the study sample by using the panel granger causality method.

While the aforementioned studies shows the results for different countries, studies conducted on Indian economy includes Kamat and Kamat (2007), Banerjee and Ghosh (2010) and Sahoo (2013). Kamat and Kamat (2007) supported the finance-led growth hypothesis for the Indian economy by employing Unrestricted Vector Error Correction (VECM) for the time period 1971-2004. Banerjee and Ghosh (2010) used a VAR framework to study the issue in India. Sahoo (2013) used Auto regressive distributed lag (ARDL) with the time span 1982- 2011and commented that both the bank-based and market-based financial deepening have positive roles in driving India's economic growth.

Growth-led finance (Demand-following Hypotheses)

The second view of the relationship between financial development and economic growth was advanced by Robinson (1952) and it states that financial development follows economic growth or ''where enterprise leads finance follows'' (Robinson, 1952, p. 86). According to this ''demand-following'' view, as the real side of the economy expands, it states that, if demand for financial services increases, then this will lead to the growth of these services. Empirical support for this second view can also be found in some recent studies (Demetrides & Hussein, 1996; Friedman & Schwartz, 1963; Ireland, 1994).

Many studies haven't accepted the hypothesis that finance is a good forecaster of economic growth. According to them, financial development follows growth, and only one way causality runs from economic growth to financial development. Most of the studies are based on time series dataset regarding this view. Neusser and Kugler (1996), took the sample 13 OECD countries for their study period. They suggested that in most of its countries studied, economic growth causes financial development, except in three countries (USA, Japan and Germany), where the reverse causality was found in the USA, Japan and Germany. Shan et al, in their study of 9 OECD countries and China, gave support to causality running from economic growth to finance, with causality being bi-directional in others, and with no evidence of causality running

from financial development to economic growth. Findings of Habibullah (1999) suggested that there is a strong relationship between financial development and economic growth. Finance-led growth was only supported in the case of the Philippines, but in the other Asian countries, the study found the demand-following hypothesis to prevail.

The empirical results of the study Thornton (1996) used data for 22 developing countries over the time period 1960-1990 showed that financial development does not have much effect on economic growth. In 8 countries, no relationship was detected, and in 6countries, economic growth led to financial development. Deidda and Fattouh (2002) argued that no significant relationship between financial depth and economic growth was found in the low income sample. Only in the high-income sample, regressions confirmed the positive association between finance and growth by using the threshold regression model for 119 countries with time span 1960-1989. Waqabaca (2004) performed Granger causality tests for Fiji and stated that reveal a short-term relationship, predominantly running from economic growth to financial development. However, evidence of opposite causality was found in only one case, where private sector credit led to investment.

Odhiambo (2004) examined the link between financial development and economic growth in South Africa over the time period 1968-2000 by using Co-integration and error correction model and concluded that the supply-leading hypothesis was rejected in South Africa. Indeed, there is an evidence of a demand-following relationship between financial development and economic growth in South Africa. Ang and McKibbin (2007) also used the Co-integration and causality tests, his findings supported Robinson's view that output growth leads to more financial depth in the long-run. Handa and Khan (2008) also use time series data on 13 countries. By using VEC model the results showed the existence of unidirectional causality from economic growth to financial development for Bangladesh, Sri Lanka, Brazil, Malaysia, Thailand and Turkey. Meanwhile, for Germany, Japan, India, Argentina, the UK and the USA they establish bidirectional; and no causality exists in Pakistan.

Furthermore, Odhiambo (2007) and Sinha, Macri Joseph (2009) used VAR framework. All these studies supported the growth-led finance hypothesis. Zang and Kim (2007) analyzed the issue for

71 developing countries with the time span 1961–1995 and concluded that high growth might lead to the emergence of more developed financial intermediaries and markets. As argued by Robinson (1952), financial development might primarily follow economic growth, as a result of increased demand for financial services.

In Indian context, Paramati, Gupta (2011) investigated the relationship between financial development and economic growth in Indian context. This study provides evidence in favor of 'demand following' hypothesis in the short-run and rejected a long-term relationship between financial development and economic growth.

Bi-directional causality

A third view of the relationship between financial development and economic growth postulates that the two variables are mutually causal, that is, they have bidirectional causality, which suggests that a country with a well-developed financial system could promote high economic growth through technological change, service innovations, which will in turn create a high demand for financial services. As the financial sector acts in responses to these demands, it will motivate increased economic performance. Thus, finance can affect economic growth at a certain stage of development, and the reverse will be found. Thus, financial development and economic growth go together. This section focuses on the bidirectional relationship between financial development and economic growth.

The studies based on time series data includes; Fritz (1984) employed Causality test in the Philippines and commented that early stages of economic development: finance causes growth more advanced stages of economic development: growth causes finance.

Through time-series data and VAR methodology Demetriades and Hussein (1996) obtained results that contrast with most of the cross-sectional studies. Most of their findings on the 16 countries studied supported bidirectional causality between financial development and economic growth. Akinboade (1998) argued that bi-directional causality exists between financial development and per capita income in Botswana over the time period 1972-1995. Luintel and

Khan (1999) used a sample of ten less developed countries to conclude that the causality between financial development and output growth is bi-directional.

Yousif (2002), in a study of 30 developing countries, gave some support to the supply-leading and demand-following pattern in certain countries, but concluded that they are not as significant as the bidirectional one. Unalmis (2003), Chuah and Thai (2004) used bi-variate time series model; their studies supported the hypothesis of bi-directional causality. The empirical findings of the study conducted by Odhiambo (2005) for Tanzania with time span 1960-2005, suggested that the causal relationship between financial development and economic growth is dependent on the choice of proxy of financial development. Akinlo, Egbetunde (2010) examined the issue for ten countries in sub-Saharan African countries by using a vector error correction model (VECM) for the time period 1980-2005 and concluded that Bidirectional relationship exists between financial development and economic growth was found in Kenya, Chad, South Africa, Sierra Leone and Swaziland.

From a panel dataset perspective of developing countries, Apergis et al. (2007) reported bi-directional causality by employing panel co-integration methodology developed by Pedroni (1999) for 65 developing and developed countries. The study of Hassana et al. (2011) found that: Sub-Saharan Africa (low- and middle-income countries) there is s one-way causality running from growth to financial measures and trade is the only variable which explains the growth variation. High-income OECD countries, empirical evidences support a two-way causal between finance and growth.

Ahmed Abdullahi (2010) employed Panel data Granger causality and JJ co-integration for 15 Sub-Saharan African countries in time period 1976-2005. He concluded that the bi-directional causal relationship exists in five countries and reverse causality from economic growth to financial development in two countries. The findings of Kar et al. (2011) suggested that suggested that the direction of causality between financial development and economic growth is sensitive to the selection of the financial development indicator. Empirical evidences support both hypotheses on demand-following and supply leading to the fifteen Middle East and North African (MENA) over the time period 1980–2007. Masoud and Hardaker (2012) developed an endogenous growth model for 42 countries, and stated that the relation between stock market

development and economic growth in emerging economies is bi-directional. The findings describe that the stock market and the banking sector in emerging economy are more complementary rather than substitutes in providing financial services to the economy. Sehgal Sanjay et al. (2013) used panel co-integration and Fully Modified Ordinary Least Squares (FMOLS) for 75 countries with time span 1990-2009. The findings supported the bi-directional causality between financial development and economic growth. Pradhan et al. (2014) investigated the relationship between banking sector development, stock market development, economic growth in the case for ASEAN countries over the time period 1961–2012. The study found that there exists a co-integration maong the adopted variables. The presence of both unidirectional and bidirectional causality between these variables is also found. Samargandi et al. (2015) analyzed the relationship between financial development and economic growth during the 1980–2008 period for a panel of 52 middle-income countries by employing pooled mean group estimations in a dynamic heterogeneous panel setting. The empirical findings of the study stated that in the short run, the relationship between financial development and economic growth is insignificant while there is an inverted U-shaped relationship is found in the long run. The finding of inverted U-shaped relationship is supported by the estimation of the threshold.

Summary

As to sum the review of empirical literature, one can conclude that that studies using cross-sectional regressions (Goldsmith, 1969; King and Levine, 1993a,b,c; De Gregorio, Guidotti, 1995; Rajan and Zingales, 1998; Ram, 1999) generally concluded that financial developments positively affect economic growth via two channels: productivity of capital and accumulation of saving however they failed in explaining the real direction of causality between financial development and economic growth but failed in providing the direction of the causal linkage between financial development and economic growth. These studies are comparatively old.

Overall, the view that in developing countries, finance causes growth in the earlier stages of economic development, and that in developed countries, growth causes financial development, prevailed. Some of these studies found evidence for bi-directional causality. These studies also suggested that the causal relationship between financial development and economic growth depend on proxy used for financial development used and the level of development of the

financial sector. According to Akinboade and Makina (2006), there can be a misleading interpretation of some variables. For example the ratio of money to GDP, which is always used as indicator of financial development could not be the same if it includes components such as short term inflow of foreign savings. When money supply to GDP ratio includes short-term inflow of foreign savings responding to the liberalization of capital accounts and comparatively high and positive real interest rates, its increase will only reflect a financial development if the inflow is stable and is productively deployed by the domestic financial system.

It is also argued that the proxy of financial development has a great impact on the relationship between finance and economic growth because the impact of financial development on economic growth in a country where both the banking sector and stock exchange are well developed (in developed countries) will not the same as in a country where only the banking sector are developed (developing countries). Therefore, the level of financial sector development has the important implication in the relationship between finance and economic growth. These differences in financial development in developed and developing countries should be taken care of while studying the link between finance and economic growth.

3. 1.3 Dataset, variables and Model specification

Data and Variable identification

In the empirical analysis, the chapter uses annual time series data for the period 1982-2013[1].

Economic growth: Economic growth is measured by Per capita Gross Domestic Product at factor cost (PGDP) (base year 2005=100).

Financial development: The sum of credit to the private sector and market capitalization as a ratio of GDP (FINDEP) is used as the broad indicator of financial deepening [3]. This study uses four different types of financial development indicators to construct the financial development index for Indian economy by employing the principal component method. These indicators include: domestic credit to the private sector as a percentage of GDP (LCREDIT); market capitalization of listed companies as a percentage of GDP (LMCAP); Total Bank Deposit Liabilities (LBDL)[4] as a percentage of GDP and broad money as a percentage of GDP (LM3).

Principal component analysis has traditionally been used to reduce a large set of correlated variables into a smaller set of uncorrelated variables, known as principal components (see Stock and Watson, 2002a,b).

Control variables: Beside these variables, three control variables such as call money rate as a proxy of policy rate (CALL), trade openness (TOP= (Export+Import/GDP)) and price stability indicator, INF (composite Consumer Price Index with base year 2005=100) were also included while examining their role in the economic growth [4].

The data were collected from Handbook of Statistics on Indian Economy published by the Reserve Bank of India, the National Accounts Statistics published by the Central Statistical Organization, Government of India and World Economic Outlook Database, IMF. The following general specification has been used in this study to empirically examine the long run relationship between financial development and economic growth.

Model Specification

The used model equation is given below:

LPGDP = F (LFD, LCALL, LTOP, LINF) ….. (1)

Where, LPGDP is the per capita gross domestic product, LFD represents financial development variable, LTOP is trade openness, LCALL is call money rate, LINF is consumer price Index and L implies that the variables have been transformed in natural logs.

We have made three models, model (A), model (B) and model (C). In model (A), (B) and (C); all the variables are same except the proxy variable of financial development. In model (A), dependent variable is per capita gross domestic product (LPGDP) and independent variables are: The ratio of private sector credit to GDP (LCREDIT); the ratio of market capitalization to GDP (LMCAP); call money rate as a proxy of policy rate (LCALL), trade as a percentage of GDP (LTOP) and consumer price index (LINF). In model B, dependent variable is per capita gross domestic product (LPGDP) and independent variables are: The sum of credit to the private sector and market capitalization as a ratio of GDP (LFINDEP); The ratio of market capitalization to GDP (MCAP); call money rate as a proxy of policy rate (LCALL), trade as a percentage of GDP

(LTOP) and consumer price index (LINF). In model C, dependent variable is per capita gross domestic product (LPGDP) and independent variables are: financial development index (LFDI); call money rate as a proxy of policy rate (LCALL), trade as a percentage of GDP (LTOP) and consumer price index (LINF).

Model (A): LPGDP = f (LCREDIT, LMCAP, CALL, LTOP, LINF)
Model (B): LPGDP = f (LFINDEP, LCALL, LTOP, LINF)
Model (C): LPGDP = f (LFDI, LCALL, LTOP, LINF)

3.1.4 Methodology

Principle component analysis (PCA) and construction of FDI

Principal Component Analysis (PCA) is a special case of more general methods of factor analysis. The PCA transforms an original set of variables into smaller set of linear combinations that account for most of the variance of the original set. The aim of PCA is to construct out of a set of variables, X_j's (j = 1, 2, .., k) new variables (Pi) called ' Principal Components', which are linear combinations of X's. The first principal component (P1) is determined as the linear combination of X_1, X_2,....,X_m provided that the variance contribution is maximum. The second principal component (P2), independent from the first principal component, is determined as to provide a maximum contribution to total variance left after the variance explained by the first principal component, then the third and the other principal components are determined as to provide the maximum contribution to the remaining variance and independent from each other. The aim here is to determine age coefficients providing the linear combinations of variables based on the conditions specified. The following formula is used to have financial sector development index.

$$FDI = \sum_{i=1}^{j} a_i \frac{X_{ij}}{Sd\ (X_i)} \quad \ldots\ldots (1)$$

Where FDI is the financial development index; Sd = Standard Deviation; X_{ij} = i^{th} items in j^{th} year; a_i, = Factor loadings as derived by PCA.

Measuring financial development is a complicated procedure because there is no clear cut definition of financial development and no thumb rule about the inclusion of variables. Bandiera et al. (2000) stated that an ideal index of financial sector development should include various

aspects of regulatory and institutional reforms. Inclusion all the policy variables separately in the same model might cause multi-co linearity. In order to avoid it, this study uses four different types of financial development indicators to construct the financial development index for Indian economy by employing the principal component method. All the variables are taken in their natural logarithm. The variables are taken from 1982-2013 [1].

Table 3.1.1: Principal Component Analysis

	PAC 1	PAC 2	PAC 3	PAC 4
Eigen Value	3.667283	0.287036	0.038997	0.006684
Cumulative Value	3.667283	3.954319	3.993316	4
Variance Proportion	0.9168	0.0718	0.0097	0.0017
Cumulative Proportion	0.9168	0.9886	0.9983	1
Variables/ Eigen Vectors	Vector 1	Vector 2	Vector 3	Vector 4
LCREDIT	0.479714	0.719004	0.430406	0.260112
LMCAP	0.489743	-0.63851	0.178642	0.566166
LBDL	0.512924	0.161069	-0.843178	0.00401
LM3	0.516658	-0.222249	0.268119	-0.782165

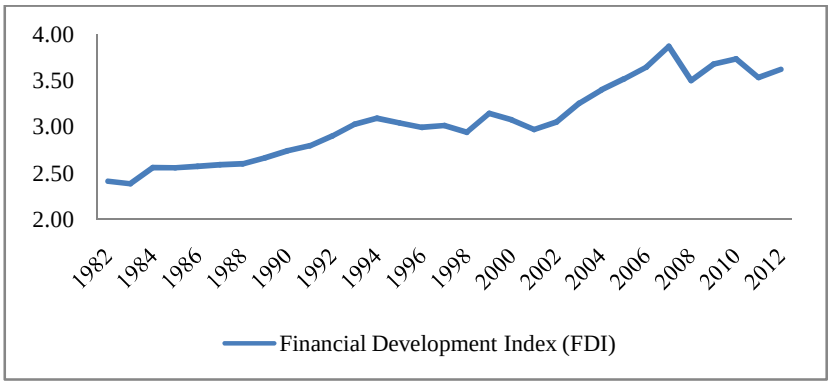
Source: Author's own computation, World Bank database, Hand Book of Reserve Bank of India
Notes: LCREDIT: Domestic credit to private sector (% of GDP), LMCAP: market capitalization of listed companies (% of GDP), LBDL: Total bank deposit liabilities (% of GDP) and LM3: broad money (% of GDP). L denotes the natural logarithm of the series.

The results of the principal component method (PCM) are presented in Table 3.1.1. It reveals that the first principal component explains 91.68 percent, the second 7.18 percent, third further 0.97 percent and last principal component reports only 0.17 percent standardized variance. It can be easily concluded that the first principal component is better than other components/combination of variables because it explains the high level of variability. Thus, the first eigenvector values are used as a weight to construct a Financial Development Index (FDI) and denoted as FDI. The variables LCREDIT, LMCAP, LBDL and LM3 are individually contributing the standardized variance of the first principal component, i.e. 47.97, 48.97, 51.29 and 51.66 percent, respectively.

The graph of financial development index (FDI) is presented below (Figure 3.1.1). It indicates the changes in financial development that took place in the Indian economy during the 1982-

2012. First, it shows the steady increase than from 1982 to 1994 moderate increase. From 1995 to 2001, it fluctuates and then sharply increases. After that there were some fluctuations in 2008 and 2011. It decreases in 2008 and increases till 2013. It again decreases in the year 2011 and rises in 2012 and 2013. Overall, this graph also indicates a steady improvement in the financial sector.

Figure 3.1.1: Financial development index (FDI) of Indian Economy



Source: Author's own computation

Co-integration with ARDL

To empirically analyze the long run relationship and dynamic interaction of economic growth with financial development, the above model has been estimated by the auto regressive lag (ARDL) co-integration procedure developed by Pesaran et al. (2001). The procedure is adopted for four reasons. First, the bound test is simple as opposed to other multivariate co-integration technique such as Johansen & Juselius (1990), it allows co-integrating relationship to be estimated by OLS once the lag order is selected. Second, the bound test procedure does not require the pre testing of the variables included in the model for unit root unlike other techniques such as Engle Granger (1987) and Johansen & Juselius (1992). These approaches require that all the variables to be integrated of the same order (I(1)). Otherwise the predictive power will be lost (Kim et al 2004; Perron 1989, 1997). However ARDL technique is applicable irrespective of whether regressor in the model is I (0) or I (1). The procedure will however crash in the presence of I (2) series. Third, the test is relatively more efficient in small sample data sizes as is the case of this study. Fourth the error correction method integrates the short run dynamics with long run equilibrium without losing long run information. The unrestricted error correction model

(UECM) of ARDL model is used to examine the long run & short run relationship take the following form.

$$\Delta LPGDP = \delta_0 + \delta_1 T + \delta_2 LFD_{t-1} + \delta_3 LCALL_{t-1} + \delta_4 LTOP_{t-1} + \delta_5 LINF_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta PGDP_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LFD_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LCALL_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LTOP_{t-i} + \sum_{i=1}^{q} \omega_i \Delta LINF_{t-i} + \varepsilon_t \quad \ldots\ldots (2)$$

Where the variables are as defined earlier and T is time trend and L implies that the variables have been transformed in natural logs. The first part of the equation (3) with δ_2, δ_3, δ_4 and δ_5 refer to the long run coefficients and the second part with α, β, μ, σ, ω refers to the short run coefficients and ε_t is the error term. The null hypothesis of no co-integration $H_0: \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ and the alternative hypothesis $H_1: \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ implies co-integration among the series (equation 2).

ARDL bounds Test procedure

The first step in the ARDL test is to estimate the equation (3) by OLS in order to test for the existence of a long run relationship among variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of variables i.e. H_0 (null hypothesis) as against H_1(alternative hypothesis) as stated earlier. In the second step, once the co-integration is established the conditional ARDL long run model for $LPGDP_t$ can be estimated as:

$$\Delta LPGDP_t = \alpha_0 + \sum_{i=1}^{q} \delta_1 \ LPGDP_{t-i} + \sum_{i=1}^{q} \delta_2 \ LFD_{t-i} + \sum_{i=1}^{q} \delta_3 \ LCALL_{t-i} + \sum_{i=1}^{q} \delta_4 \ LINF_{t-i} + \sum_{i=1}^{q} \delta_5 \ LTOP_{t-i} + \varepsilon_t \quad \ldots. (3)$$

This involves selection of the orders of ARDL (q,q_1 ,q_2, q_3, q_4) models using SIC. The third and final step, we obtain the short run dynamic parameters by estimating an error correction model with the long run estimates. This is specified as below.

$$\Delta LGPGDP_t = \mu + \sum_{i=1}^{q} \alpha_i \Delta LGPGDP_{t-i} + \sum_{i=1}^{q_1} \beta_i \Delta LFD_{t-i} + \sum_{i=1}^{q_2} \mu_i \Delta LCALL_{t-i} + \sum_{i=1}^{q_3} \sigma_i \Delta LINF_{t-i} + \sum_{i=1}^{q_4} \omega_i \Delta LTOP_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad \ldots.. (4)$$

Where $\alpha, \beta, \mu, \sigma, \omega$ are short run dynamic coefficient to equilibrium and ϕ is the speed adjustment coefficient. To check the goodness of fit of the ARDL model, diagnostic tests and stability tests are conducted. The diagnostic tests examine the serial correlation, functional form, normality, and heteroscedasticity associated with the model. The structural stability test is conducted by employing the cumulative residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ).

Granger Causality Test

The co-integration relationship indicates the existence of causal relationship between variables but it does not indicate the direction of causal relationship between variables. Therefore, it is common to test for detecting the causal relationship between variables using the Engle and Granger (1987) test procedure. There are three different models that can be used to detect the direction of causality between two variables X and Y depending upon the order of integration and the presence or absence of co-integration relationship. If two variables say X and Y are individually integrated of order one I (1) and co-integrated, then Granger causality test may use I(1) data because of super consistency properties of estimators. If X and Y are I(1) and co-integrated, the Granger causality test can be applied to I(0) data with an error correction term. If X and Y are I(1) but not co-integrated, the Granger causality test requires transformation of the data to make I(0). For this paper, the presence of co-integration relation- ship the application of Engle and Granger (1987) causality test in the first differenced variables by means of a VAR will misleading the results, therefore an inclusion of an additional variable to the VAR system such as the error correction term would help us to capture the long- run relationship. The augmented form of the Granger causality test involving the error correction term is formulated in a multivariate p[th] order vector error correction model given as below:

$$\begin{pmatrix} \Delta LFD_t \\ \Delta LPGDP_t \\ \Delta LCALL_t \\ \Delta LINF_t \\ \Delta LTOP \end{pmatrix} = \begin{pmatrix} C1 \\ C2 \\ C3 \\ C4 \\ C5 \end{pmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \beta_{11i} & \beta_{12i} & \beta_{13i} & \beta_{14i} & \beta_{15i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} & \beta_{24i} & \beta_{25i} \\ \beta_{31i} & \beta_{32i} & \beta_{33i} & \beta_{34i} & \beta_{35i} \\ \beta_{41i} & \beta_{42i} & \beta_{43i} & \beta_{44i} & \beta_{45i} \\ \beta_{51i} & \beta_{52i} & \beta_{53i} & \beta_{54i} & \beta_{55i} \end{bmatrix} \begin{pmatrix} \Delta LFD_{t-i} \\ \Delta LPGDP_{t-i} \\ \Delta LCALL_{t-i} \\ \Delta LINF_{t-i} \\ \Delta LTOP_{t-i} \end{pmatrix} \begin{pmatrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \\ \gamma_5 \end{pmatrix} \mathrm{ECM}_{t-1} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{pmatrix}$$

…… (5)

The C's, β's and γ's are the parameters to be estimated. ECM_{t-1} represents the one period lagged error-term derived from the co-integration vector and the ε's are serially independent with mean zero and finite covariance matrix. From the Equation (5) given the use of a VAR structure, all variables are treated as endogenous variables. The F test is applied here to ex- amine the direction of any causal relationship between the variables. The economic growth variable (LPGDP) does not Granger cause financial development (LFD) in the short run, if and only if all the coefficients of β_{12}i's are not significantly different from zero in Equation (5). Similarly the economic growth do not Granger cause energy in the short run if and only if all the coefficients β_{21}i's are not significantly different from zero in the Equation (5). There are referred to as the short-run Granger causality test. The coefficients on the ECM represent how fast deviations from the long-run equilibrium are eliminated. Another channel of causality can be studied by testing the significance of ECM's. This test is referred to as the long run causality test.

3.1.5 Empirical Results

Stationarity test

To determine the order of integration, this study uses ADF, DF-GLS, KPSS and Ng-Perron unit root tests. The vital results of these tests are reported in Table 3.1.2 and 3.1.3. The results show that all the variables are non-stationary at levels. Now, the next step is to differentiate the variables once in order to perform stationarity tests on differenced variables. It is, therefore, worth concluding that all the variables used in this study are integrated of order one i.e. difference stationary I (1). Additionally, it is also important to ascertain that the optimal lag order is chosen appropriately so that the error terms of the equations are not serially correlated. Consequently, the lag order should be high enough so that the conditional ECM is not subject to over parameterization problems (Narayan, 2005; Pesaran 2001). The result of lag length selection is provided in table 3.1.4. For both the models selected lag length is 1 by Schwarz information criterion.

Table 3.1.2: Stationarity Test of Variables (With Trend and Intercept)

	ADF	DF-GLS	KPSS	Stationarity Status
LCREDIT	0.0509	0.6508	0.5828	
ΔLCREDIT	-2.1525	-2.1888	0.3093	I (1)
LPGDP	2.2805	0.3283	0.7228	
ΔLPGDP	-3.9109	-3.1099	0.4757	I (1)
LMCAP	-0.9518	-0.7338	0.597	
ΔLMCAP	-6.008	-4.5461	0.0626	I (1)
LFINDEP	-0.9857	-0.3893	0.6103	
ΔLFINDEP	-5.6397	-4.889	0.0714	I (1)
LFDI	-2.3966	-2.5494	0.0593	
ΔLFDI	-4.4940	-4.6279	0.0639	I (1)
LCALL	-2.6723	0.1436	0.3875	
ΔLCALL	-4.9708	-3.4561	0.2261	I (1)
LTOP	1.6679	0.5934	0.6768	
ΔLTOP	-6.5352	-2.5214	0.4545	I (1)
LINF	0.0509	0.6908	0.5828	
ΔLINF	-4.1525	-2.3956	0.0809	I (1)

Source: Author's own Calculation by using E-views 7.0

Δ denotes the first difference of the series. L implies that the variables have been transformed in natural logs

Table 3.1.3: Ng-Perron Test (With Trend and Intercept)

	MZa	MZt	MSB	MPT
LPGDP	-3.8881	-1.2482	0.3210	21.5690
LCREDIT	-7.6206	-1.9037	0.2498	12.0589
LMCAP	-10.177	-2.1814	0.2143	9.28288
LFINDEP	-11.6091	-2.3922	0.2060	7.9364
LFDI	-11.0718	-2.3270	0.2101	8.3570
LCALL	-11.4628	-2.3622	0.2060	8.1098
LTOP	-5.4971	-1.6430	0.2988	16.531
LINF	-11.6858	-2.3899	0.2045	7.9377
ΔLPGDP	-18.1030	-2.9540	0.1807	7.0514
ΔLCREDIT	-6.9500	-2.8531	0.1666	13.122
ΔLMCAP	-18.470	-2.8577	0.1719	6.8176
ΔLFINDEP	-19.3360	-2.5748	0.1930	6.8740
ΔLFDI	-18.6376	-3.6064	0.1911	6.7090
ΔLCALL	-28.867	-2.9820	0.0240	0.1051
ΔLINF	-18.2142	-2.6953	0.1445	6.9009
ΔLTOP	-19.9672	-2.9218	0.1746	6.6620

Note: Δ denotes the first difference of the series. L implies that the variables have been transformed in natural logs.

Table 3.1.4: Lag Length Selection

	Lag order	Log L	LR	FPE	AIC	SIC	HQ
Model A	1	239.5498	253.4418	2.25e-13	-16.9678*	-13.7404*	-14.5314
Model B	1	223.0353	221.8670*	4.64e-11	-18.6289	-13.4394*	-14.2653*
Model C	1	263.6452	210.7114	2.49e-13	-17.6865*	-17.7149*	-18.5106

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Co-integration test

After determining the order of integration, next we employ ARDL approach to co-integration in order to determine the long run relationship among the variables. By applying, the procedure in OLS regression for the first difference part of the equation (3) and then test for the joint significance of the parameters of the lagged level variables when added to the first regression. The F-Statistics tests the joint Null hypothesis that the coefficients of lagged level variables in the equation (3) are zero. Table 3.1.5, reports the result of the calculated F-Statistics & diagnostic tests. The bound test evidence confirm the long run relationship because the calculated F statistics greater than the critical values of the upper level of the bound at 1% level of significance for both the models. The estimated statistics shows that the model specification seems to pass all diagnostic test successfully.

Table 3.1.5: ARDL Bounds test

Panel I: Bounds testing to co-integration:
Estimated Equation: *LPGDP = F (LFD, LCALL, LTOP, LINF)*

Indicators	Model A	Model B	Model C
Optimal lag	01	01	01
F – Statistics	8.6524	8.2460	7.0453

Panel II: Diagnostic Tests:

Diagnostic Tests Indicators	**Model A**	**Model B**	**Model C**
Normality J-B value	0.9796 (0.45)	0.8776 (0.55)	0.9214 (0.59)
Serial Correlation LM Test	1.6765 (0.77)	1.3923 (0.69)	1.0245 (0.77)
Heteroscedasticity Test (ARCH)	1.3087 (0.19)	1.3806 (0.95)	1.2014 (0.26)
Ramsey Reset Test	0.0467 (0.88)	0.0536 (0.21)	0.8521 (0.36)

Note: Values in the parentheses (#) are p-values

The next step is to estimate the long run and short run coefficients of ARDL model. The optimum model is chosen by Schwarz Bayesian criterion. The estimated long run coefficient of ARDL approach for two model specification is reported in table 3.1.6. The long run empirical results demonstrate that all (LCREDIT, LMCAP, LFINDEP and LFDI) all indicators of financial development have expected positive coefficients. However, CREDIT is significant at the 1 % level in determining economic growth in India. The estimated coefficient reveals that a 1% rise in credit (bank based indicator) increases economic growth (LPGDP) by 60.91%. The coefficient of LFDI is positive and significant at 10%. It implies that 1% increase in LFDI increases economic growth by 0.6792%. The study has considered call money rate (LCALL) as one of the proxy for policy indicator in the model. The result shows a desired negative and statistically significant coefficient (5% in model A and 10% in model B). This implies that the call money rate is one of the important policy variables for economic growth in India.

The result indicates that investment demand in India also dependent on the change in short term interest rates. The trade openness (LTOP) variable as another proxy for policy indicator has a negative sign with statistically insignificant coefficient. A negative sign for LTOP is against the strategy of export led growth hypothesis. However, in a developing country like India which is heavily dependent on capital intensive imports, it is expected that trade openness may have a negative impact on the economic growth. This result also supported by Jude (2010). Looking at the coefficient, the favorable impact of financial development on economic growth is supported by LINF. This implies that price rise acts as an investment inducing variable in India. With price rise and expected inflation, the real cost of borrowing decreases and hence demand for capital increases; leads to more growth. This result is inconsistence with Fischer (1991, 1993).

Table 3.1.6: Estimated Long Run Coefficients (Dependent variable: LPGDP)

	Model (A)		Model (B)		Model (C)	
Regressors	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
LCREDIT	0.6091*** (3.0152)	0.007	----	----	----	----
LMCAP	0.1901 (1.2376)	0.230	----	----	----	----
LFINDEP	----	----	0.83602 (1.4367)	0.165	----	----
LFDI	----	----			0.6792* (1.6550)	0.101
LCALL	-0.2474** (-2.1974)	0.044	-0.5604* (-2.1580)	0.0103	----	----
LTOP	-0.5738 (-1.1383)	0.268	-1.0023 (-0.9725)	0.341	0.2456 (0.4521)	0.105
LINF	0.5618*** (3.2409)	0.004	0.73819* (1.7506)	0.094	0.5012* (1.6720)	0.0892
CONS	3.8392 (4.7165)	0.000	4.7113 (5.9942)	0.000	2.2546 (3.8921)	0.000
Robustness Indicators						
R^2	0.9988		0.9988		0.9976	
Adjusted R^2	0.9984		0.9985		0.9972	
F Statistics	2536.8	[0.000]	3114.6	[0.000]	2106.5	[0.000]
D.W. Stat	1.9734		1.8938		1.9610	
Serial Correlation	0. 1813	[0.189]	0. 8175	[0.376]	0.3561	[0.695]
Heteroscedasticity	0.3708	[0.549]	1.989	[0.170]	1.0241	[0.586]

Note: (1) The lag order of models is based on Schwarz Bayesian Criterion (SBC). Model A is ARDL(1,0,0,1,0,0), Models B is ARDL(1,0,1,0,0) .Values in the (#) parentheses are t-values.
(2) *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.
(3)Values in [#] are probability values.

Results of short run dynamics using the ECM version of ARDL are reported in Table 3.1.7. The model includes an error correction term (ECM_{-1}). The coefficient of the error correction term is an adjustment coefficient capturing the proportion of the disequilibrium in economic growth in one period which is corrected in the next period. The larger the error term, the earlier the economy's return to the equilibrium rate of growth, following a shock. The value of the error correction term ought to lie between 0 and -1. The value of -1 indicates that 100% of the disequilibrium in the growth is corrected in the following year. The estimated error correction term of models A is -0.171 and significant at 1% level, the estimated error correction term of

model B is -0.0769 (significant at the 10 % level) and the estimated error correction term of model C is -0.0351 (significant at the 1 % level). This indicates that following a shock, there is a relatively slow return to the equilibrium growth in the following year.

Table 3.1.7: Error Correction Representation for the Selected ARDL Model (Dependent variable: ΔLPGDP)

	Model (A)		**Model (B)**		**Model (C)**	
Regressors	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
ΔLCREDIT	0.1045* (1.6989)	0.103	----	----	----	----
ΔLMCAP	0.0326*** (3.2337)	0.004	----	----	----	----
ΔFINDEP	----	----	0.06433*** (3.7116)	0.001	----	
ΔLFDI	----	----	----	----	0.1317** (2.0188)	0.049
ΔLCALL	-0.00643 (-.61183)	0.547	-0.0076 (-0.7819)	0.442	0.0959* (1.8974)	0.101
ΔLTOP	-0.0985** (-2.0987)	0.048	-0.0771* (-1.8317)	0.080	0.56443 (-0.8887)	0.254
ΔLINF	0.09644* (1.8360)	0.080	0.05680 (2.5090)	0.020	0.09312 (0.2537)	0.140
ΔCONS	0.6590* (1.9426)	0.065	0.36254* (1.8523)	0.077	0.63214* (1.9654)	0.103
ECM (-1)	-0.1716*** (-2.4742)	0.015	-0.0769*** (-2.6287)	0.011	-0.0351*** (-3.8547)	0.010
Robustness Indicators						
R^2	0.69384		0 .69245		0.8836	
Adjusted R^2	0.61034		0.58993		0.8175	
D.W. Stat	1.9438		1.9158		1.9404	
Heteroscedisticity	0.7055	[0.649]	0.8955	[0.454]	0.5142	[0.554]
J-B normality test	1.0659	[0.586]	1.0041	[0.884]	1.0968	[0.585]
F-stat.	7.8803	[0.000]	9.9713	[0.000]	5.8088	[0.003]

Note: Figures in (#) parentheses are estimated t-values. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.
Values in [#] are probability values.

However, all the three models have valid error correction parameters with a negative sign and the statistically significant value. All the three indicators of financial development (LCREDIT, LMCAP and LFINDEP) have positive and statistically significant coefficient. But trade openness (LTOP) is the only control variable which is significant both in the short run and long run. Call

money rate (LCALL) is not significant in the short run in all the models, while inflation (LINF) is significant in the model A in short run (at the 10 % level).

Causality test

The direction of the causality is checked by granger causality test. The results of Granger causality are presented in table 3.1.8. The findings (Model A) indicate that short-run unidirectional causality running from financial development (LCREDIT) to economic growth, trade openness (LTOP) to financial development (LMCAP) and inflation (LINF) to financial development (LMCAP) in India. Bidirectional causality has been found between trade openness (LTOP) and economic growth, inflation and economic growth.

In Model (B), the results of granger causality suggest that unidirectional causality running from trade openness (LTOP) to financial development (LMCAP) and inflation (LINF) to trade openness (LTOP). It is found that bidirectional causality exists between economic growth (LPGDP) and financial development variable (LFINDEP), inflation (LINF) and economic growth (LPGDP), trade openness (LTOP) and economic growth (LPGDP). In, Model (C), the results of Granger causality suggest that unidirectional causality running from trade openness (LTOP) and financial development index (LFDI) to economic growth (LPGDP). It is found that bidirectional causality exists between financial development index (LFDI) and trade openness (LTOP). In all the models (A, B and C) it has been found that the error correction terms are statistically significant at 1%, 5% and 10% respectively for the specification with economic growth (LPGDP) as the dependent variables which indicate that there exists a long-run relationship among the variables in the form of Equation (1) which also confirm the results of the ARDL bounds test.

Table 3.1.8: Granger causality results: Model (A)

Dependent Variables	***Sources of Causation***					
	Short run (independent variables)					***Long-run***
	ΔLPGDP	ΔLCREDIT	ΔLMCAP	ΔLTOP	ΔLINF	*ECT (t Value)*
ΔLPGDP	----	4.8366***	1.8948	3.1857**	3.8037**	-3.9762***
ΔLCREDIT	1.3957	----	0.1446	0.0186	0.1421	0.6622
ΔLMCAP	0.6669	0.8447	----	5.2888***	1.4265**	1.7174
ΔLTOP	6.2414***	1.0544	1.3884	----	1.1498	0.6899
ΔLINF	18.457***	0.5298	4.4460	3.2483*	----	1.1689

Note: *, ** and *** indicates significant at 10%, 5% and 1% level of significance.

Model (B)

Dependent Variables	*Sources of Causation*				
	Short run (independent variables)				*Long-run*
	ΔLPGDP	ΔLFINDEP	ΔLTOP	ΔLINF	*ECT (t Value)*
ΔLPGDP	----	4.0592***	3.7794**	2.9756*	-3.8130**
ΔLFINDEP	8.2106***	----	8.8306***	2.5821	0.8904
ΔLTOP	1.8974	14.6319***	----	4.9143**	0.0905
ΔLINF	7.1545***	0.2133	1.2770	----	1.2499

Note: *, ** and *** indicates significant at 10%, 5% and 1% level of significance.

Model (C)

Dependent Variables	*Sources of Causation*				
	Short run (independent variables)				*Long-run*
	ΔLPGDP	ΔLFDI	ΔLTOP	ΔLINF	*ECT (t Value)*
ΔLPGDP	----	2.1870**	1. 9860*	0.9756	-1.9860*
ΔLFDI	0.9852	----	2.0194*	0.8701	0.5012
ΔLTOP	1.4120	1.5012***	----	0.3065**	0.6012
ΔLINF	0.8516	0.6820	0.8962	----	0.0827

Note: *, ** and *** indicates significant at 10%, 5% and 1% level of significance.

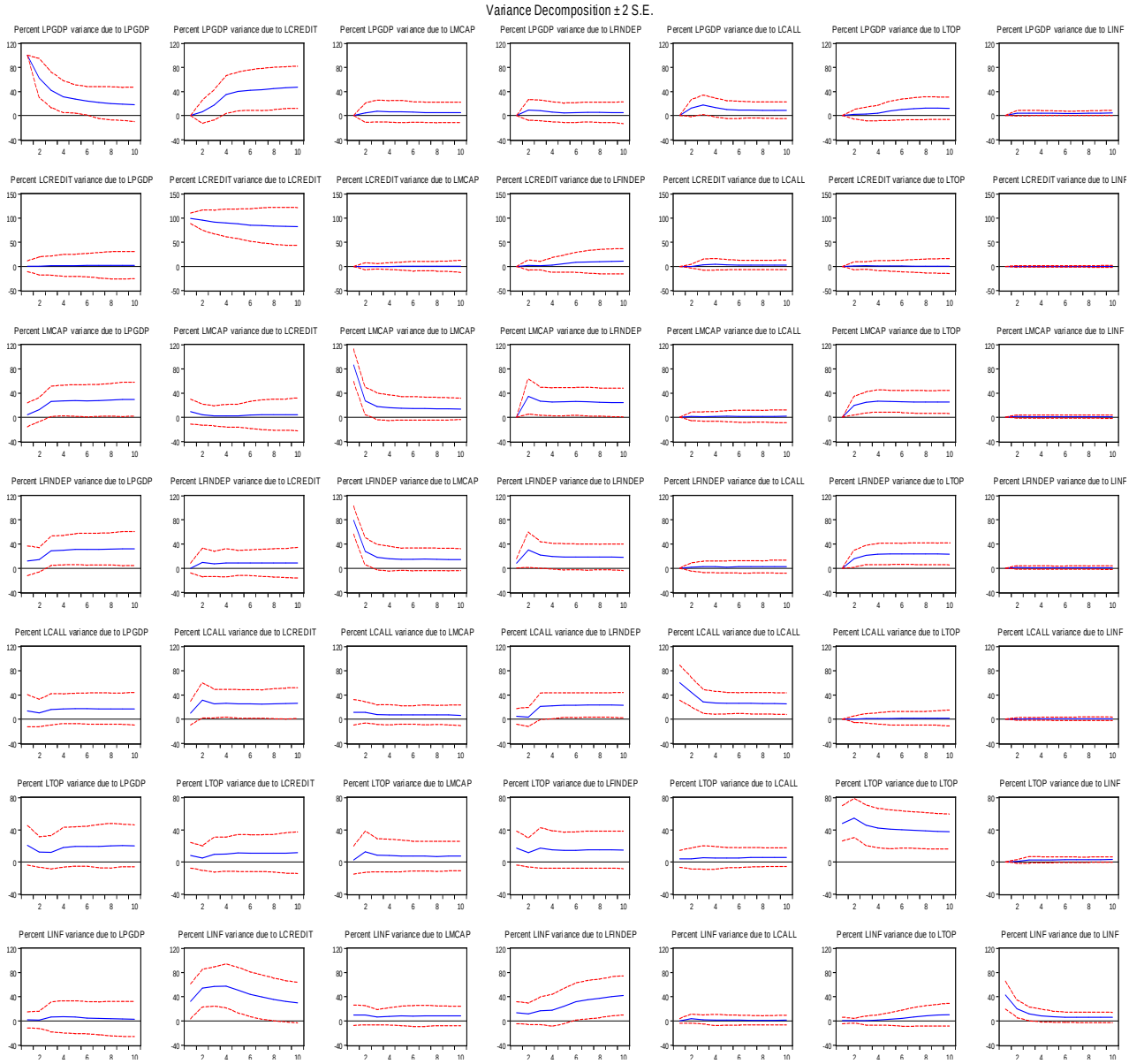
Variance decomposition analysis

The Variance Decomposition analysis indicates the percentage of forecast error variance in one variable that is due to errors in forecasting itself and each of the variables. The results of Variance Decomposition are illustrated in table 8 and individual graphs are presented in Figure 3.1.9. The results find that, among all financial indicators, LCREDIT exerts the largest influence, whose steady contribution level for economic growth changes approaches to 46.90%; while the influence of LFINDEP and LMCAP follows, with steady contribution levels of 4.75%; and 4.86%, respectively.

Table 3.1.9: Variance Decomposition of LPGDP

Period	S.E.	LPGDP	LCREDIT	LMCAP	LFINDEP	LCALL	LTOP	LINF
1	0.0161	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.02494	62.34491	6.1460	4.2692	9.2320	12.3211	1.8852	3.8013
3	0.031	42.4014	17.788	7.4784	8.1848	17.5491	2.4475	4.1503
4	0.0366	31.3898	34.8757	6.4962	6.0089	13.1020	4.0107	4.1164
5	0.0425	27.4899	40.1442	6.3996	4.4734	9.8995	7.6310	3.9621
6	0.0477	24.1700	42.2604	5.7380	4.8292	9.2871	10.041	3.6731
7	0.0517	21.7978	43.1922	5.1230	5.6172	9.3056	11.3824	3.5815
8	0.0544	20.2583	44.6893	4.9244	5.2084	9.0037	12.0988	3.8166
9	0.0563	19.1198	46.0851	4.8491	4.8753	8.7850	12.1417	4.1432
10	0.0577	18.2509	46.9062	4.8601	4.7568	8.8512	11.9864	4.3881

Figure 3.1.2: Variance Decoposition±2SE



Stability test

Finally, the CUSUM and CUSUMSQ are presented in Figure 3.3 (i, ii and iii). Examination of plots shows that CUSUM and CUSUMSQ statistics are well within the 5% critical bounds implying that short run and long run coefficients in the ARDL-Error Correction Model are stable.

Figure 3.1.3 (i): Stability Test of Model A

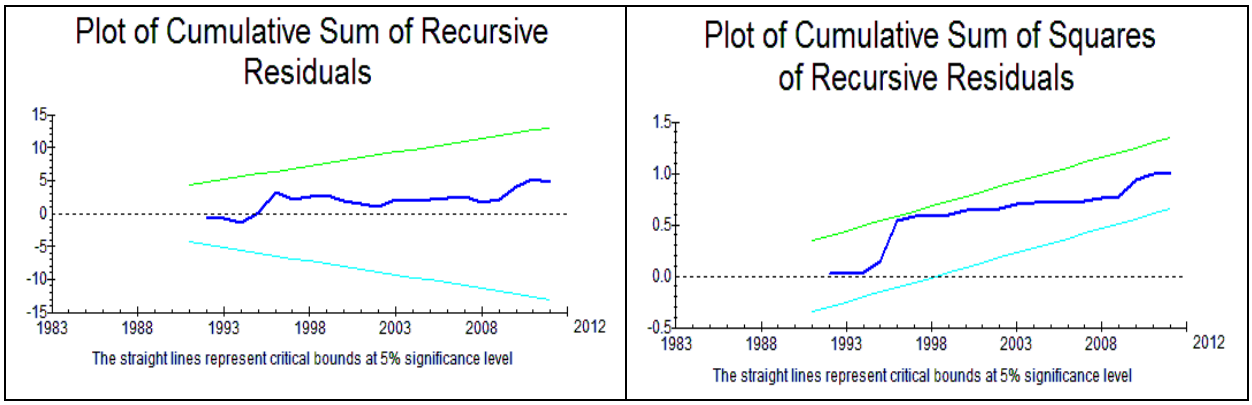


Figure 3.1.3 (ii): Stability Test of Model B

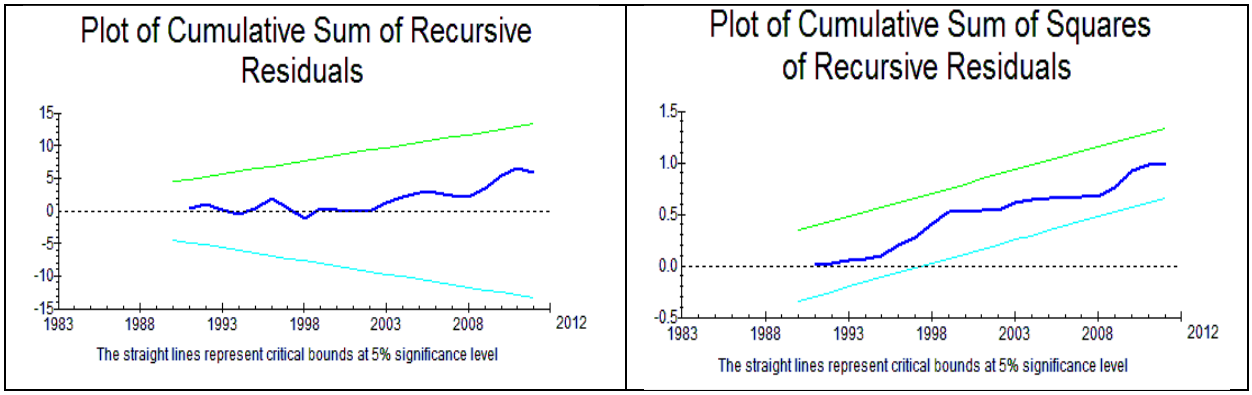
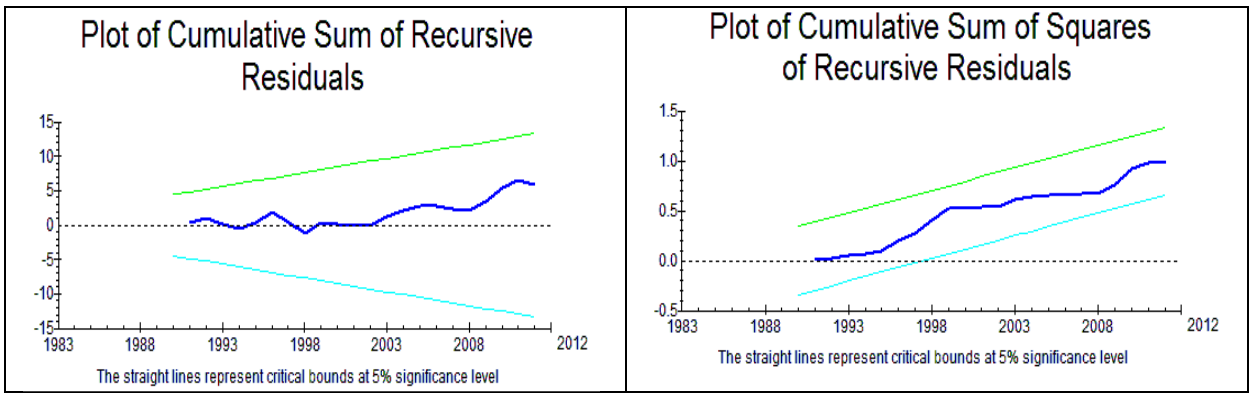


Figure 3.1.3 (iii): Stability Test of Model C



Source: Author's own computation.

3.1.6 Summary and Conclusions

This study examines the causal relationship between financial development and economic growth in India over the time period 1982 to 2013. The study attempts to answer one critical question. Whether financial development leads in the process of economic growth in India or vice versa? For this purpose the study has used, the Per capita Gross Domestic Product at factor cost for the proxy of economic growth. Four indicators are used for financial development: (1) The ratio of private sector credit to GDP (2) The ratio of market capitalization to GDP (3) The sum of credit to the private sector and market capitalization as a ratio of GDP is used as the broad indicator of financial deepening and (4) financial development index (FDI). Beside these variables, three control variables such as call money rate policy rate, and trade as a percentage of GDP and consumer price index (INF) were also included while examining their role in the economic growth.

The chapter has estimated the structural equation with the help of three models to make a comparison of bank based and market based indicators of financial development. The bounds test approach confirms the long run relationship between economic growth and financial development indicators. A detailed analysis based on ARDL test reveals that both the bank-based and market-based indicators of financial development have a positive impact on economic growth in India. The empirical findings of the study provide important policy insights in Indian context. As the Indian financial sector is largely bank-centric, the performance of the banking sector is crucial in the development process of the economy. Given the potential of more credit disbursement by Indian banks, there is still scope for them to channelize credit to the productive sectors of the economy. Therefore, Indian banks need to develop strong linkages with the real sector to develop the ability to maintain high growth in the economy.

It is also worthwhile to mention that call money rate is one of the important policy variables for economic growth in India. This indicates that investment demand in India also dependent on the change in short term interest rates.

The findings of Granger causality indicate that in model (A) and (C) there exists a short-run unidirectional causality running from financial development (LCREDIT) to economic growth

and but in the case of model (B), it has been found that there exists a bi-directional causality between financial development variable (LFINDEP) and economic growth (LPGDP). The results of Granger causality suggested that the error correction terms are statistically significant at 1%, 5% and 10% in model (A,B,C) respectively for the specification with economic growth (LPGDP) as the dependent variables which indicate that there exists a long-run relationship among the variables.

End Notes:

[1] The study limits to the starting period as 1982-83 due to the non-availability of data on stock market capitalization prior to this period.

[2] To date, there are hardly any studies that use both market based indicator and bank based indicator of financial development in India.

[3] See Levine, 1992; Demirguc-Kunt and Levine, 1999; Khan and Senhadji, 2000; Levine, 2004; Shahbaz et al, 2008; Shahbaz 2009.

[4] Total Bank Deposit Liabilities are equal to liquid liabilities minus currency in circulation. Demetriades and Luintel (1996) argued that without deducting currency in circulation, we are left with primarily a measure of monetization, not financial depth (p.360).

[5] INF is preferred over WPI in measuring inflation in India, because INF takes care of service sector unlike the WPI measure. There are different INFs for industrial workers INF, Agricultural worker INF, and rural labor INF. For our analysis, we have used composite index of INF constructed by the World Bank.

3.2 Financial development and economic growth: Panel data empirical evidences

3.2.1 Introduction

The relationship between financial development and economic growth has been an issue of debate among the economists in the modern history of economics. The debate centered around the issue whether the financial sector actually leads, real sector or the turn around. However, there are conflicting views concerning the role of the financial system plays in economic growth. In theoretical literature, there are three different views on the direction of the causality between economic growth and financial development based on different empirical investigations. The first vision states that financial development is a prerequisite for economic growth; this is known as "supply leading" notion and emerged due to Schumpeter (1911), Patrick (1966). The second view advocates that real economic growth leads to financial development, this view is known as ''demand-following'' given by Robinson (1952). The third view argues that there exists bidirectional causality between these two variables (Demetrides & Hussein, 1996; Greenwood & Smith, 1997).

The earlier studies suggest that the strength and direction of the relationship between financial development and economic growth is sensitive to the variables used to measure the financial development. Additionally, the findings suggest that outcome between two sectors differs from country to country over time. Most of the studies on this issue suffer from two limitations (1) Studies are mainly based on cross country, which cannot satisfactorily address the country specific issue (2) Many studies drawn conclusion from a bi-variate analysis, suffers from the omission of variables. Further, there are many cross-country studies that have shown the significant role of financial development on economic growth in developing and least developed countries (LDCs) of Asia and Africa. Some studies have shown the importance of the financial sector on growth, but there is not much detailed study at the sub-national (state) level in India addressing the role of the financial sector in the process of economic growth. The current study, therefore, attempts to re- examine the issue by using multivariate analysis with the help of time series data for a specific country like India at the state level.

The rest of the paper is structured as follows. Section 3.2.2 presents the review of literature on the relationship between financial development and economic growth. In Section 3.2.3, we present a brief overview of financial development of states in India. Section 3.2.4 presents the

description of variables and data. In Section 3.2.5 the methodology used is discussed. Section 3.2.6 analyses the empirical results while concluding remarks are presented in Section 7.

3.2.2 Literature review of the empirical studies

Since the revolutionary contributions of Schumpeter (1911), Robinson (1952), Goldsmith (1969), McKinnon (1973), and Shaw (1973) on the relationship between economic growth and financial development has remained an important issue of debate among researchers and policymakers.

Earlier literature, including Gurley and Shaw (1967), Goldsmith (1969), McKinnon (1973) and Shaw (1973) suggested that economic growth leads finance in developing countries, because of the increasing demand for financial services. King and Levine (1993a, 1993b) used cross-countries data to analyze the relationship between economic growth and the financial development. They used real per capita GDP growth as a proxy of economic growth and the ratio of liquid liabilities to GDP as a proxy of financial development. Their results found that a range of financial indicators are robustly positively correlated with economic growth. De Gregorio and Pablo (1995) used real per capita GDP growth as a proxy of economic growth and domestic credit to the private sector as a share to GDP to measure financial development. He suggested that financial development leads to improved growth performance, but this effect, however, varies across countries and over time.

Blackburn and Huang (1998) established a positive two-way causal relationship between growth and financial development. According to their analysis, private informed agents obtain external financing for their projects through incentive-compatible loan contracts. Beck and Levine (2004) reported that financial development has a positive effect on long-run growth. Calderon and Liu (2003) used real GDP per capita growth for economic growth and to measure financial development; the ratio of broad money (M2) to GDP and the ratio of credits provided by financial intermediaries to the private sector to GDP are used. They confirmed a positive effect of finance on growth for the whole sample of 109 countries, but they also found bidirectional causality when the sample is split between developed and developing countries. Ang and McKibbin (2007) suggested that there exists a unidirectional causality running from economic

growth to financial development in case of Malaysia and financial liberalization policies have a favorable effect in stimulating financial sector development. Real per capita GDP is used as a proxy variable for economic growth and liquid liabilities to nominal GDP to measure financial development. Dawson (2008) found a strong positive relationship between finance and growth when financial development is measured using growth in M3. Surprisingly, his proxy model where financial development is measured using depth, i.e. the ratio of M3/GDP, stated that a negative relationship between finance and growth.

Hassan et al. (2011) concluded that there exists a positive relationship between financial development and economic growth in developing countries. Bittencourt (2012) used real GDP per capita as a proxy for economic growth and the ratio of the liquid liabilities to GDP for financial development. He concluded that both the variable macroeconomic stability and financial development are important in generating economic activity, innovation. He used real GDP per capita as an indicator of growth and the ratio of the liquid liabilities to GDP for financial development. He concluded that empirical results concluded that both the variable macroeconomic stability and financial development are important in generating economic activity Adu et al. (2013), examined Ghanaian data over the period 1961–2010, economic growth. They stated that the finance growth nexus became positive only when they used financial development indicators such as private credit to GDP and private credit to total credit. The relationship turned negative when they used the broad money (M3) as a proxy.

Studies conducted on Indian economy at the state level, such as Acharya et al. (2009) inspected the finance-growth nexus and suggested the presence of long run relation between finance and growth for Indian economy. He used state domestic product for economic growth and bank credit outstanding of commercial banks as a proxy for financial development. Bhanumurthy (2013) examined the role of financial sector development in growth in the Indian states for the period 1985–1986 to 2007–2008. The study used state domestic product as an indicator of economic growth and credit to deposit ratio of scheduled commercial banks, according to the point of utilization, wise and the number of scheduled commercial has been used to represent financial development. He concluded that there exist a long run co-integration relationship between financial development and economic growth.

To sum up, the review shows that there is no universal consensus on the relationship between financial development and economic growth. There are some mixed results regarding the nexus between financial development and economic growth. The studies also show that the relationship depends on the choice of the indicators of financial development and the degree of financial inclusion in the economy.

3. 2.3 Financial Development and Economic Growth in Indian states

The Indian economy has undergone tremendous transformation since 1991, when the government had adopted liberalization and globalization policies; financial sector reforms were introduced as a part of the economic reform program. Consequently, interest rates were gradually liberalized; reserve and liquidity ratios were reduced significantly. These reforms were designed to promote efficiency in the economy through the promotion of competition. The impact of India's economic reforms on economic performance has been the subject of much academic study and public debate in India and abroad, but the focus has been largely on the performance of the economy as a whole or of individual sectors. The performance of individual states in the post-reforms period has not received comparable attention and yet there are very good reasons why such an analysis should be of special interest. First, balanced regional development has always been one of the declared objectives of national policy in India and it is relevant to ask whether economic reforms have promoted this objective. Second, India's federal democracy is characterized by regionalization of politics, with politics at the state level being driven by state rather than national issues and this makes the economic performance of individual states an issue of potential electoral importance. This is particularly so because liberalization has eliminated many of the controls earlier exercised by the central government and thereby increased the role of state governments in many areas that are critical for economic development. Finally, since state level performance shows considerable variation across states, with many states recording strong growth in the post-reforms period, it is important to identify the reasons for their success in order to replicate it in other states.

In response to the financial development in the economy, the growth rate of GSDP is not uniform across all Indian states as present in Table 3.2.1. It presents the growth performance across major states over the time period 1994-2013.

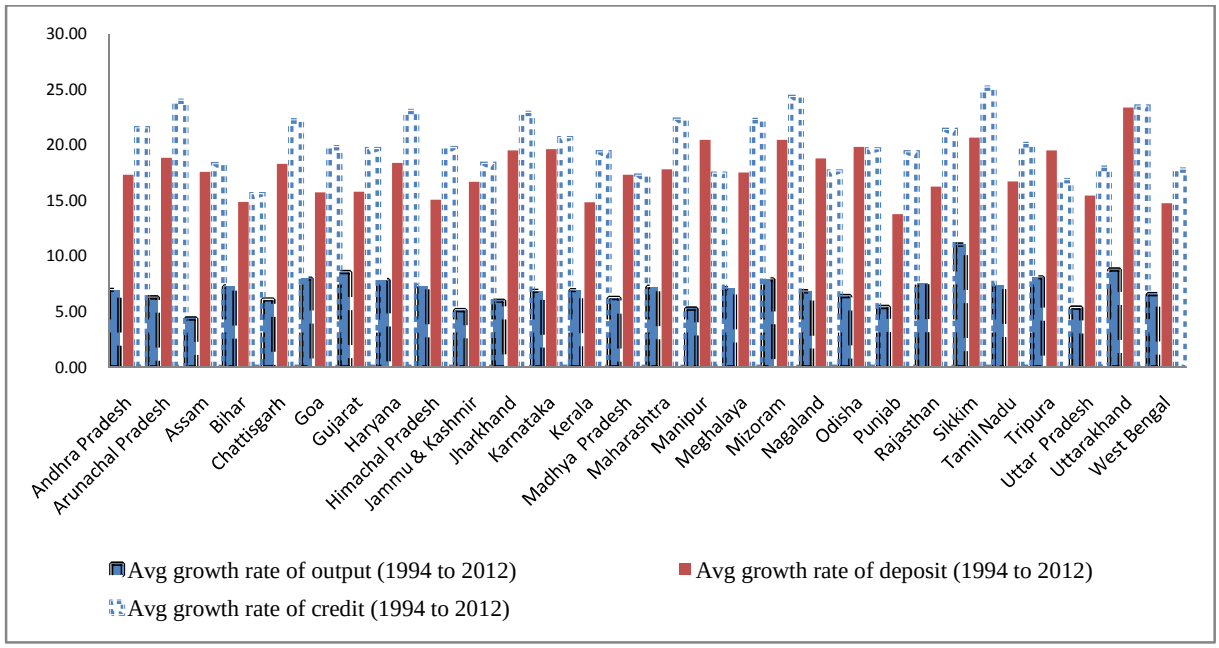
Table 3.2.1: Gross State Domestic Product Growth Rates in States (%)

Main states	1994-00	2001-05	2005-10	2011	2012
Andhra Pradesh	5.91	6.37	8.85	7.82	5.04
Assam	2.16	4.24	6.42	6.47	6.88
Bihar	6.32	1.59	10.91	10.65	14.48
Chhattisgarh	1.72	8.60	9.75	8.14	8.57
Gujarat	6.17	10.59	9.19	8.53	NA
Haryana	6.27	8.31	9.48	7.83	7.13
Himachal Pradesh	7.04	6.59	9.59	7.44	6.24
Jammu and Kashmir	4.80	4.21	8.38	6.08	6.14
Jharkhand	3.17	6.03	5.79	7.18	7.83
Karnataka	6.77	5.66	8.23	4.86	6.19
Kerala	5.36	7.33	7.89	9.51	NA
Madhya Pradesh	4.38	5.02	8.68	11.81	10.02
Maharashtra	5.10	7.50	9.38	7.10	7.13
Orissa	3.56	7.56	8.72	4.92	9.14
Punjab	4.66	3.94	7.58	5.92	5.19
Rajasthan	6.86	7.56	9.58	6.11	NA
Tamil Nadu	6.55	5.01	10.15	7.42	4.14
Uttar Pradesh	4.37	4.21	7.36	6.45	5.52
Uttarakhand	4.48	9.32	14.50	5.18	7.87
West Bengal	6.65	6.30	6.91	6.26	7.50
All-India	6.21	6.82	8.70	6.21	4.99

Source: CSO and authors' calculations

First, consistent with the fact that the decade 2001-2010 was the best one for Indian macroeconomic performance, growth, increased across almost all states in the period 2001-2010 compared to the period 1994-2000. Second, nevertheless we continue to see the phenomenon of divergence in growth across states on average the richer states in 2000 grew faster in 2001-2010. However, during the crisis years of 2008-09, states with higher growth suffered the largest deceleration during post 2010 period. Since high growing states are also financially open and liberalized, it seems that this financial openness creates dynamism, divergence and vulnerability in the growth performance. India's growth performance, especially across the states within the country since 1980 has been the subject of considerable research interest, including Alhuwalia (2000), Rodrick and Sumramaniam (2005), Panagariya (2008), Aiyer & Modi (2011).

Figure 3.2.1: Credit allocation, deposit and output growth in Indian states



Source: Planning commission, CSO
Author's own calculation

To understand the credit-output and deposit-output in an elementary fashion, table 3.2.2 and figure 3.2.1 presents the summary statistics during period 1993-2012. Figure 3.2.1 presents the relationships between the average growth rate of output, the average growth rate of credit and average growth rate of deposit. The figure 1 suggests that as the percentage increase in deposit and credit increases equally corresponded by the growth in output in all the states during the study period. From table 3.2.2 it can be seen a significant correlation exists between credit and output growth, deposit and output growth. Except few north eastern states, all other states in India show high correlation statistics.

Table 3.2.2: Correlation between Credit and Output/ Deposit and Output in Indian States (1993-2012)

States	Correlation between output and credit	Correlation between output and deposit
Andhra Pradesh	0.9052	0.9466
Arunachal Pradesh	0.9098	0.9026
Assam	0.8837	0.7506
Bihar	0.9417	0.9591
Chattisgarh	0.9230	0.9461
Goa	0.9590	0.9724
Gujarat	0.9547	0.9753
Haryana	0.9120	0.9318
Himachal Pradesh	0.9359	0.9400
Jammu & Kashmir	0.9516	0.9361
Jharkhand	0.9512	0.9656
Karnataka	0.9400	0.9388
Kerala	0.9321	0.9659
Madhya Pradesh	0.8997	0.9225
Maharashtra	0.9635	0.9541
Manipur	0.8988	0.8914
Meghalaya	0.9636	0.9310
Mizoram	0.9939	0.9679
Nagaland	0.8789	0.9098
Odisha	0.9469	0.9233
Punjab	0.8867	0.9143
Rajasthan	0.9222	0.9702
Sikkim	0.9516	0.9861
Tamil Nadu	0.9496	0.9575
Tripura	0.9195	0.9408
Uttar Pradesh	0.9160	0.9391
Uttarakhand	0.8993	0.9376
West Bengal	0.8993	0.9020

Source: Planning commission, CSO
Author's own calculation

The information on credit-output and deposit-output correlation may partially explain the nexus between financial development and economic growth. Every state in this case is treated as an independent entity. However, in reality particular state may influence by another state's financial performance. Hence simple correlation may not provide cross sectional relationship across states, leaving lesser scope for policy prescriptions. Further, it can indicate the direction of the

relationship, but fails to suggest the extent of the relationship between two variables. Therefore an empirical analysis with cross sectional as well as time series influences, may explain better the link between financial development and economic growth.

Thus, this paper attempts to estimate the relationship between financial development and economic growth by considering all 28 Indian states as a panel, each variable of the panel exerts influence on the other cross section and time period. In view of this objective, Pedroni's panel co-integration techniques are employed to assess the above relationship among Indian states. To estimate the coefficients of co-integration the fully modified OLS (FMOLS) is used. To examine the causal link between the variables, panel Granger causality test is used in this study.

3.2.4 Data source and definitions of variables

Data source: Annual time series data, which covers the 1993-2013[1] period is utilized in this study. The data used in the study are obtained from different sources, including various series of the Reserve Bank of India's reports, Planning Commission of India, International Financial Statistics (IFS) Yearbooks published by the International Monetary Fund and World Bank Statistical Yearbooks.

Definitions of variables: To investigate the relationship between financial development and economic growth for Indian states, we have considered following variables:

- Financial development is measured by two variables: (1) CR, which is the ratio of credit amount as a share of the regional output (gross state domestic product) in the same region (2) PD, which is the ratio of deposit amount as a share of the regional output (gross state domestic product) in the same region (3) and number of all scheduled commercial bank branches (LBB) in a state has been used in the study to represent development in the financial sector.

- The economic growth is measured by per capita gross state domestic product at factor cost (LPGSDP) (amount Rs. Million) with base year 2004-05.

Earlier studies for Indian states used net state domestic product (NSDP) as a proxy for economic growth, whereas the present study used per capita gross state domestic product (GSDP). GSDP is a superior measure of economic output than the NSDP [2].

We have taken all the variables in per capita availability, which normalizes the population affect. Further, based on the consistent data available for the full sample period, the study considered three financial development indicators i. e. CR, DP and LBB.

However the availability of suitable data for appropriate indicators of financial development over the study period for all the 28 Indian is a major constraint/ limitation of the study. Usually some studies have taken M2/GDP or M3/GDP as financial development indicators. However, credit also considered as a suitable indicator of financial development as it represents deposit mobilization and investing, the financial resources in productive sectors through credit availability. It directs the flow of savings and investment in the economy. So that capital accumulation and production takes place.

3.2.5 Econometric Methodology

Panel unit root test

Unit root tests are traditionally used to test the order of integration and to verify the stationarity of the variables. Panel unit root tests have been proposed by Levin and Lin (1992), Im, Pesaran and Shin (1997), Harris and Tzavalis (1999), Madala and Wu (1999), Hadri (2000), and Levin, Lin and Chu (2002). Among these, the LLC test and the IPS test are the most widely-used. Both of these tests are based on the Augmented Dickey-Fuller (ADF) principle. The LLC test assumes homogeneity in the dynamics of the autoregressive (AR) coefficients for all panel members. Concretely, the LLC test assumes that each individual unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects and possibly a time trend. The model only allows for heterogeneity in the intercept and is given by:

$$\Delta X_{i,t} = a_i + \gamma X_{i,t-1} + \sum_{j=1}^{p_i} a_j \Delta X_{i,t-j} + \varepsilon_{i,t} \quad \text{..... (1)}$$

Where $X_{i,t}$, is a series for panel member (country) i over period t ((i=1,2.,N); t=1,2.,T)), p_i denotes the number of lags in the ADF regression and the error term $\varepsilon_{i,t}$ are assumed to be

independently and normally distributed random variables for all i and t zero mean and finite heterogeneous variance. The lag order p_i in equation (1) is allowed to vary across the countries. Thus, the null hypothesis in all panel unit root tests assumes that each series in the panel contains a unit root, and thus is difference stationary; H_0: $\gamma = 0$ while the alternative hypothesis is that all individual series in the panel are stationary; which is H_1: $\gamma < 0$.

The Im-Pesaran-Shin (IPS) test is not as restrictive as the Levin-Lin-Chu test, since it allows for heterogeneous coefficients. Therefore, it is described as a "Heterogeneous Panel Unit Root Test". The stationarity of all variables is considered as a prerequisite for the co-integration test. The model is given by:

$$\Delta X_{i,t} = a_i + \gamma_i X_{i,t-1} + \sum_{j=1}^{p_i} a_j \Delta X_{i,t-j} + \varepsilon_{i,t} \quad \text{…….. (2)}$$

Therefore, the null hypothesis is relaxed; H_0: $\gamma_i = 0$ while the alternative hypothesis is that at least one of the individual series in the panel is stationary; H_1: $\gamma_i < 0$ for all i. The alternative hypothesis simply implies that γ_i differ across countries.

Panel co-integration

The next step of our empirical work involves investigating the long-run relationship between poverty and financial development, using Pedroni's (1999) panel co-integration technique. This technique allows for heterogeneity among individual members of the panel and is thus an improvement over conventional co-integration tests. Following Pedroni, the estimated co-integration relationship is specified as follows:

$$LPGSDP_t = \alpha_0 + \delta_i t + \beta_1 CR_{it} + \beta_2 DP_{it} + \beta_3 LBB_{it} + \varepsilon_{it} \quad \text{…… (3)}$$

LPGSDP is the proxy for economic growth, CR, and DP are the variables of financial development, and LBB is number of bank branches (all in log form); t=1,…,T refers to the time period; i=1,…,N for each country in the panel; α_i denote country-specific effects, δ_t is the deterministic time trend, and ε_{it} is the estimated residual. The estimated residual indicates the deviation from the long-run relationship. All variables are expressed in natural logarithms so the

$\beta_i's$ parameters of the model can be interpreted as elasticities. To test the null hypothesis of no co-integration, ρ_i=1, the following unit root test is conducted on the residuals as follows:

$$\varepsilon_{it} = \rho_{it} + \varepsilon_{it-1} + \omega_{it} \quad \ldots\ldots (4)$$

The Pedroni technique allows testing for the co-integrated relationship between financial development and poverty in four different models: Model without heterogeneous trend and ignoring common time effect (M1); Model without common time effect and allowing heterogeneous trend (M2); Model with heterogeneous trend and allowing common time effect (M3); Model with common time effect and ignoring heterogeneous trend (M4). Pedroni (1999) shows that there are seven different statistics for the co-integration test. They are the panel v-statistic, panel ρ-statistic, Pedroni Panel (PP)-statistic, panel Augmented Dickey–Fuller (ADF)-statistic, group rho-statistic, group PP-statistic, and group ADF- statistic. The first four statistics are known as panel co-integration statistics and are based on the within dimension approach. The last three statistics are group panel co-integration statistics and are based on the between dimension approach.

Panel fully modified ordinary least squares (FMOLS) test

Given the presence of co-integration, the fully modified OLS (FMOLS) technique for heterogeneous co-integrated panels is estimated to determine the long-run equilibrium relationship (Pedroni, 2000). Fully modified least squares (FMOLS) regression was originally designed by Phillips and Hansen (1990) to provide optimal estimates of co-integrating regressions. Co-integrating links between non-stationary series lead to endogeneity in the regressors that cannot be avoided by using vector auto-regression (VAR) as if they were simply reduced forms. The method modifies least squares to account for serial correlation effects and for the endogeneity in the regressors that result from the existence of a co-integrating relationship (Pedroni, 2001). Consider the following co-integrated system for a panel of i=1, 2… N states over time t = 1, 2… M:

$$Y_{it} = a_{it} + \gamma X_{it} + \varepsilon_{it} \quad \ldots.. (5)$$

Where $X_{it} = X_{it-1} + \varepsilon_{it}$; the estimates α_{it} and γ is done through FMOLS methodology

Panel causality test

To test for panel causality, the most widely used method in the literature, is that proposed by Holtz-Eakin et al. (1985, 1988). We use this method after examining the presence of panel co-integration. This method distinguishes the long run and short run causality which is not the case of other causality techniques. To infer the causal relationship between the variables a panel vector error correction model (Pesaran et al. 1999) is estimated. The Engle and Granger (1987) two-step procedure is undertaken by first estimating the long-run model specified in Eq. (3) in order to obtain the estimated residuals. Next, defining the lagged residuals from Eq. (3) as the error correction term, the following dynamic error correction model is estimated:

$$\Delta LPGSDP_{it} = a_{ij} + \sum_{k=1}^{q} \theta_{11ik} \Delta LPGSDP_{it-k} + \sum_{k=1}^{q} \theta_{12ik} \Delta CR_{it-k} + \sum_{k=1}^{q} \theta_{13ik} \Delta DP_{it-k} + \sum_{k=1}^{q} \theta_{14ik} \Delta BB_{it-k} + \partial_{1i} \ \in_{it-1} + \mu_t \quad \ldots. (6)$$

$$\Delta CR_{it} = a_{ij} + \sum_{k=1}^{q} \theta_{11ik} \Delta CR_{it-k} + \sum_{k=1}^{q} \theta_{12ik} \Delta LPGSDP_{it-k} + \sum_{k=1}^{q} \theta_{13ik} \Delta DP_{it-k} + \sum_{k=1}^{q} \theta_{14ik} \Delta BB_{it-k} + \partial_{1i} \ \in_{it-1} + \mu_t \quad \ldots. (7)$$

$$\Delta DP_{it} = a_{ij} + \sum_{k=1}^{q} \theta_{11ik} \Delta DP_{it-k} + \sum_{k=1}^{q} \theta_{12ik} \Delta CR_{it-k} + \sum_{k=1}^{q} \theta_{13ik} \Delta LPGSDP_{it-k} + \sum_{k=1}^{q} \theta_{14ik} \Delta BB_{it-k} + \partial_{1i} \ \in_{it-1} + \mu_t \quad \ldots. (8)$$

Where Δ is the first-difference operator; k is the lag length; and u is the serially uncorrelated error term. With respect to Equations (6) – (8), short-run causality is determined by the statistical significance of the partial F-statistic associated with the corresponding right hand side variables. Long-run causality is revealed by the statistical significance of the respective error correction terms using a t-test.

3.2.6 Empirical Results and discussion

Panel unit root results

The results of the IPS and LLC panel unit root tests are shown in Table 3.2.3 and 3.2.4. The unit root statistics reported are for the level and first difference series of these variables. In the LLC test the stationarity property of all variables for the levels is in question; the small negative values for each variable cannot exceed the critical values (in absolute terms). However, when we take the first difference of each variable, the large negative LLC statistics allow us to reject the null of non-stationarity at least 5% significance level for all variables. The LLC results, in general, indicate that the null of a unit root for the individual series is not rejected for all of the series tested at their levels. According to the IPS results, we note that the null of unit root is strongly rejected at least 5% level of significance for all series at their first difference. Therefore, we conclude that all the series are non-stationary and integrated of order one. Table 3.2.5 provides the residual test statistics of the employed model and it suggest that the employed model (equation 3) passed all the tests.

Table 3.2.3: LLC Unit Root Test

		LPGSDP	CR	DP	LBB
Level	(1)	0.00914	1.2014	-0.5210	0.1438
	(2)	0.05584	0.0658	-0.1502	0.0674
First Difference	(1)	-2.1197**	-3.7413***	-3.9470***	-2.0607**
	(2)	-1.9603*	-2.5012**	-3.0129**	-1.74652**

Note: (1) Model with heterogeneous intercepts.
(2) Model with heterogeneous intercepts and heterogeneous trend.
*,**,*** Indicates significance at 10%, 5%, 1% level respectively.

Table 3.2.4: IPS Unit Root Test

		LPGSDP	CR	DP	LBB
Level	(1)	-0.0817	-1.0010	-0.5018	0.0830
	(2)	-0.8446	0.3459	-1.1416	0.3829
First	(1)	-1.2423*	-2.8515**	-2.7705**	-1.1980*
Difference	(2)	-2.4942***	-3.5601***	-3.0142***	-1.6310*

Note: (1) Model with heterogeneous intercepts.
(2) Model with heterogeneous intercepts and heterogeneous
*,**,*** Indicates significance at 10%, 5%, 1% level respectively

Panel co-integration results

This study carried out the test of Pedroni's co-integration test with four different model specifications i. e. M1, M2, M3 and M4. The results are presented in table 3.2.5. The table presents seven test statistics (1) Panel v-Statistic (2) Panel rho-Statistic (3) Panel PP-Statistic (4) Panel ADF-Statistic (5) Group rho-Statistic (6) Group PP-Statistic and (7) Group ADF-Statistic.

Table 3.2.5: Pedroni Residual Co-integration Test

	M1	M2	M3	M4
Panel v-Statistic	1.1279	2.4815	4.1045	2.7429
Panel rho-Statistic	0.0237	-2.0372**	-2.9751*	-2.1614**
Panel PP-Statistic	-1.5271	-4.7785***	-13.746***	-3.8778***
Panel ADF-Statistic	-6.5337***	1.6186	-1.4913*	0.8687
Group rho-Statistic	1.0951	-2.4066**	-2.7102**	-3.6769***
Group PP-Statistic	-1.2496	1.7646	-9.1763***	1.2250
Group ADF-Statistic	-7.9908***	-1.4560*	-2.3382***	-2.6536**

Note: M1: Model without heterogeneous trend and ignoring common time effect
M2: Model without common time effect and allowing heterogeneous trend
M3: Model with heterogeneous trend and allowing common time effect
M4: Model with common time effect and ignoring heterogeneous trend
*, **, *** Indicates significant at 10%, 5% and 1% level of significance respectively.

The evidence of table 3.2.5 shows that the null hypothesis of no co-integration is rejected in three models: M2, M3 and M4, because at least four statistics are significant out of seven. It implies that there is a long run panel co-integration between indicators of finance and economic growth in Indian states.

Pedroni panel FMOLS

Given the presence of co-integration, the fully modified OLS (FMOLS) technique for heterogeneous co-integrated panels is estimated to determine the long-run equilibrium relationship (Pedroni, 2000). Table 3.2.6 reports the FMOLS results. All the coefficients are positive and statistically significant where the coefficients can be interpreted as elasticity estimates. All the variables are positively related to LGSDP and statistically significant.

Table 3.2.6: Pedroni panel FMOLS result

Dependent Variable: LPGSDP			
Variable	Coefficient	t-Statistic	Probability
CR	0.7378***	4.8426	0.001
DP	0.4764**	2.1684	0.001
LBB	0.6250**	2.7835	0.041
C	2.4502***	4.6920	0.000
Diagnostic tests			
R-squared	0.8694	Mean dependent variance	15.094
Adjusted R-squared	0.8234	S.D. dependent variance	0.2505
S.E. of regression	0.0268	Sum squared residual	0.0098
Durbin-Watson stat	1.9354	Long-run variance	0.0046

Note: ***Indicates significant at 1% level of significance.

Panel causality test

The causality results in both short and long run are estimated and are presented in Table 3.2.7. The short run causality results are consistent with the "supply leading" hypothesis that financial development has contributed to economic growth in Indian states. In the short run, there exists unidirectional causality from credit to the economic growth and the number of bank branches; deposit to economic growth and there is a bi-directional causality between credit and capita deposit.

In the case of long-run, the findings demonstrate the presence of bi-directional causality between financial development and economic growth, imparting to the support of both "demand following" and "supply leading" hypothesis. The findings are similar in the lines of Greenwood and Smith (1999), Levine (1999), Wolde-Rufael (2009), Pradhan (2013) and Bhanumurthy (2013). This implies that financial development plays a central role in economic growth and that economic growth leads to the further formation of financial development to the economy. This suggests that financial development can be used as a policy variable to foster economic growth in India.

Table 3.2.7: Panel causality test result

Dependent Variables	***Sources of causation***				
	Short run (independent variables)				*Long-run*
	ΔLPGSDP	*ΔCR*	*ΔDP*	*ΔLBB*	*ECM*
ΔLPGSDP	----	2.9140**	2.2514**	1.1426	-3.2104***
ΔCR	1.4314	----	2.0862*	3.2540**	-0.064**
ΔDP	0.2541	2.6910**	----	0.8204	-0.071**
ΔLBB	2.5104*	3.6914***	0.4802	----	-0.0114

Note: ** and *** indicates significant at 5% and 1% level of significance.

3.2.7 Summary and Conclusions

In this study, an attempt has been made to analyze the role of financial development in economic growth in all 28 Indian states by using a panel dataset over the period from 1993 to 2013. Financial development is measured by two variables. The first one is CR, which is the ratio of credit amount as a share of the regional output (gross state domestic product) in the same region (2) PD, which is the ratio of deposit amount as a share of the regional output (gross state domestic product) in the same region. The economic growth is measured by per capita gross state domestic product (PGSDP) and number of scheduled commercial bank branches has been used in the study to represent development in the financial sector. All the variables are taken in their natural logarithm. The present study uses Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) test to check the stationarity properties of the variable and Pedroni Residual Co-integration test to investigate the long-run co-integrating relationship. The fully modified OLS is employed to examine the coefficients of co-integrating equation and panel Granger causality to check the direction of the causality.

The preliminary investigation of credit growth and output growth, deposit growth and output growth have revealed a significant correlation between credit-output growths, deposit - output growth for all Indian states. As the coefficient of correlation presents the directional relationship, it is necessary to assess the extent of relationship between the indicators of financial development and economic growth by employing techniques such as Pedroni's panel co-integration, fully modified Ordinary Least Squares (FMOLS). By employing LLC and IPS panel unit root tests, the study has found that all the variables have a unit root. The study used Pedroni's panel co-integration test to examine the long run relationship between financial

development and economic growth among the variables. The empirical results confirm that there exists a long run co-integration relationship among the variables. As per the results of FMOLS a sensitivity of credit-output, deposit-output is positive and statistically significant. However, the number of bank branches is not a significant variable in explaining economic growth. The results of panel Granger causality suggest that there exists unidirectional causality from per capita credit to the economic growth and the number of bank branches; per capita deposit to economic growth. There is bi-directional causality between per capita credit and per capita deposit.

The results of our study suggest that reforms in the financial sector will enhance the economic growth of Indian states and not just the growth of the sectors alone. Here it also noted that just increase the number of bank branches is not sufficient for enhancing financial accessibility and hence economic growth. The findings suggest that it is necessary to increase the business and transactions of banks that is to increase in credit and deposits that will decide the extent of financial accessibility and will encourage the economic growth. The policy implication of the study is that current economic policies should recognize the finance-growth nexus in order to maintain sustainable economic development in the country.

Endnotes:

[1] The study limits to the starting period as 1993-94 due to the non-availability of data of three new states: Jharkhand, Uttrakhand and Chhattisgarh. These states got established in 2000, but planning commission has provided the GSDP data of these states from 1993-94. The dataset of other variables is calculated based on the per capita availability ratio.

[2] The comparison of states both at a period of time and over a period of time is highly sensitive to the concept of state income used. The estimates of GSDP at market price are drastically different from NSDP at factor cost among states due to the differences in indirect taxes, subsidies and depreciation rates. Further, due to the inherent structural differences, these rates are not same uniform across the states.

CHAPTER 4
Re-examining the threshold effects in the inflation–growth nexus: evidence from India

4.1 Introduction

The relationship between inflation and economic growth has attracted a considerable interest of researchers and policy makers. The literature on this issue suggests that some important results are still undiscovered and a relatively wide consensus about some facets of this growth-inflation trade-off has been reached. Researchers examined about inflation and economic growth and arrived came up with different views. It has been a controversial in both theory and empirical findings. They showed that there might be no-relationship, negative relationship and positive relationship between inflation and economic growth, according to different conditions (Dorrance, 1963; Tobin, 1965; Sidrauski, 1967; Stockman, 1981; Andres and Hemando, 1997; Barro, 1995; De Gregorio, 1992; Mallik and Chowdhury, 2001; Saeed, 2007). Nevertheless, the experiences of the emerging economies raise the concern that low inflation threshold may hurt economic growth. In the last two decades, empirical studies confirmed the negative and the nonlinear impact of inflation on the economic growth beyond some threshold levels, even though different threshold levels have been reported in the literature (Bruno and Easterly, 1998; Burdekin et al., 2004). It is also believed that the nature of the relationship and its degree of sensitivity are influenced by differences in the degree of economic development of different countries. This all implies country-specific and time-specific structural breaks in the inflation–growth relationship (Khan and Senhadji, 2001).

Therefore, the question of the existence and nature of the relationship between inflation and economic growth has been the topic of considerable interest and debate among the economists both in theoretical and empirical literature. The debate on the trade-off between inflation and economic growth is still open.

If we take the case of Indian economy; inflation has gained momentum after the recent global financial crisis in 2008, as growth steadily recovered. Inflation remained higher and persisted at above the comfort level of the central bank (Reserve Bank of India). The debate about growth-inflation trade-off and the role of monetary policy reappeared and have once again obtained center stage of recent policy debate. Therefore, price stability has become the most important

objective of Reserve Bank of India. According to the RBI Report (2010-11), empirical work on 'Backward bending Phillips Curve', argued that the Phillips Curve is negatively sloped at low levels of inflation, becomes positively sloped at high levels of inflation and turns vertical if inflation expectations converge to actual inflation. This lends support to the hypothesis of the existence of a threshold level of inflation. In the present study, an attempt is made to explore the non-linearity of inflation-output growth nexus in the case of India. Specifically, the question that is addressed here are: (1) is there some threshold level of inflation in the case of India below which inflation is a desired phenomena? (2) Is such a structural break statistically significant?

The study is arranged in the following manner. An introduction has been discussed in Section 4.1 above. Section 4.2 presents related literature review. Section 4.3 provides a brief summary of empirical estimation of threshold inflation for Indian economy over the period of time. Section 4.4 discusses data source, variables and estimation of a threshold level of inflation in India, while final section 4.5 concludes the study.

4.2 Literature review of the empirical studies

Inflation has always been a topic of debate in economic theories. The phenomenon of inflation and its effect on economic growth has been discussed ever since the appearance of classical economic theory and been furthered later on as the development of modern economic theories. This section provides a review of different economic theories, and the focus is on the explanations of inflation and its effect on economic growth under the framework the concept of threshold inflation level of economic growth rather than details of the theories themselves.

In recent decades, there has been substantial theoretical and empirical research that investigates the inflation/growth trade-off. Different studies reflect different views on the relationship between inflation and economic growth. Their empirical findings differ depending on data periods and countries, suggesting that the relationship between inflation and growth is not stable. Still, the existence of a non-linear and concave relationship between these two variables is widely accepted by economists now.

In case of time series studies, Fischer (1993) is among the first to examine the possibility of nonlinearities in the relationship between economic growth and inflation in the long run covering 93 countries with the time span 1961-1980 by using both cross section and panel data. He argued

that inflation impedes the efficient allocation of resources due to harmful changes of relative prices. The findings suggested that that there are more than one break point between inflation and economic growth.

Sidrauski (1967) testified the super neutrality of money in his model with conclusion, that inflation has no relationship with growth in the long run. Some recent empirical studies which evidence the zero inflation - economic growth relationship especially in the long run support Sidrauski (1967)'s argument. Bruno and Easterly (1995) demonstrated a non-relationship between inflation and economic growth when they deleted the observations of high inflation cases. Because, some studies showed that the inflation - economic growth relationship is very sensitive to the high inflation cases.

Andres, et al (1999) used causality method along with VAR approach to find out the correlation between growth and inflation of the OECD countries during the period from1960-92. This paper tries to assess the long running costs of inflation, within an explicit theoretical framework stemming from growth literature. The empirical results suggested two channels via inflation influences growth. These are: first, through a reduction in propensity to invest. Second, a reduction in the efficiency of the input costs. The main finding of the study is that current inflation has never been found to be positively correlated income per capita over the long run. In general, this finding shows that the long running costs of inflation are significant and the efforts to keep inflation under control will pay off in terms of better performance of economic growth.

Tabi and Ondoa (2001) constructed VAR model to identify the possible link between the variables mentioned above in Cameroon with data from 1960-2007. The empirical result showed that money in circulation causes growth and growth causes inflation. The interesting conclusion is that the increase in money in circulation does not necessarily persuade an increase in the general price level. Mallik et al. (2001) attempted to examine the relationship between inflation and economic growth for four Asian countries, namely, Bangladesh, India, Pakistan and Sri Lanka. The study used un-even sample size of 1974-97 for Bangladesh, 1961-97 for India, 1957-97 for Pakistan and 1966-97 for Sri Lanka by employing co-integration and Error correction model to examine the extent to which economic growth is related to inflation and vice versa. The empirical findings suggested that there is a long run relationship between economic growth rates and inflation rates in all four countries. Finally, the study evaluates that inflation and economic

growth are positively related, the sensitivity of inflation to changes in growth rates is longer than that of growth to changes in inflation rates. It also suggests that the economies are in a knife edge position. Nell (2000) examined the cost and benefit of inflation by dividing the South Africa's inflationary experience into four episodes. The empirical results revealed that there is a nonlinear relationship between inflation and economic growth. Within the single-digit zone inflation is beneficial to growth, while it costs in terms of slower growth at higher level. However, further results indicate that even during periods when deflationary policy yielded growth benefits as a result of a more stable economic environment, the costs of deflation outweighed the benefits.

Gylfason et al. (2001) adopted simple regression techniques in order to determine the link between inflation and growth for 170 developing and developed countries. The study used annual data series covering the frequency from 1960-1992. The empirical findings concluded that the cross country links between inflation and growth are economically and statistically significant and robust. However, Faria and Carneiro (2001) investigated the issue in the case of Brazil for the period January 1980 to July 1995 by using the bivariate VAR model. The empirical findings resulted that inflation does not impact economic growth in the long run, but in the short run there exists a negative association between inflation and economic growth. These results support Sidrauski's (1967) super neutrality of money in the long run, but cast doubt on the short run implications of the model for separable utility functions in consumption and real money balances, as exposed by Fischer (1979). The results are more likely to support a class of utility functions in which real money balances and consumption are perfect complements.

Valdovinos et al. (2003) Studied to examine the growth rate of the economy and the level of inflation from a non-structural, low frequency point of view. The study has used annual data for the eight Latin American countries covering the period from 1970-2000. The study employed spectral analysis to examine the growth inflation levels. The empirical findings of the study emphasized that the average long run rate of inflation in a country is negatively associated with the countries long run rate of growth. Mubarik (2005) followed the study of Khan and Senhadji (2000) and detected a threshold level of inflation at 9% for Pakistan using annual dataset from 1973 to 2000. The author argued that the above threshold level, there is a negative inflation - economic growth, relationship, but no significant relationship below the threshold level. He also found a one-way direction relationship from inflation to growth by Granger Causality method.

The most distinct part of the study by Gokal and Hanif (2004) is that they reviewed the development of inflation - economic growth relationship from a theoretical point of view. They also sum up one of the externalities of inflation is that inflation uncertainty, which is generated by inflation and will inversely affect growth. Sweidan (2004) adopts annual time series data of Jordan by using of ARCH (Autoregressive Conditional Heteroskedasticity) model to detect the relationship between inflation and inflation uncertainty. His study confirms the positive relationship between inflation and inflation uncertainty in the context of Jordan. But he evidences no significant relationship between inflation uncertainty and economic growth, which is contrary to his assumption.

Wang Zhiyong (2008) adopted co-integration and error correction models to detect inflation - economic growth relationship of China. He found a positive association between economic growth and inflation with about three quarters' lag and the causal direction is one-way from growth to inflation. The author suggested that it is important to keep a close eye on inflation in the context of high growth in the economy of China.

Iqbal and Nawaz (2009) investigated the threshold level of inflation in Pakistan using annual data from 1961 to 2008. Their empirical findings suggested the existence of a double threshold; 6 percent and 11 percent, which divides the inflation into three categories i.e. low inflation, moderate inflation and high inflation. Inflation, the first threshold level is 6 percent, below this threshold inflation is positively associated economic growth, but insignificantly; at moderate rates of inflation (between 6 percent and 11 percent-between the two threshold levels), the effect of inflation is negative and significant; and at high rates of inflation (above 11 percent), above the second threshold, the marginal impact of additional inflation on economic growth weakens but it is still negative and significant. The results argued that the nonlinear relationship between inflation and economic growth exists at only one threshold (7 percent).

Lee and Wong (2005) investigated the existence of inflation thresholds for Taiwan and Japan uses data for the period 1962–2002 in Taiwan and 1970–2001 for Japan, respectively by employing a threshold regression model. The authors suggested threshold levels of 7.25% for Taiwan and 9.66% for Japan. Similarly, Furuoka et al. (2009) examined the existence of threshold effects of inflation on economic growth in the context of Malaysia. They employed endogenous threshold autoregressive (TAR) models proposed by Hansen (1999). The study uses

annual data covering the period 1970–2005 and found a threshold level of 3.89%, above which inflation significantly retards growth of GDP and below which inflation is positively and significantly related to growth. Khan and Schimmelpfenning (2006) constructed a simple inflation model taking data of the economy of Pakistan for the period January 1998 to June 2005. The authors suggested that there may be no trade-off between inflation and growth in the short run, but it certainly exists in the medium and long run. Their estimated results suggest 5 per cent inflation target for sustained economic growth and macroeconomic stability in the economy.

Hodge (2006) used a dataset on the South African economy to examine whether the data support the findings of other cross-section studies that inflation has a negative effect on growth over the long term. He further investigated whether higher economic growth can be gained at the cost of higher inflation in the short run. The study makes use of annual data from 1950 to 2002. The empirical findings of the study concluded that inflation retards economic growth in the long run in South Africa. In Bangladesh, Ahmed and Mortaza (2005) found a statistically significant long-run negative relationship between inflation and economic growth using annual data over the period 1980 to 2005. The study employed co-integration and error correction models. The authors found a threshold level of 6 per cent (structural-break point) above which inflation will adversely affect economic growth. They concluded that their findings have direct relevance to the conduct of monetary policy by the Bangladesh Bank.

Munir et al. (2009) examined the nonlinear relationship between inflation level and economic growth rate for the period 1970-2005 in the economy of Malaysia by employing new endogenous threshold autoregressive (TAR) models proposed by Hansen (2000). They found that threshold level of inflation is 3.9 percent and support the view that the relationship between inflation rate and economic growth is nonlinear. An inflation rate above the threshold level significantly retards growth rate of GDP and below the threshold level, it promotes economic growth significantly. Chimobi (2010) used Nigerian data on CPI and GDP for the period 1970-2005 to examine the existence or not, of a relationship between inflation and economic growth and its causality by employing the Johansen-Juselius co-integration technique and Engle-Granger causality test. The result suggested a unidirectional causality running from inflation to economic growth. Thus, the study maintained that the unidirectional causality found is an indication that inflation indeed impacts on economic growth. However, this study did not estimate or suggest

any threshold level at which the impact could be positive or negative, significant or not, in the long run or short run. By using annual time-series data for the period 1972-73 to 2009-10, Ayyoub et al. (2011) investigated the tradeoff between inflation and economic growth in Pakistan by employing the method of Ordinary Least Squares (OLS). The study suggested a threshold level of inflation at 7 percent, above which inflation is quite harmful for the economy.

Bhusal and Silpakar (2011) found a threshold of 6% for Nepal for the period 1975-2010. The empirical results suggested that beyond the threshold level of inflation rate, higher or lower than the threshold value, the economic growth can be endangered. Hasanov, Fakhri (2011) examined the possibility of threshold effect of inflation on economic growth over the period of 2000-2009. The estimated threshold model indicates that there is a non-linear relationship between economic growth and inflation in the Azerbaijani economy and the threshold level of inflation for GDP growth is 13 percent. Below threshold level inflation has statistically significant positive effect on GDP growth, but this positive relationship becomes a negative one when inflation exceeds 13 percent. The results of the study may be useful for monetary policymakers in terms of keeping inflation below the threshold level of 13 percent to prevent its negative effect on economic growth.

A study conducted by Phiri (2010) revealed that there exists a threshold level of 8% for the period 2000 to 2010. Furthermore, Frimpong and Oteng-Abayie (2010) attempted to find out whether inflation is harmful or not; and if it is at what level does it become harmful to economic growth in Ghana. The study employed a threshold regression model designed to estimate the inflation thresholds instead of imposing them, using the annual dataset covering 1960-2008. They found evidence of a threshold effect of inflation on economic growth, which was estimated at 11 per cent. Below this level, inflation is likely to have a mild effect on economic growth, while above it inflation would significantly hurt economic growth. Leshoro (2012) re-examined the inflation–growth relationship in South Africa using quarterly data for the period 1980 to 2010. The author used the threshold regression model developed by Khan and Senhadji (2001) and estimated an inflation threshold level of 4% for South Africa, below which there is a positive but statistically insignificant relationship between inflation and growth.

In the context of studies based on panel data, De Gregorio (1992) used a sample 12 Latin American Countries which have high inflation history. The empirical result stated that there exists a negative relationship between inflation and economic growth in the long run.

Barro (1995) used data set covering over 100 countries from 1960 to 1990 to analysis the estimated effects of inflation on growth by using the Instrumental Variable (IV) estimation method. Annual inflation rates were computed in most cases from consumer price indices. By employing different instrumental variables, he obtained a robust estimation result showing that an increase in average inflation by 10 percentage points per year would slow the growth rate of the economic growth by 0.2-0.3 percentage points per year. The author also suggested the adverse influence of inflation on growth appeared small; but the long-term effects on standards of living were actually significant. However, some other empirical and theoretical studies argued that the inflation-growth relationship is fragile.

Sarel (1995) investigated the non-linear relationship between inflation and economic growth with panel data sample covering 87 countries over 21 years (1970-1990) by employing used fixed effect technique. The authors found that the evidence of structural break in the interaction between inflation and growth. The main result is that the estimated threshold level equals to 8 percent, exceeding which leads to negative, powerful and robust impact of inflation on growth.

Bruno and Easterly (1995) studied inflation-growth relationship for 26 countries over the 1961-1992 period. They identified countries, which had high inflation crisis of 40 percent and above. This was followed by assessing how the country's growth has performed before, during and after its high inflation crisis. The authors concluded that a negative relationship between inflation and growth when the level of inflation exceeds some threshold. At the same time they showed that impact of low and moderate inflation on growth is quite ambiguous. They argued that in this case inflation and growth are influenced jointly by different demand and supply shocks thus no stable pattern exists.

In the study of Ghosh and Phillips (1998), they used data set consists of 3,603 annual observations from 145 countries, over the period 1960-96. By employing panel regression, they explained why different level of price variability will have different influence on the inflation - economic growth relationship. As a result, they found a threshold at 2.5 percent, and a significant

negative effect above this level. They argued that low inflation is necessary and could weaken the price rigidity and then improve the efficiency of the price mechanism, but high inflation will lead to inefficient allocation of resources by distorted price variability. Christoffersen and Doyle (1998) investigated the nonlinear relationship between inflation and growth for 22 transitional countries over the time period from 1990 to 1997. The authors employed Sarrel's (1995) approach to model the kinked interaction between inflation level and economic growth. The findings suggested an inflation threshold level of 13%. They did not find any evidences that output will be rapidly increased by high inflation for countries that keep inflation below this threshold level. This result showed that policy makers should keep inflation at some specific threshold level where the favorable impact of inflation on growth performance is the highest.

Buerdekin et al. (2000) studied the non-linear relationship between inflation and economic growth. They argued that threshold levels (structural break points) should be different and distinguished in estimation between developed and developing countries. But totally different to the results of other studies which focus on studying the threshold of inflation – economic growth relationship, they found a lower one with 3% for developing countries and a higher threshold with 8% for developed countries.

Khan and Senhadji (2001) used the panel data set of 140 countries (both industrial and developing) over the period 1960-1998 to investigate the inflation-growth interaction for both developing and developed countries by applying the technique of conditional least squares. The authors employed the method of nonlinear least squares to deal with non-linearity and non-differentiability of the inflation threshold level in growth regression. The empirical findings suggested the threshold levels of 1-3% for developed and 11-12% for developing countries, which turned out to be very precise. The authors pointed out that the total negative effect of inflation may be underestimated due to the fact that they controlled investment and employment, so the main channel of impact is productivity. However, this study also stressed the idea that low inflation is a good thing for the economy because it has a favorable influence on economic growth. By using a nonlinear specification and the data from four groups of countries at various stages of development Moshiri and Sepehri (2004), examined the possibility of various thresholds (rather than a single threshold) across countries at various stages of development. They found the threshold levels varying widely from as high as 15% per year for lower middle-

income countries to 11% for low-income countries, and 5% for upper–middle income countries. They also argued that there is no evidence of any statistically detectable, long-run relationship between inflation and growth is evident for the OECD countries. The results indicate the potential bias in the estimation of inflation–growth nexus that may result from combining various countries at different levels of development. The existence of such a degree of heterogeneity across countries at various stages of development also suggests the inappropriateness of setting a single, uniform numerical policy target applicable to all (developing) countries.

Drukker et al. (2005) investigated the non-linearities in the inflation–growth relationship using data of 138 countries over the period 1950–2000. The results reveal one threshold value of 19.16%, below which inflation do not have a statistically significant effect on growth and above which inflation has a negative and statistically significant impact on long-run growth.

Li (2006) estimated a non-linear relationship between inflation and economic growth for 27 developing and 90 developed countries over the 1961–2004 period. The author suggested that there exist two threshold levels of 14% and 38% for developing countries. When the inflation rate is below14%, the effects of inflation on growth are positive and insignificant. Between 14 and 38%, the effects are strongly negative and significant and above 38% the effects diminish but remain significantly negative. Furthermore, the study reveals a threshold level of 24% for developed countries, above which the effects of inflation on growth remain significantly negative, but the marginal effect of inflation on growth diminishes.

Schiavo and Vaona (2007) used a nonparametric estimator and semi parametric instrumental variable (IV) estimator to assess the non-linearities between inflation and economic growth, and also the existence of a threshold level of inflation. The study used a data set for 167 countries comprising of developed and developing countries, covering the period 1960–1999. The results reveal the existence of a threshold level of 12% for developed countries, where below this level, inflation seems not to be harmful to growth, while it turns harmful above the 12% level. Due to high variability of growth performances in developing countries, the study did not find a precise threshold level of inflation for the group of countries included in the analysis.

A study by Kremer et al. (2009) using panel data from 63 countries, comprising industrial and non-industrial countries- confirmed the effect of inflation on long-term economic growth. The empirical findings revealed that inflation affected growth when it exceeded 2 per cent threshold for industrial countries and 12 per cent for non-industrial countries, and that below these levels the relationship between inflation and economic growth was significantly positive. However, they argued that the inflation threshold in non-industrial countries and the appropriate level of inflation target might be country specific. Therefore, they recommended that the identification of country specific threshold might provide useful information about the appropriate location and width of an inflation targeting band.

Roodman (2009) employed generalized method of moment (GMM) style instruments for 32 Asian countries over the period 1980–2009 to estimate the potential threshold point, and investigates the effect of inflation on economic growth. The sample size has been reduced by taking the average of the data for every two years in order to eliminate the fluctuations in the business cycle. Sergii (2009) examined the growth-inflation trade off for CIS countries over the period of 2001-2008 and found that when inflation level is higher than 8 percent economic growth is slowed down, otherwise, it is promoted. Bick (2010) introduces a generalized panel threshold model by allowing for regime intercepts and concluded that allowing for different intercepts in each regime decreases the threshold from 19% to 12% and doubles the magnitude and marginal effect of inflation on growth. Espinoza et al. (2010) used a panel of 165 countries and for a period 1960–2007. They found that estimated a threshold of about 10 per cent for all country groups (except for advanced countries) above which inflation rapidly becomes harmful to economic growth. However, for the advanced economies, the threshold was much lower.

In a recent paper, with a panel of six industrialized economies (Canada, France, Italy, Japan, UK and US), Kan and Omay (2010), re-examined the threshold effects in the inflation–growth nexus for a panel data set for 6 industrialized countries covering the period 1972–2005. They employed panel smooth transition regression (PSTR) which takes into account the non-linearities in their study. They also controlled for unobserved heterogeneity in both cross-section and time dimensions. The empirical results concluded that there exists a threshold level of 2.52%, above which inflation negatively and significantly affects economic growth. A different note, Eggoh (2010) investigated the linkage between financial development and economic growth by

employing panel smooth transition regression (PSTR) for 71 countries, comprising both developed and developing countries with the time span 1960 to 2004. The findings supported the non linearity between inflation and economic growth. The results specifically showed that inflation, the ratio of government expenditures to GDP, degree of openness to trade and financial development affects the nonlinearity between financial development and growth. The author also suggested the inflation threshold for the advanced economies which is 3.4%; for the upper-middle income 10% and for middle-income countries 12% and, respectively. Finally, the inflation threshold for the low income economies is around 20%. Abbott and Vita (2011) used a panel of 125 industrialized and developing countries over the period 1980-2004. The author argued that indicate that the costs of inflation for economic growth are significant only in the case of developing countries, and are higher for floating exchange rates than they are under fixed or intermediate regimes.

Similarly, Ibarra and Trupkin (2011) also used a panel smooth transition regression (PSTR) model with fixed effects to investigate the non-linearities in the inflation–growth nexus for a panel of 120 countries for the period 1950–2007. Their results depict a threshold level of 19.1% for non-industrialized countries and a high speed of transition from low to high inflation regimes. By the same token, Villavicencio and Mignon (2011) also rely on a PSTR model to investigate the non-linearities in the inflation–growth relationship among 44 countries covering the period 1961–2007 and find a threshold level of 19.6% for lower–middle and low-income countries.

Vinayagathasan (2013) investigated the existence of a threshold level for inflation for 32 Asian countries over the period 1980–2009. The study used a dynamic panel threshold growth, regression by allowing for fixed effects and endogeneity. As a result, the authors found that threshold level of approximately 5.43%, at a 1% significance level. Seleteng, Bittencourt and Eyden (2013) used the Panel Smooth Transition Regression (PSTR) method developed by González et al. (2005) to examine the non-linearities in the inflation–growth nexus in the Southern African Development Community (SADC) region for the period 1980– 2008. Kremer, Bick, and Nautz (2013) introduced a dynamic panel threshold model to estimate inflation thresholds for long-term economic growth. The study used a large panel-dataset including 124 countries. The authors found that the threshold level is different for industrialized and developing

countries, and stated that target inflation should be 2% for developed countries and 17% for developing countries.

Empirical estimation of threshold inflation in India

Many studies in Indian context have provided different views on inflation threshold. Chakarvarty Committee (1985) referred to it as the acceptable rise in prices at 4 per cent. This, according to the Committee, reflects changes in relative prices necessary to attract resources to growth sectors. "As growth is not uniform in all the sectors, maintaining absolute price stability, meaning a zero rate of increase in prices, may not be possible and nor is it desirable" (Reserve Bank of India, 1985). Rangarajan (1998), who pioneered the concept of threshold inflation, brought central bank focus on the inflation rate at 6–7 per cent known as "acceptable level" of inflation. His idea of the threshold was: at what level of inflation does an adverse consequence set in? The study conducted by Vasudevan et al. (1998) and, Kannan and Joshi (1998) found the threshold level to be around 6 per cent. Kannan and Joshi, with a sample covering a period from 1981-82 to 1995-96, it is estimated that an inflation rate of more than a threshold rate of 6 per cent per annum would have a significant downward impact on growth in India.

The empirical results of Samantaraya and Prasad (2001) are also on similar line as they found the threshold level to be around 6.5 per cent. Singh and Kalirajan (2003) used the annual data for the period of 1971–1998 and analyzed the threshold effect of inflation economic growth. As a result the authors suggested that the increase in inflation from any level has a negative effect on economic growth and considerable gains can be acquired by implementing the monetary policy towards maintaining price stability. By using the Khan and Senhadji (2001) framework, Bhanumurthy and Alex (2008) investigated the non linearity of inflation. The empirical result showed that the threshold inflation level is at 4 to 4.5%, and found that above this threshold level is inflation hurts economic growth. Singh (2010) which used both, yearly and quarterly data, found threshold level of inflation for India at 6 per cent but failed to confirm the same in Sarel (1996) sense. According to Tripathi and Goyal (2011), the inflation process in India supports an optimal inflation level of about 5% because price increases more than they fall. Mohanty et al. (2011) used two different approaches: Sarel's method and Espinoza et al. (2010) method to explore the issue of the existence of threshold effects in the India for the period of Q1:1996-97 to

Q3:2010-11. The study supported the existence of the non-linear relationship between inflation and growth. The empirical results suggested that that there exists statistically significant structural break in the relation between inflation and economic growth at 4.0% and 5.5%. Table 4.1 presents the summary of earlier work on inflation-growth trade.

Table 4.1: Estimates of threshold inflation from past empirical Studies

Study	Period	Threshold Inflation (%)	Methodology
Chakravarty Committee Report (1985)#		4	
Rangarajan (1998)*		6	Macro Econometric Model
Kannan and Joshi (1998)	1981-96	6-7	
Vasudevan, Bhoi and Dhal (1998)	1961-98	5-7	Correlation/regression
Samantaraya and Prasad (2001)	1970-99	6.5	
Report on Currency and Finance (2001)	1970-2000	5	Sarel's Spline Method
Singh and Kalirajan (2003)	1971-98	No Threshold	Spline regression
Bhanumurthy and Alex (2010)**	1975-2005	5 - 5.5	Spline regression
Singh, Prakash (2010)	1970-2009	6	Spline regression
RBI Annual Report (2010-11)		4 - 6	Spline regression, non-linear least squares and Logistic Smooth Transition Regression (LSTR) model.
Pattanaik and Nadhanael (2013)	1972-2011	6	Spline regression, non-linear approach, vector auto regression (VAR)
IMF (2012)	1996-2012	5-6	
Mohanty et al. (2011)	1996-2011	4-5.5	Spline regression, non-linear least squares and Logistic Smooth Transition Regression (LSTR) model.
Subbarao (2013)	1996-2012	4.4-5.7	Spline regression, non-linear least squares and Logistic Smooth Transition Regression (LSTR) model.

Note: # cited as accepted rate of rise in prices

* Rangarajan (1996) observed that the objective of policy should be to keep inflation rate around 6%

**Using monthly data for January 2000 to April 2007, they suggested 4-4.5 percent as the threshold.

Source: Reserve Bank of India

To sum up, the review shows that there are some mixed results regarding the trade-off between inflation and economic growth in Indian economy. The calculated threshold inflation rate depends on the study period, methods used and frequency of the data considered.

4.3 Data source, variables and estimation of threshold

Data source, variables

The present study uses quarterly data from 2004:Q1 to 2014:Q2 to capture the recent growth-inflation dynamics in Indian economy [1]. The data used has been obtained from different sources, including Handbook of Statistics on Indian Economy published by the Reserve Bank of India, the National Accounts Statistics published by the Central Statistical Organization, World Bank's World Development Indicators (WDI) and World Economic Outlook (WEO). The used variables are: inflation is measured by wholesale price index (WPI) inflation with new base year (2004-05=100), growth rate of GDP is used to measure economic growth. Apart from these variables, we also used two control variables:

(1) World's GDP growth (WGDPG): To observe the significance of external developments on domestic growth-inflation relationship, we used world GDP growth. However, in absence of quarterly World GDP data, OECD countries GDP growth is used as a proxy variable (Mohanty et al., 2011).

(2) Crude Oil (OIL): It is believed that developing countries are exposed to supply side shocks caused by fluctuations in oil prices in the international markets. Therefore, these fluctuations in the oil prices may act as an inducement for domestic production and consequently affect growth (Muzaffara Ahmed Taneem & Junankar P.N., 2014). This variable is included to examine the influence of supply shocks as a result of rising oil.

Table 4.2: Correlation matrix of variables

	GDPG	WDGDPG	LOIL	INF
GDPG	1.00000			
WDGDPG	0.39146	1.00000		
LOIL	-0.29804	0.03197	1.00000	
INF	-0.28607	-0.41551	0.42689	1.00000

Note: L represents the natural logarithm.

Table 4.2 presents the correlation matrix of the variables. It suggests that there is no correlation among the variables used in this study. In summing up, the selection of variables to examine the tradeoff between inflation and economic growth in Indian economy during 2004-05:Q1-2014-15:Q2 is done by taken care of economic factors related to structural, demand and supply side shocks. As a preliminary step, before the estimation of a threshold level of inflation, we investigate the possibility of a nonlinear relationship between inflation and economic growth during the study period. To check the non-linearity between inflation and economic growth, both a linear inflation rate (inflation) and a quadratic term $(\text{inflation})^2$ are included as independent variables. In this type of relationship inflation variable itself captures the non-linearity.

Before estimate any regressions, we need to examine the stationarity of the variables. The Augmented Dickey Fuller (ADF), DF-GLS and Ng-Perron unit root tests are employed to check the stationarity of all the variables. The results are presented in Table 4.3. The results suggest that all the variables are stationary at level, thus the variables are difference stationary I (1). To check the stability, the cumulative sum of recursive residuals (CUSUM) and the CUSUM square (CUSUMSQ) tests proposed by Brown et al. (1975) have been applied. The results (figure 4.1) suggest parameter consistency under both tests. The plots are within the critical bounds of 5 percent level of significance.

Table 4.3: Stationarity test results

Variable	ADF	DF-GLS	MZa	MZt	MSB	MPT
LOIL	-1.2050	-1.8012	-9.0145	-2.4821	0.2563	2.4102
DLOIL	-4.1967	-5.9489	-28.1041	-3.7172	0.1322	3.4243
INF	-5.1775	-5.2623	-54.7454	-5.2151	0.0952	1.7445
LAGWG	-5.1093	-6.1023	-57.5043	-5.3367	0.0928	1.7030

Note: D, L represents first difference and the natural logarithm respectively.

The model specification for non-linearity test is given by equation (1).

$$\text{GDPG} = \alpha_0 + \alpha_1(INF) + \alpha_2(INF^2) + \alpha_3(WGDPG) + \alpha_4(LOIL) + \varepsilon_t \quad \text{..... (1)}$$

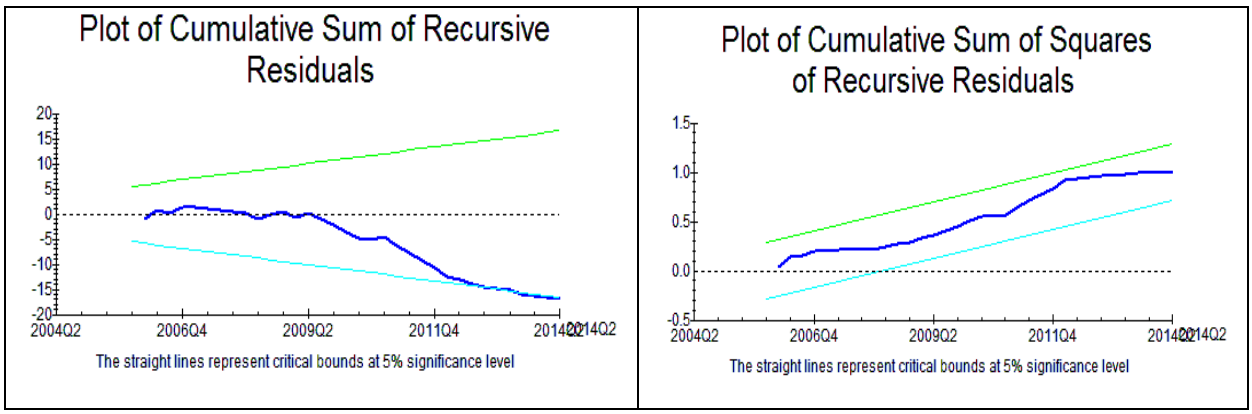
Table 4.4: Estimates of the GDP growth equation

Explanatory Variables	Coefficient	t-value
Constant	3.2140**	4.0219
INF	0.2580**	2.2994
INF^2	-0.0198**	-2.9401
WGDP	0.1063*	2.1100
LOIL	-0.1671*	-1.7577
R^2	0.3021	
DW	1.65	

Note: **, * indicates significant at 1% and 5% level of significance respectively.

The results of table 6 reveal that estimated (inflation) coefficient is positive and significant, and the (inflation) ^{2} coefficient is negative and significant, which supports the hypothesis of a nonlinear relationship between inflation and economic growth in Indian economy. The coefficients of all other variables are as expected.

Figure 4.1: Stability Test



Source: Author's calculation.

4.4 Estimation of threshold inflation for Indian economy

Many studies have tried different methodologies to estimate the threshold level of inflation using different sample. In this study, we have used three different methodologies as proposed by Sarel (1996) and Espinoza et al. (2010) for estimating the threshold level of inflation for Indian economy. Sarel (1996) proposed an estimation procedure for inflation threshold; the procedure is based on OLS estimation of economic growth equation with an appropriate procedure to detect structural breaks. This equation takes economic growth as a dependent variable and inflation with some control variables are used as independent variables. Since the value of the threshold

level (π*) is unknown. This methodology finds the threshold level of inflation by estimating these series of regression equations and provides the threshold value of inflation, which maximizes R-squared or minimizes Root Mean Square Error (RMSE).

The basic equation for estimation of threshold inflation is specified below equation (2).

$$GDPG = f\ (INF, (\pi *, EXTRA), WGDPG, LOIL) \quad \text{…..(2)}$$

$$\text{GDPG} = \alpha_0 + \beta_1(INF) + D\beta_2(INF - \pi *) + \beta_3(WGDPG) + \beta_4(LOIL) + \varepsilon_t \quad \text{….. (3)}$$

Where π* = Experimental threshold inflation, EXTRA= D* (π - π*)

D = Dummy is 0 if : π < π* and 1 otherwise

In the estimated equation (2), the relationship between output growth and inflation is given by: (i) β_1 captures the impact o inflation on economic growth and (ii) β_2 captures the impact of inflation exceeding threshold on growth. At the threshold level both coefficients (inflation and threshold) should be statistically significant, but also that β_1 should be positive and β_2 should be negative. Apart from this, the sum of the two coefficients $\beta_1 + \beta_2$ should be negative above the threshold. Another condition for threshold level is that it is level or point at which the explanatory power of an estimated equation (3) becomes maximum or higher value of R^2. The results of spline regression are presented in table 5 below.

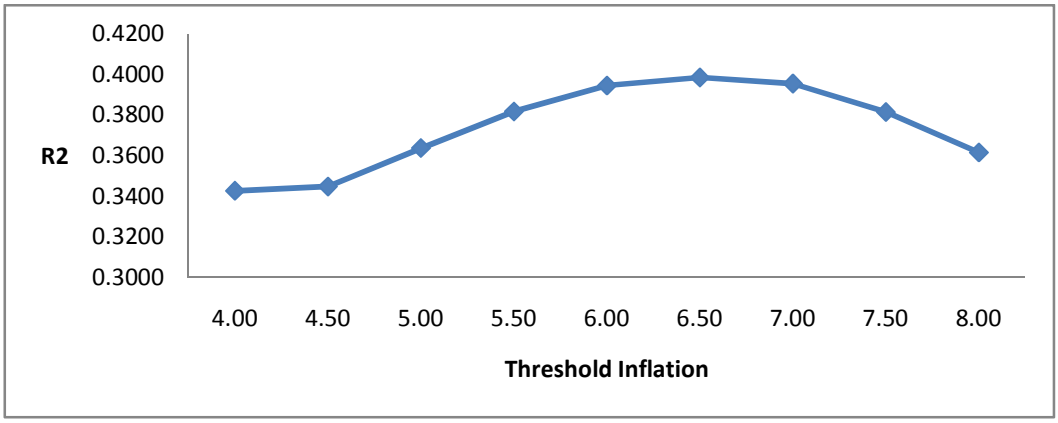
The results suggest that at π*=6.5, the value of the R^2 is the highest. At 6.5 percent, β_1 is significant and positive and β_2 is significant and negative, suggesting a statistically significant break at this point which implies that the positive effect of inflation almost ceases around the 6.5 percent level of inflation, which could ideally be considered as the estimated threshold level of inflation in our sample period (Samantaraya and Prasad, 2001). The Adjusted R^2 is plotted against different levels of threshold in Figure 4.2.

Table 4.5: Coefficients of OLS Regression – Sarel's Method (Dependent Variable: GDPG)

Parameters	π*=4	π*=4.5	π*=5.0	π*=5.5	π*=6	π*=6.5	π*=7	π*=7.5	π *=8
α_0	15.41**	15.87**	15.65**	15.42**	15.21**	14.58**	14.94**	14.23**	14.52**
β_1	0.21	0.12	0.08	0.04	0.03	0.08*	0.05*	0.07*	0.07*
β_2	-0.01	-0.14	-0.24*	-0.26	-0.27	-0.29*	-0.70*	-0.96*	-0.98*
β_3	-1.75*	-1.79*	-1.74*	-1.68*	-1.57*	-1.38*	-1.35*	-1.17*	-1.18*
β_4	1.00*	1.02	1.03*	1.03*	1.03*	1.05**	1.05**	1.04**	1.04*
R^2	0.3426	0.3447	0.3637	0.3817	0.3945	**0.3985**	0.3955	0.3814	0.3615
DW	1.5196	1.5336	1.5472	1.5502	1.5590	1.6117	1.5866	1.5431	1.5210
Heteroskedas	0.5098	0.5098	0.5901	0.5054	0.5316	0.5301	0.5812	0.6012	0.6214
ticity: ARCH	(0.52)	(0.55)	(0.59)	(0.52)	(0.55)	(058)	(0.62)	(0.62)	(0.68)
Residual	1.16	1.72	1.26	1.16	1.06	1.12	1.10	1.14	1.45
Normality:JB	(0.33)	(0.48)	(0.55)	(0.45)	(0.58)	(0.57)	(0.57)	(0.56)	(0.67)
BG: LM test	1.79	1.05	1.04	1.23	1.01	0.21	0.48	0.54	0.79
	(0.23)	(0.54)	(0.26)	(0.29)	(0.21)	(0.56)	(0.57)	(0.65)	(0.72)

Note: **, * indicates significant at 1% and 5% level of significance respectively.

Figure 4.2: Threshold inflation in India



Source: Author's computation

The next approach to estimate inflation threshold is adopted from a recent paper Espinoza et al. (2010); they used a Logistic Smooth Transition Regression (LSTR) model proposed by Teräsvirta (1994, 1998) to estimate the threshold. The present study uses the model specification proposed by McAleer & Medeiros (2008) which employs a quasi maximum likelihood (QML) estimator of smooth transition regression with multiple regimes. The specification is given by equation (4) below.

$$\Delta GDP = \alpha + \beta_0 \pi + \sum_{i=1}^{M} \beta_i W_i (\pi - \pi^*) + \emptyset X + e \quad \ldots\ldots (4)$$

Where $W_i = 1/ (1+e^{(\gamma_i (\pi - \pi*))})$

X= control variables and M= no. of regimes, we have taken M=2, the first regime presents the situation of very low inflation; in the middle regime represents low inflation periods and the third regime is associated with the situation of high inflation. In the first the impact of inflation on economic growth is driven by β_0. The results of LSTR model are presented in table 4.6. Threshold inflation can be deducted from values of β coefficients. The results reveal that both β_1 and β_2 are significant at π^*= 6.50 percent. The coefficient of β_1 is positive and coefficient β_2 is negative. This suggests a statistically significant break at this point; beyond 6.50 per cent the positive impact of inflation on growth is statistically significant. It is found the second break occurs at 6.75 per cent, but no evidence of negative impact is witnessed but the positive impact got wears off. Therefore, 6.75 per cent is considered the threshold level of inflation beyond which the positive impact of inflation on growth is not significant. Additionally, inflation between 6.50 to 6.75 per cent the positive impact of inflation is significant.

Table 4.6: Logistic smooth transition regression (LSTR) coefficients

Parameters	Estimates	P-value
$\boldsymbol{\alpha}$	0.1413 *	0.041
$\boldsymbol{\beta_0}$	0.2020	0.640
$\boldsymbol{\beta_1}$	0.6214*	0.053
$\boldsymbol{\beta_2}$	-0.8330*	0.038
$\boldsymbol{\emptyset_1}$	0.1219	0.251
$\boldsymbol{\emptyset_2}$	0.1654*	0.042
$\boldsymbol{\gamma_1}$	175*	
$\boldsymbol{\gamma_2}$	38	
First Break	6.50**	
Second Break	6.75*	

Note: **, * indicates significant at 1% and 5% level of significance respectively.

4.5 Summary and Conclusions

This paper re-examines the existence of threshold level for inflation and how such level affect the economic growth of Indian economy. For this purpose the study uses two different methodologies proposed by Sarel (1996) and Espinoza et al. (2010). For the estimation of the above mentioned methods, this study considered quarterly time series data from 2004:Q1 to

2014:Q2. In the present study inflation is measured by WPI inflation (base year 2004-05), growth rate of real GDP is used to measure the economic growth. Beside these variables, three control variables are also used in the study i. e. World's GDP growth rate, crude oil price and lagged GDP growth rate.

The test for non-linearity provides evidence that the relationship between inflation and economic growth is non-linear. As a result, this warrants the use of threshold estimation techniques to estimate the threshold level of inflation. The empirical findings confirm a non-linear relationship between inflation and economic growth in India economy over the period from 2004:Q1 to 2014:Q2. We detect a threshold level of approximately 6.75 percent. The empirical findings show that there exists statistically significant structural break in the relation between economic growth and inflation at 6.50 per cent and 6.75 percent. For the first break at 6.5%, there is positive impact on growth, which is statistically significant. We also found that inflation hurts economic growth when it goes beyond the threshold level of 6.75 percent and encourages economic growth below this threshold level. This study provides support of a shift in regime indicating possible unfavorable impact of inflation on economic growth beyond 6.75% WPI-inflation. Different estimation methods determine that this effect of inflation on growth is robust.

To wind up, as is now well-known, the Indian economy has experienced inflation in excess of threshold level in the last decade because of increasing costs for food and fuel, the high fiscal deficit and other supply shocks, which is negatively affecting the economic growth. Our findings may be useful to Reserve Bank of India as a guide for inflation targeting tool in Indian economy. The findings recommend that bringing inflation below the threshold level of 6.75 percent should be the goal of macroeconomic policies. The outcome of the paper will be relevant to monetary policy makers and academicians interested in this trade-off. The policy implications arising from this recommends for the development of institutional arrangements for controlling and fighting inflation and for maintaining macroeconomic stability, and for encouraging the positive effect of inflation on economic growth.

End notes:

[1] The new base year of WPI consist 676 commodities and the values are available since 2004:Q1.

CHAPTER 5

Financial development and Inclusive growth: empirical evidences

5.1 Financial development, economic growth and income inequality

5.1.1 Introduction

The link between financial development and economic growth has received considerable attention in recent literature. Numerous studies have studied this relationship at both the theoretical and empirical levels. At a basic level, they have tried to find the answer, whether financial development leads to improved growth performance or vice versa. Other studies have focused on identifying the channels of transmission between financial intermediation and growth. Despite several attempts to empirically investigate the relationship between financial development and economic growth, very few studies have addressed the causal relationship between financial development and income inequality (Barro, 2000; Westley, 2001; Beck et. al, 2007; Clarke et. al, 2003; 2007; Ang, 2010). The theoretical predictions of the effects of financial development on income inequality are still unresolved (Arestis and Cancer, 2004).

It is generally accepted that strong financial growth can offer more development and progress of an economy. A financial system, which is inherently strong, functionally diverse and displays efficiency, is essential for national objectives of fostering a market-driven productive and competitive economy. Subsequently, this will promote the highest level of investment and economic growth with its depth and coverage. Policies directed towards enacting a strong and vibrant financial sector growth through two channels. Firstly, these policies make credit cheaper, make best available tool to cater financial need and requirements of various participants and different segments of the society, boost entrepreneurial activities, generates employment opportunities and enhance the welfare of the poor. Secondly, the availability of credit at cheaper cost can provide crucial support to the financially weaker families by allowing them to invest in health, education and improve the life of their children and create and enhance human capital formation of the economy which in turn will improve the income distribution of the economy.

This study takes into the case of Indian economy to explore the relationship of financial development with income inequality.

The objective of the current study, therefore, attempts to fill this gap by examining the long run relationship between financial development and income inequality in India, by using Autoregressive distributed lag (ARDL) bound test approach of co-integration. The sample period used in this study covers the period from 1982 to 2013. In addition to the long run relationship, this paper makes an attempt to test the Greenwood and Jovanovich (1990) hypothesis which posit that at the initial stage of development of the financial sector, income distribution may deteriorate, but over time as the economy progresses, income distribution may improve. This is on par with the Kuznets hypothesis of income growth and inequality relation and later extended to the relationship between economic growth and environmental quality known as Environmental Kuznets Curve (EKC).

Till date, there is hardly any study that makes a clear comparison between market based indicator and bank based indicator of financial development in India and those examining the relationship between finance-inequality nexus. So the contribution of the paper is to fill this gap. Further, the authors are not aware of any study that financial development and income inequality taking Gini coefficient for India. In particular, there is no study taking Gini coefficient as the indicator of income inequality and test GJ hypothesis for India. This study provides evidence on such a relationship using ARDL approach and thus makes a modest attempt to fill the gap in the literature. The finding of this chapter should help the policy maker in pursuing the inclusive growth objectives of Indian plan and address the issue of distributive justice in the country.

The rest of the chapter is organized as follows. Section 5.1.2 presents the review of empirical studies. Section 5.1.3 provides descriptions of our data and model specification while section 5.1.4 provides multivariate time series methodologies applied in the chapter. Section 5.1.5 analyzes the empirical results, and Section 5.1.6 provides conclusions.

5.1.2 Literature review of the empirical studies

In Cross sectional studies**,** Clarke et al. (2003, 2007) examined the impact of financial development on income inequality for both developing and developed nations and concluded that financial development reduces income inequality, and also supported for GJ hypothesis.

The studies based on time series data; Westley (2001) examined the impact of financial markets on income distribution for Latin American countries, and concluded that easy access to financial resources through micro finance policies can reduce income inequality. Dollar and Kraay, (2002) found that trade openness improves the income of the poor, but inflation, government consumption and financial development worsen income inequality. Arestis and Caner (2004) suggested three channels that persuade income inequality/poverty. First, the economic growth channel, proposed by McKinnon (1973) and Shaw (1973) which works via economic growth, but the links is far from unambiguous. Second, the financial crisis channel which works through macroeconomic volatility caused by crises following financial liberalization where the poor bear the brunt. Finally, better access to credit and financial services can have a profound impact on the poor.

Baliamoune-Lut and Lutz (2005) investigated the effects of financial deepening, trade openness and foreign capital on rural-urban income inequality in African countries. They found an insignificant impact of financial deepening and foreign capital on reduction of rural-urban income inequality; but openness appears to be helpful.

Liang (2006) examined the relationship between financial deepening and income inequality, using Chinese provincial data over the period of 1991-2000. He concluded that financial development significantly contributes to the reduction of rural income distribution in China. Motonishi (2006) tried to identify the determinants of income inequality in Thailand, in Thailand, over the time period 1975 and 1998. He argued that limited evidences found that sectoral factors, financial development, and education level disparities play a roughly equally important role in explaining inequality. Shahbaz et al. (2007b) examined the relationship between financial development, trade-openness and rural-urban income inequality. The empirical results suggested that the financial development reduces rural-urban income inequality in Pakistan; and economic growth, foreign capital, and openness widen the rural-urban income gap. Low inflation adds to rural-urban income inequality.

Tan and Law (2009) found that financial deepening improves income distribution in Malaysia over the period of 1980-2000 by using ARDL bounds test. They argued that the evidence is valid for a variety of financial indicators, including the banking sector, the stock market and financial

aggregate variables. Shahbaz and Islam (2011) stated that financial development reduces income inequality while financial instability aggravates income inequality in Pakistan over the time period 1971 to 2005 by using the Auto Regressive Distributed Lag (ARDL) bounds testing approach to co-integration. By employing bounds testing approach with time span 1973-2010, Nafiseh Baligh (2012) examined the relationship between financial development and income inequality in Iran. The findings resulted that there exists a negative and a linear relationship between financial development and income inequality. Financial development significantly reduces income inequality in Iran. The studies conducted on Indian economy include; Burgess and Pande (2005) documented that opening of bank branches in rural areas helped in the improvement of income distribution in India. Ang (2010) has investigated the impact of financial development on income inequality in India by using ARDL bounds and ECM models covering the period of 1951-2004. He found that financial development lessens income inequality. The results are robust to the use of different measures for financial development and financial liberalization.

Tiwari et al (2013) examined the impact of financial development on the rural-urban income inequality in India using annual data from 1965 to 2008 by employing ARDL bounds testing approach to co-integration. The empirical results suggested that in the short term, economic growth and inflation lowers rural-urban income inequality while trade openness increases it. Financial development aggravates inequality, but not significant. Anna Lo Prete (2013) documented that financial development reduces income inequality because it enhances the ability to take advantage of new investment opportunities for 30 countries over the 1980–2005 period by using Ordinary least squares estimates.

From the panel data perspective, Li et al. (1998) examined the relationship between financial development and income inequality for 40 developed and developing countries from 1947-1994, using pooled Ordinary Least Squares (OLS) estimator, AR(1) error specification and instrumental variable method (IV). They found that better functioning financial markets are strongly associated with lower income inequality.

Bittencourt (2006) argued that broader access to financial and credit markets, reduce inequality during the 1980s and first half of the 1990s in Brazil by employing time series and panel techniques. Clarke et al (2006) used data from a panel of 83 countries over the period 1960–1995 and found that financial development reduces the level of the Gini coefficient. Their empirical results concluded that in the long run, inequality is less when financial development is greater, consistent with Galor and Zeira (1993) and Banerjee and Newman (1993). Beck, Demirguc-Kunt, and Levine (2007) examined the relationship between financial intermediary development and income distribution for 72 countries with time span 1960 – 2005. They concluded that financial development is associated with a lower growth rate of the Gini coefficient and a higher growth rate of income for the poor.

Rehman et al. (2008) tested the Kuznet's hypothesis by breaking a panel of 51 countries into four sub-panels; low income, lower middle income, upper income and higher income countries over the period 1975 to 2002. The findings concluded that financial development reduces the inequalities in income distribution irrespective of stage of development, and hence counteracts the inverted U-shaped relationship between inequality and financial development. Roine et al. (2009) further showed that financial development is pro-rich and the effect is strongest at low stages of economic development in a panel of 16 OECD countries over the entire twentieth century.

Akhter Selim, Yiyang Liu (2010) investigated the relationship between financial development and poverty by using a fixed effect vector decomposition (FEVD) model. They concluded that financial development is conducive for poverty reduction while the instability in financial markets is unfavorable to the poor. The empirical findings of Agnello et al. (2012) argued that there exists a nonlinear relationship between per capita income and income inequality by using a panel of 62 countries for 1973–2005. Kim and Lin (2011) used the data set of Beck et al. (2007) who construct a panel of up to 72 countries over the period 1960–2005. They examined the nexus between financial development and income inequality. It was found that there exists a nonlinear threshold effect of financial development on income inequality and financial development improves income distribution if the country has reached a threshold level of financial development.

For a set of 49 countries over the 1994-2002 period, Gimet and Lagoarde-Segot (2011) found an inequality-increasing impact of financial development. They employed a panel Bayesian structural vector autoregressive (SVAR) model for the panel. They also commented that, the relationship is dependent on the characteristics of the financial sector, rather than on its size. Hamori and Hashiguchi (2012) used an unbalanced panel data analysis of 126 countries for the period 1963- 2002 to investigate the effects of financial deepening on income inequality. The empirical results can be summarized as follows: (1) financial deepening reduces inequality; (2) economic growth reduces the equalizing effects of financial deepening; (3) inequality increases with an increase in trade openness

5.1.3 Dataset, variables and Model specification

Data and Variable identification

Financial Development: To measure financial development, this study uses the sum of domestic credit to the private sector as a share of GDP and market capitalization as a share of GDP[1] (FINDEP). This is a better measure compared to M3 as a share of GDP (See Levine, 1992; Demirguc-Kunt and Levine, 1999; Khan and Senhadji, 2000; Levine, 2004; Shahbaz et al, 2008; Shahbaz 2009).

Income inequality: The Gini coefficient (GINI) measures inequality in the distribution of the income [2]. The Gini coefficient is the ratio of the area between the Lorenz curve (which plots share of the population against income shares received) to the area below the diagonal. The value ranges from 0 to 1, where 0 means perfect income equality and 1 implies perfect income inequality. We use the Gini data from Deininger and Squire (1996) and Dollar and Kraay (2002). These data are updated with more recent data points available from ADB and UNDP reports.

Economic Growth: Real GDP (at factor cost with base year 2005=100) per capita (PGDP) represents the size of economic activity and a proxy for the growth momentum of the economy. Real GDP per capita considers the impact of financial development on steady state distribution of income.

Control variables: Consumer price index (base year 2005=100) (INF)[3] is used as a proxy for price stability and trade openness (TOP= ((Exports+Imports)/GDP) captures the impact of trade openness on inequality of income.

All the variables are taken in their natural logarithms (e.g. LGINI, LFD, LPGDP, LINF and LTOP). Inflation reduces the purchasing power of all but hurts the poor and middle income groups more than the upper income group. The wealthy and business class can hedge their exposure to an inflationary situation (Easterly and Fisher, 2001) because of their easy access to the financial services and financial markets compared to the lower and middle income groups. Thus inflation worsens the income inequality. The impact of trade openness on income inequality can go either way. Income distribution may improve if trade is pro poor or vice versa.

The study uses annual data on the above described variables covering the period from 1982 to 2013[4]. The data have been taken from Handbook of Statistics on Indian economy, RBI; Economic Survey, Govt. of India; World Bank database. The Gini Coefficient data have been obtained from planning commission reports, Deininger and Square dataset from the World Bank and Raghbendra Jha (2000).

Model Specification and Data:

The following general specification has been used in this study to empirically examine the long run relationship between financial development and income inequality.

$$LGINI = \alpha_0 + \alpha_1 LFD + \alpha_2 LPGDP + \alpha_3 LCPI + \alpha_4 LTOP + \varepsilon_t \quad \ldots\ldots (1)$$

Where, FD represents financial development, Gini coefficient (GINI) measures inequality in the distribution of the income[2]. Real GDP per capita (PRGDP) represents the size of economic activity and a proxy for the growth momentum of the economy. Consumer price index (CPI)[3] proxy for consumer price and TOP ((Exports+Imports)/GDP) captures the impact of trade openness on inequality of income. GDP per capita considers the impact of financial development of steady state distribution of income. All the variables are taken in their natural logarithms (e.g. LGINI, LFD, LPGDP, LCPI and LTOP). Inflation reduces the purchasing power of all but hurts the poor and middle income groups more than the upper income group. The wealthy and business class can hedge their exposure to an inflationary situation (Easterly and Fisher, 2001)

because of their easy access to the financial services and financial markets compared to the lower and middle income groups. Thus inflation worsens the income inequality. The impact on trade openness on income inequality can go either way. Income distribution may improve if trade is pro poor or vice versa.

Several Studies suggest that capital market imperfections might affect income inequality, Greenwood and Jovanovic (1990) present a theoretical model which suggests that financial development foster economic development may result into income inequality. They asserted that the fixed cost (for example membership fees) associated with financial accessibility prevents low income individual from joining them. Assuming that poor individuals save less and thus accumulate wealth more slowly income, differences between high income members of intermediary and low income outside will widen, resulting in an increase in income inequality.

Following the methodology of Clarke et. al. (2003, 2007), we propose to test G J hypothesis using non – linear specification.

$$LGINI = \alpha_1 + \alpha_{11}LFD + \alpha_{12}LFD^2 + \alpha_{13}LPGDP + \alpha_{14}LCPI + \alpha_{15}LTOP + \varepsilon_t \quad \ldots (2)$$

Equation 2 predicts inequality reducing theory of $\alpha_{11} < 0$ holding $\alpha_{12}=0$. Again, if $\alpha_{12}=0$ and $\alpha_{11} > 0$, we have inequality increasing theory. The inverted U shape hypothesis requires that $\alpha_{11} > 0$ and $\alpha_{12} < 0$; but if $\alpha_{11} < 0$ and $\alpha_{12} > 0$, we can conclude with the U shape relationship.

The Study empirically estimates the relationship between financial development and income inequality with the help of above described methodology for India. The study uses annual data on the above described variables covering the period from 1982 to 2012[4]. The data have been taken from Handbook of Statistics on Indian economy, RBI; Economic Survey, Govt. of India; World Bank database. The Gini Coefficient data have been obtained from planning commission reports, Deininger and Square dataset from the World Bank and Raghbendra Jha (2000).

5.1.4 Methodology

Co-integration with ARDL

To empirically analyze the long run relationship and dynamic interaction of income inequality with financial development and controlled variables, the present study employed the auto regressive lag (ARDL) co-integration procedure developed by Pesaran et. al (2001) because of the superiority of the ARDL approach on other co-integration techniques (As discussed earlier in Chapter 3.1). The unrestricted error correction model (UECM) of ARDL model is used to examine the long run and short run relationship take the following form.

$$\Delta LGINI_t = \delta_0 + \delta_1 T + \delta_2 LFD_{t-1} + \delta_3 LPGDP_{t-1} + \delta_4 LCPI_{t-1} + \delta_5 LTOP_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta LGINI_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LFD_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LCPI_{t-i} + \sum_{i=1}^{q} \omega_i \Delta LTOP_{t-i} + \varepsilon_t \quad \ldots. (3)$$

Where the series are as defined earlier and T is time trend and L implies that the variables have been transformed in natural logs. The first part of the equation (3) with δ_2, δ_3, δ_4 and δ_5 refer to the long run coefficients and the second part with α, β, μ, σ, ω refers to the short run coefficients. The null hypothesis of no co-integration $H_0: \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ and the alternative hypothesis $H_1: \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ implies co-integration among the series (equation 3).

ARDL bounds Test procedure

The first step in the ARDL test is to estimate the equation (3) by OLS in order to test for the existence of a long run relationship among variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of variables i.e. H_0 (null hypothesis) as against H_1(alternative hypothesis) as stated earlier. Two asymptotic critical values bound provide a test for co-integration when the independent variables are I(d) where ($0 \leq d \leq 1$); a lower value, assuming the regressors are I(0) and an upper value, assuming purely I(1) regressors of the F-statistics is above the upper critical values, the null hypothesis of no long run relationship can be rejected. Conversely, if the test statistics fall between the lower and the upper bound of critical values, the null hypothesis cannot be rejected. Further, if the calculated values lie between lower

and upper bounds, the decision about the co-integration is inconclusive (Pesaran et al 2001). The ARDL bound testing approach to co-integration uses $(\rho + 1)^q$ formulas to estimate the number of regressors. Where ρ indicates the maximum number of lags used and q represents the total number of variables.

In the second step, once the co-integration is established the conditional ARDL long run model for income inequality (L$GINI)_t$ can be estimated as:

$$\Delta LGINI_t = \alpha_0 + \sum_{i=1}^{q} \delta_1 \ LGINI_{t-i} + \sum_{i=1}^{q} \delta_2 \, LFD_{t-i} + \sum_{i=1}^{q} \delta_3 \, LPGDP_{t-i} + \sum_{i=1}^{q} \delta_4 \, LCPI_{t-i} + \sum_{i=1}^{q} \delta_5 \, LTOP_{t-i} + \varepsilon_t \quad \ldots. (4)$$

Where all variables are as previously defined. This involves selecting the orders of ARDL (q, q_1, q_2, q_3, q_4) models using SIC.

The third and final step, we obtain the short run dynamic parameters by estimating an error correction model with the long run estimates. This is specified as below:

$$\Delta LGINI_t = \mu + \sum_{i=1}^{q} \alpha_i \, \Delta \, LGINI_{t-i} + \sum_{i=1}^{q_1} \beta_i \, \Delta \, LFD_{t-i} + \sum_{i=1}^{q_2} \mu_i \, \Delta \, LPGDP_{t-i} + \sum_{i=1}^{q_3} \sigma_i \, \Delta \, LCPI_{t-i} + \sum_{i=1}^{q_4} \omega_i \, \Delta \, LTOP_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad \ldots.. (5)$$

Where $\alpha, \beta, \mu, \sigma, \omega$ are short run dynamic coefficient to equilibrium and ϕ is the speed adjustment coefficient.

5.1.5 Empirical Results

Unit Root Tests: Before we proceed to ARDL testing, we test for unit root of the variables to determine their order of integration. The test for unit root is to ensure that none of the series in integrated at I (2). In the present study, we have used ADF, DF-GLS, KPSS and Ng- Perron unit root tests. The results of the conventional (ADF, DF-GLS, KPSS) test results are presented in table 5.1.1 and the results of newly developed Ng- Perron test developed by Ng- Perron (2001) test is presented in table 5.1.2. The analysis of the unit root test results indicates that all the variables are integrated order one or none of the variables are I (2) series.

Table 5.1.1: Stationarity Test of the Variables (ADF, DF-GLS, KPSS)

	ADF	DF-GLS	KPSS
LGINI	-0.3456	1.0171	0.7381
LPGDP	2.2805	-0.3009	0.7228
LFD	-0.4682	-0.6717	0.6245
LCPI	-0.2496	0.6908	0.7317
LTOP	0.6294	0.0603	0.7018
ΔLGINI	-6.8167	-1.7832	0.1310
ΔLPGDP	-3.9110	-3.9886	0.4758
ΔLFD	-6.1076	-6.2250	0.0713
ΔLCPI	-3.4613	-3.0492	0.1638
ΔLTOP	-5.9279	-3.5215	0.2319

Note: L denotes the natural logarithm of the variable and Δ denotes the first difference of the series.

Table 5.1.2: Stationarity Test of the Variables: Ng-Perron Test (With trend ant constant)

	MZa	MZt	MSB	MPT
LGINI	-13.5648	-2.5050	0.1847	7.2648
LPGDP	-6.7259	-1.5710	0.2336	4.4761
LFD	-0.8805	-0.4223	0.4796	15.3017
LCPI	-5.7305	-1.6925	0.2954	15.9012
LTOP	-0.1798	-0.0885	0.4923	18.0610
ΔLGINI	-19.6700	-3.1198	0.1586	4.7299
ΔLPGDP	-13.5068	-2.5486	0.1887	2.0030
ΔLFD	-27.5160	-3.7023	0.1346	3.3511
ΔLCPI	-26.9696	-3.6718	0.1362	3.3807
ΔLTOP	-13.9672	-2.6182	0.1875	6.6621

Note: L denotes the natural logarithm of the variable and Δ denotes the first difference of the series

Before estimating the ARDL model, we examine the causal nexus between financial development variables with income inequality parameter. The Granger (1969) causality test results (Table – 5.1.3) shows one-way causality running from LCREDIT, LFD, LCPI, LPGDP and LTOP to LGINI, was observed implying that bank-based financial deepening, inflation, trade and economic growth indicators leads to income inequality, and not the *vice-versa*. This finding is well expected in developing economies like India. However, no evidence of causality was found between market-based financial deepening and inequality. This could be due to the

fact that the measure of market-based financial deepening is partial in nature as it has considered the market capitalization of Bombay Stock Exchange Limited (BSE) only due to non-availability of data for other stock exchanges. This measure also suffers from the limitation of excluding funds raised in the primary segment of the capital market due to non-availability of data for the entire period.

Table 5.1.3: Granger Causality Results

Null Hypothesis:	F-Statistic	Prob.
LGINI does not Granger Cause LCREDIT	2.37872	0.1142
LCREDIT does not Granger Cause LGINI	2.65836*	0.0906
LGINI does not Granger Cause LFD	1.36104	0.2755
LFD does not Granger Cause LGINI	2.59943*	0.0998
LTRADE does not Granger Cause LGINI	2.94012*	0.0721
LGINI does not Granger Cause LTRADE	1.86500	0.1767
LPRGDP does not Granger Cause LGINI	4.40747**	0.0234
LGINI does not Granger Cause LPRGDP	1.20935	0.3159
LMCAP does not Granger Cause LGINI	0.61440	0.5493
LGINI does not Granger Cause LMCAP	1.74209	0.1966
LCPI does not Granger Cause LGINI	4.29720**	0.0254
LGINI does not Granger Cause LCPI	1.63802	0.2154

Note: Granger causality tests are based on one lag with I (0) series. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

The paper estimates the ARDL bound test approach to co-integration. We used SIC to select a minimum lag order of 2 for conditional ARDL-VECM. By applying, the procedure in OLS regression for the first difference part of the equation (3) and then test for the joint significance of the parameters of the lagged level variables when added to the first regression. The F-Statistics test the joint Null hypothesis that the coefficients of lagged level variables are zero. Table 5.1.4, reports the result of the calculated F-Statistics & diagnostic tests. The calculated F-Statistics is, which is more than UCB either at 1% (Pearson (2001) or 5% for (Naryaran (2005) and Turner (2006)). Thus the Null Hypothesis of no co-integration is rejected, implying long run co-integrating relationship amongst the series of financial development and inequality. The estimated statistics show that the model specification seems to pass all diagnostic tests successfully.

Table 5.1.4: ARDL Bounds test

Panel I: Bounds testing to co-integration:

Estimated Equation : *LGINI = F (LFD, LPGDP, LCPI, LTOP)*

Optimal lag : 2

F – Statistics : 5.1375

Panel II: Diagnostic Tests:

Normality J-B value	: 0.2616 (0.8686)
Serial Correlation LM Test	: 0.6652 (0.5287)
Heteroscedasticity Test (ARCH)	: 0.4202 (0.6618)
Ramsey Reset Test	: 1.4850 (0.5710)

Note: Values in the parentheses (#) are t-values.

Once we established that a long run co-integrating relationship exists, equation 4 was estimated using ARDL (1, 0, 0, 0) specification. The coefficient of financial development is positive, but not significant. This implies that the growth of the financial sector has not contributed in the reduction income inequality among people. This may be due to fact that the growths of financial instruments are accessible to the poor and rich people not getting the benefit of financial growth of the country. The findings are consistent with Dollar & Kraay (2003), Calderon & Serven (2003), Roine et al (2009), Keppel (2010) and Wahid et al (2010). But contrast with Barrow (2000), Li & Zoa (2002), Clarke et al (2007), Motonishi (2006), Demirglic-Kunt & Levine (2008), Ang (2010) and Shahbaz & Islam (2011).

The growth in GDP has positive impact on inequality and it's significant at the 1 % level. For India 1% increase in initial real per capita GDP leads to deterioration of income distribution by 20% on an average. An implication of this is that the fruits of financial development and growth tend to be concentrated in the heads of the rich people. This result is consistence with Shahbaz (2010) and Shahbaz & Islam (2011). Considering the impact of trade openness (Sum of imports and exports as a share of GDP), it is significant at 5% and has negative impact on inequality. A 1% rise in trade openness decreases income inequality by 12%. This finding supports the view that trade openness decreases income inequality in developing economies, which has relatively

more primary education, human resource compared to developed countries (Topalova, 2007). This also explains and supports the H. O. Theory predicts that inequality increases in capitalist abundant countries, while decreases in labor abundance countries when they are faced with trade openness (Wood, 2003). Hence, trade ameliorates not accentuates, diminishes not deepens poverty in middle income group countries like India

Table 5.1.5: Estimated Long Run Coefficients using ARDL Approach (Dependent variable: LGINI)

Regressor	Model I			Model II		
	Coefficient	t- values	Prob.	Coefficient	t-values	Prob.
LPGDP	0.208***	(3.0764)	0.0050	0.1733*	(2.8071)	0.0105
LFD	.0302	(1.0076)	0.3240	0.0175	(.6634)	0.5130
LFD^2	….			0.01508	(1.0076)	0.3240
LCPI	0.0433*	(1.6945)	0.1034	0.0417*	(1.6798)	0.1050
LTOP	-0.1219**	(-2.1695)	0.0410	(-0.1219)**	(-2.1695)	0.0410
CONS	-2.296***	(-8.7571)	0.0000	(-2.1359)***	(-9.2966)	0.0000
Robustness Indicators						
R^2	0.919			R^2	0.929	
Adjusted R^2	0.9014			Adjusted R^2	0.9191	
F Statistics	52.1966			F Statistics	73.0578	
D.W. Stat	1.7734			D.W. Stat	1.9097	
Serial Correlation,	F = 0 .2604	[0.873]		Serial Correlation,	F = 0.002	[0.978]
Heteroskedasticity,	F=0.8448	[0.366]		Heteroskedasticity,	F=0.0642	[0.802]
Ramsey reset test,	F=1.0605	[0.748]		Ramsey reset test,	F= 1.0012	[0.972]

Note: Figures in (#) parentheses are estimated t-values and values in [#] parentheses are estimated p-values . *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

Table 5.1.6, shows that inflation in the economy increases income inequality. The estimated coefficient reveals that a 1% rise in prices increases inequality by 4%. The coefficient is significant at the 10 % level. This finding tend to support the hypothesis of Clarke et al (2002) that inflation rate conjecturing that monetary instability hurts the poor and middle class relatively more than rich, because the latter have better access to financial instruments that allow them to hedge their exposure to the inflation. The finding also supports the view of Easterly and Fisher (2001) that high income tends to lower the share of the bottom quantile and the real minimum wage while tending to increase the poverty. A similar result, on the effect of inflation on the per

capita income of the poor has been found by Romer & Romer (1998) and Agenor (1998). However the finding is in contrast with Shabaz et al. (2010), Ang (2010) and Tiwari et al (2013)

Table 5.1.6: Estimated Short Run Coefficients using ARDL Approach (Dependent variable: ΔLGINI)

Regressor	Coefficient	T - Ratio	Prob. Values
ΔLPGDP	0.173	2.907*	0.0100
ΔLFD	0.0157	0.6743	0.5130
ΔLCPI	0.0417	1.6798*	0.1060
ΔLTOP	-0.0819	-1.892	0.0710
ΔCONS	-2.136	-9.2966	0.0011
ECM t-1	-0.3629	-3.5298	0.0021
Robustness Indicators			
R^2	0.5111	Adjusted R^2	0.4328
D.W. Stat	1.9079	F Statistics	5.2268
SE regression	0.00872	LL Equation	79.5693
RSS	0.00872	AIC	77.5693

Note: (1) R.S.S, LL and DW are respectively residual sum of squares, log Likelihood and Durbin Watson.
(2) Figures in parentheses are estimated t-values. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

We now report the results of the test of GJ (1990) Hypothesis of inverted U-shaped relationship between financial development and income inequality for India. The coefficient of financial deepening (FD) and its square (FD^2) both have positive signs but are statistically insignificant. Thus the study failed to provide support in favor of the GJ hypothesis. This may be due to the fact that financial development and inequality need to interact more in future before any meaningful result can emerge. The non linear relationship was not found for China (Liang, 2006); for India (Ang, 2010); for Pakistan (Shahbaz and Islam, 2011). But Clarke et al. (2007) found support for GJ hypothesis using cross sectional data for developing countries. The diagnostic tests show that residual in both the models are normally distributed with no evidence of serial correlation. The heteroscedasticity seems to be absent and both the models are well specified as shown by Ramsey F- statistics in table 7.

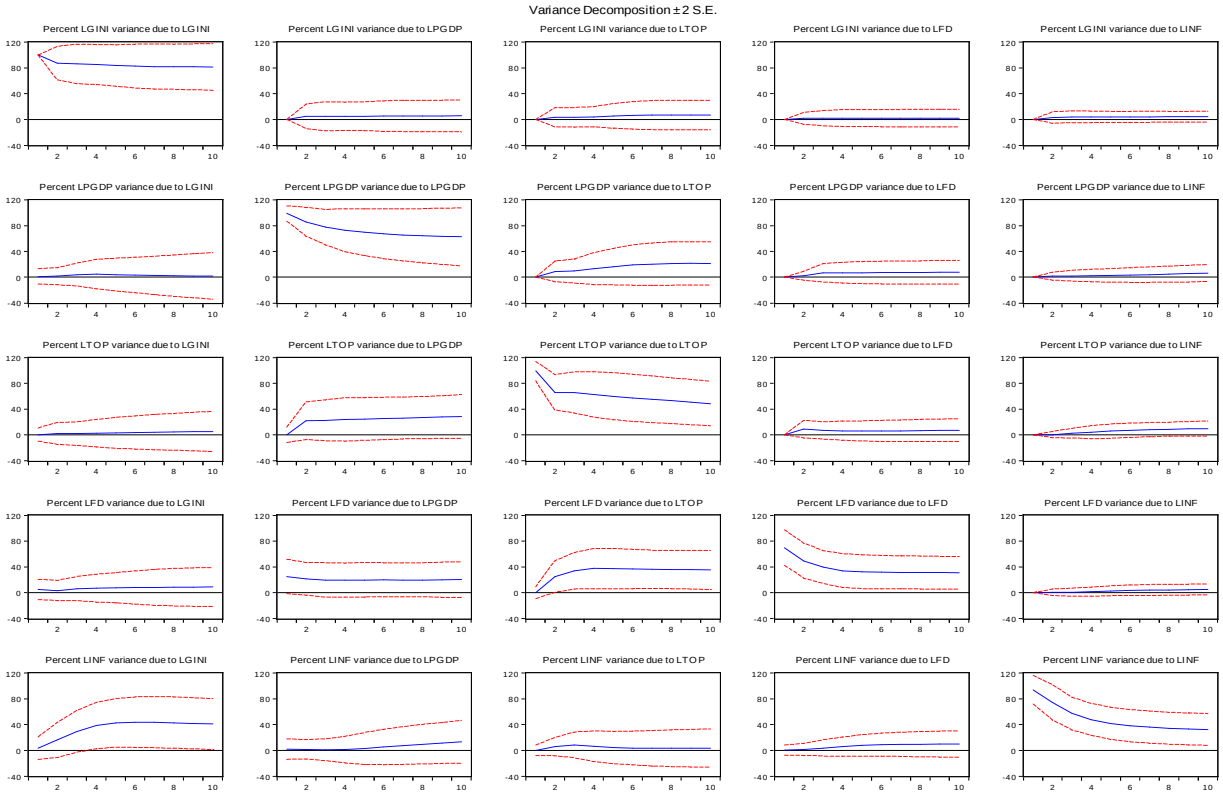
The results of short run dynamics using the ECM version of ARDL are reported in table 5.1.7. The signs of the short run dynamics are maintained to the long run. Hence, also like the long run

results, economic growth and inflation widen the income inequality. Trade openness decreases the income inequality in our findings. The short run adjustment process is examined from the ECM coefficient. The coefficient lies between 0 and -1, the equilibrium is convergent to the long run equilibrium path, is response to any external shocks. However, if the value is positive, the equilibrium will be divergent from the reported values of ECM test, we found that the $ECM_{t-1.}$ Term is -0.36 and is significant at 1%, again confirming the existence of co-integration that the derivation from the long run equilibrium path is corrected 36% per year.

Table 5.1.7: Variance Decomposition of LGINI

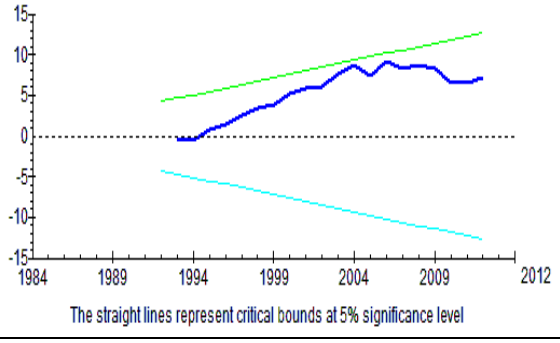
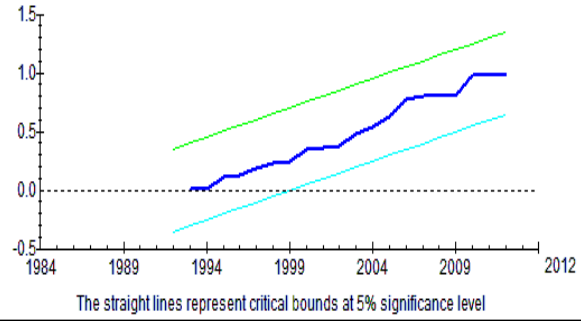
Period	S.E.	LGINI	LPGDP	LFD	LINF	LTOP
1	0.051770	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.057904	87.29225	4.699435	1.597165	3.153006	3.258140
3	0.059254	86.04586	4.834131	1.811477	4.096481	3.212052
4	0.059988	84.99584	4.990754	1.940468	4.147801	3.925136
5	0.060727	83.51477	5.123600	1.950073	4.048581	5.362976
6	0.061095	82.55759	5.207738	1.933655	4.035067	6.265951
7	0.061315	81.97005	5.291077	1.923156	4.111076	6.704642
8	0.061456	81.63673	5.370109	1.925972	4.247799	6.819386
9	0.061575	81.40546	5.431770	1.939849	4.401364	6.821555
10	0.061699	81.19725	5.492298	1.967559	4.544885	6.798011

Figure 5.1.1: Variance Decoposition±2SE



The robustness of the short run result are investigated with the help of diagnostic and stability tests. The ARDL-VECM model passes the diagnostic against serial correlation, functional mis-specification and non-normal error. The cumulative sum (CUSUM) and the cumulative sum of square (CUSUMSQ) tests have been employed in the present study to investigate the stability of a long run and short run parameters. The cumulative sum (CUSUM) and the cumulative sum of square (CUSUMSQ) plots (Figure 5.1.2) are between critical boundaries at 5% level of significance. This confirms the stability property of a long run and short run parameters which have an impact on the income inequality in the case of India. This confirms that models seem to be steady and specified appropriate.

Figure 5.1.2: Plots of Stability Test

Plot of Cumulative Sum of Recursive Residuals	Plot of Cumulative Sum of Square of Recursive Residuals
	

5.1.6 Summary and Conclusions

The present paper examined the presence of the long run relationship between financial development and income inequality in India using ARDL bounds testing co-integration and error correction model (ECM) for short run dynamics. Further, the paper also tests the existence of the Greenwood-Jovanovich (GJ) hypothesis between financial development and income inequality on the annual time series data covering the period from 1982-2012. The study makes use of ADF, DF-GLS, KPSS and Ng-Perron unit root tests to check the stationarity property of the series. The test statistics of the unit root suggest that all the variables included in the study are stationary in their first differences, so they are I (1). The bounds test confirms that the estimated equation and the series are co-integrated. The ARDL results suggest that financial development in India does not help in the reduction of income inequality rather it widens the gap between poor and rich. Further economic growth has led to the deterioration of the income inequality, as is also true in case of inflation. Whereas trade openness lowers the income inequality as workers get better job opportunities with trade liberalization in the economy. The results from non-linear specification do not support the GJ hypothesis in India. This may be due to underdeveloped financial markets and yet to reach maturity to trigger the onset of inverted U-Shaped relationship between financial development and income inequality, this result supports Ang (2010).

Our evidence suggests that the present financial development hurts the poor and benefits the rich, results in widening the gap between poor and rich. So we should subscribe the policies that help

the poor exposed to better opportunities of financial growth. This can be done by following financial inclusion path by (1) increase in the bank branch network, (2) increase in bank and credit penetration in rural India and (3) ensuring financial inclusion of the poor. The availability of banking facilities, strong bank branch network and financial inclusion of the poor are the major facilitators of developmental and expansionary activities. In turn, the economic agents will facilitate in growth, development, investment, employment generation & infrastructure development (N. Kumar, 2013). So the development of financial sector should receive proper attention of policy makers for long run sustained inclusive growth. While the main objective of macroeconomic policy is to promote economic growth, attain price stability, generate employment; it is equally important to ensure the equality of income distribution, reduction of poverty and ensure proper implementation of the policies. The financial sector reforms should be taken carefully to avoid financial instability and crisis. The financial institution should be allowed to operate without much regulation and political control. Economic decisions should be taken based on economic principle to attain inclusive growth in India.

Notes:

[1] The ratio of private sector credit to GDP is used as the indicator of bank based financial development and the ratio of Market Capitalization to GDP is used as a market based indicator of financial development. The sum of these two indicators is used as a broad indicator of financial development (FD) See Levine, 1992; Demirguc-Kunt and Levine, 1999; Khan and Senhadji, 2000; Levine, 2004; Shahbaz et al, 2008; Shahbaz 2009).

[2] Gini Coefficient is used extensively to represent a proxy for income inequality of any economy. Ang (2010) has used it for India, Shahbaz and Islam (2011) used for Pakistan in the context of financial development & income inequality relationship.

[3] CPI is preferred over WPI in measuring inflation for majorities of studies. There are different CPIs for industrial workers CPI, Agricultural worker CPI, and rural labor CPI. For our analysis, we have used composite index of CPI constructed by the World Bank.

[4] The study limits to the starting period as 1982-83 due to the non-availability of data on stock market capitalization prior to this period.

5.2 Financial development, economic growth and Poverty reduction

5.2.1 Introduction

There has been a growing emphasis from empirical works on the relationship between financial development and economic growth since the early 19th century. Financial development is considered to be a vital component in economic growth (Spears, 1992; King and Levine, 1993; Jalilian and Kirkpatrick, 2002; Abu-Bader and Abu-Qarn, 2008). It is found that a well functioning financial market contributes to economic growth by promoting efficient credit allocation, mobilizing savings, risk management. However, this close relationship between finance and growth does not imply that every income class is getting benefitted from this economic growth. There are conflicting predictions about the relationship between financial development and poverty. Some studies argue that a sound financial system reduces risk through diversified investment in financial intermediaries, lowers the transaction costs of these intermediaries through information generation and improves capital accumulation. Additionally, it also eliminates credit limitations on the poor, increases their participation and productive assets; thus, leads to poverty reduction. Other theories suggest that there are significant imperfections in the financial market, resulting, from asymmetric information, and then the contribution which the financial sector makes to economic growth is impaired (Stiglitz, 1998, 2000). Because of credit market imperfections only rich people will get the benefits of growth in financial markets, which will lead to the unequal distribution of income and wealth (Beck et. al. 2000). To date, there has been no universal consensus on the relationship between financial development and poverty.

Despite several attempts to empirically investigate the relationship between financial development and economic growth, very few studies have attempted to empirically estimate the causal link between financial development and poverty reduction (Dollar and Kraay, 2002; Honohan, 2004; Beck, 2004; Odhiambo, 2009, 2010a, 2010b). Further, the relationship between financial development and growth and the impact of financial development on poverty are interrelated to each other because there are theories and evidences which suggest that financial development can affect poverty by both indirectly, through its impact on growth (Levine, 1997; Kirkpatrick, 2002) and more directly, through expanding the access to financial services for the poor (Banerjee and Newman, 1993; Aghion and Bolton, 1997). In addition, the majorities of the

studies are mainly based on the estimation in a bivariate setting and hence suffer from the omission of variable bias (Odhiambo, 2010a). It is against this background, the present study attempts to investigate the dynamic linkage between financial development and poverty reduction in India in a multivariate setting by incorporating income and inflation as the intermittent variables.

In the above situation, the main objective of the present study is to examine the relationship between financial sector development and poverty reduction in India by using annual data from 1970-2013. The paper attempts to answer the critical question; whether financial sector development in India leads to poverty reduction or not. For this purpose, the study uses two proxies of financial development, namely broad money supply to GDP ratio (M3) and domestic credit to the private sector as a ratio of gross domestic product (CREDIT). The study uses per capita consumption as a proxy for poverty reduction (POV). The current study uses Auto Regressive Distributed Lag (ARDL) bound testing approach to co-integration to examine the long-run relationship, Error Correction Mechanism (ECM) for testing the short-run dynamics. The study also uses Granger's causality test to check the direction of causality of the variables. The rest of the study is structured as follows: Section 5.2.2 gives an overview of the empirical studies. Section 5.2.3 provides dataset, variables and model specifications while section 5.2.4 describes the methodology. Section 5.2.5 discusses the empirical results. Section 5.2.6 concludes the study.

5.2.2 Literature review of the empirical studies

Recently, there have been an increasing number of empirical analyses on the relationship between financial development and poverty reduction, including several studies (Beck et al., 2004; Honohan, 2004; Jalilian and Kirkpatrick, 2005; Beck et. al., 2007; Jeanneney and Kpodar, 2008). Banerjee & Newman (1993) and Galor and Zeira (1993) argued that imperfections in financial markets create hurdles to borrow funds for income-enhancing investments. As only the rich are able to overcome these hurdles, they affect the initial distribution of wealth.

From the perspective of Cross sectional studies**,** Honohan (2004) investigated the association between financial depth, as measured by private credit, and the poverty ratio using cross-country data available for more than 70 developing countries. He concluded that financial depth is

negatively associated with the headcount ratio. While examining the contribution of the financial sector development in the reduction of poverty for the developing countries

The time series studies include: By using a sample of 26 countries, including 18 developing countries, Jalilian & Kirkpatrick (2001) examined the link between financial development and poverty. They used Bank Deposit Money Assets, and Net Foreign Assets as their measures of financial sector development. Their empirical results suggest that a 1 percent change in financial development raises growth in the incomes of the poor in developing countries by almost 0.4 per cent – a significant impact. Beck et al. (2004), used data on 52 developing and developed countries over the period 1960-99 to assess a direct relationship between financial development and poverty reduction, found that the income of the poorest 20 per cent of the population grows faster than the average GDP per capita in countries with higher financial development. By using time-series data from the World Development Indicators from 1970-2001 in Ghana, Quartey (2005) provided two main findings. First, financial sector development does not Granger-cause savings mobilization while it encourages poverty reduction. Second is that the effect of financial sector development on poverty reduction is positive, but insignificant because financial intermediaries have not adequately channelled savings to the pro-poor sectors of the economy.

Odhiambo (2009) examined the dynamic causal relationship between financial development, economic growth and poverty reduction in South Africa over the period 1960–2006 by employing a trivariate causality test based on an error correction model. The empirical results of the Granger-causality test indicate that financial development and economic growth cause an increase in per capita consumption.

Odhiambo (2010a) while examining the inter-temporal causal relationship between financial sector development and poverty reduction in Kenya used a tri-variate causality model by including saving rate as an intermittent variable. The study finds a distinct causal flow running from financial development to poverty, both in the short-run and in the long - run. Odhiambo (2010b) analyzed the causal relationship between financial development and poverty alleviation in Zambia from 1969 to 2006 by using ARDL method and reported that the financial

development seems to cause poverty reduction when private credit and domestic money bank assets are used, while the reverse causality is found when M2/GDP is used.

The panel data studies include; De Janvry and Sadoulet (2000) used a panel of 12 countries in Latin American over the period 1970 to 1994 and investigated the impact of economic growth on poverty reduction. They found that although economic growth has reduced rural and urban poverty on average, the negative impact of recessions has been stronger than the positive impact. Jeanneney and Kpodar (2008) used panel data for 75 developing countries from 1966 to 1999, by applying GMM techniques to evaluate how financial development helps to reduce poverty directly and also indirectly through economic growth. The study concluded that financial development measured by M3/GDP has a significant positive relationship with the mean income of the poor, which is the direct effect of financial development on poverty reduction. The direct effect is stronger than the indirect effect. Jalilian and Kirkpatrick (2005) found that there exists a positive relationship between financial sector development and poverty reduction, a unit of change in financial development improves the income growth prospects of the poor by almost 0.3%. The empirical findings suggested that, up to a threshold level of economic development, financial sector growth contributes to poverty reduction through the growth enhancing effect. They covered 42 countries, including 26 developing and 16 developed countries with time span 1960–95.

Beck et al. (2007), employed generalized-methods-of-moments (GMM) panel estimator for a panel of countries over the period 1960-2005. They found that financial development reduces income disparity and also reduces poverty by boosting the incomes of the poor. Akhter Selim, Yiyang Liu (2010) investigated the relationship between financial development and poverty by using a fixed effect vector decomposition (FEVD) model. They concluded that financial development is conducive for poverty reduction while the instability in financial markets is unfavorable to the poor. Jeanneney and Kpodar (2011) used a sample of developing countries (in contrast to that of the Dollar and Kraay (2002) and Beck et al. (2007)) from 1966 through 2000 by employing OLS and GMM. They argued that financial development is pro-poor. The direct effect found stronger than the indirect effect through economic growth. Poor people benefit from the ability of the banking system to facilitate transactions and provide savings

opportunities (through the McKinnon 'conduit effect') but to some extent fail to collect the benefit from greater availability of credit. Additionally, financial instability hurts the poor and partially counteracts the benefit of financial development.

Inoue and Hamori (2011) analyzed the role of financial development in poverty reduction in India. The study used the unbalanced panel data for 28 Indian states and union territories covering seven time periods (1973, 1977, 1983, 1987, 1993, 1999 and 2004) by employing GMM estimates. The study concluded that financial deepening significantly reduces poverty, controlling for international openness, inflation rate and economic growth. Besides this direct impact, financial development can also indirectly contribute to poverty reduction through its impact on economic growth (World Bank, 2001b).

5.2.3 Dataset, variables and Model specification

Data and Variable identification:

In the empirical analysis, the chapter uses annual time series data for the period 1970-2013.

Poverty: The study uses per capita consumption expenditure as a proxy for poverty reduction (LPOV) variable because consumption expenditure among the poor is usually more reliably reported and more stable than income (Ravallion, 1992; Quartey, 2005; Odhiambo, 2009, Odhiambo, 2010a). This measure is consistent with the World Bank's definition of poverty as "the inability to attain a minimal standard of living" measured in terms of basic consumption needs (World Bank, 1990).

Financial Development: For financial development, two proxy variables are used; (1) (LCREDIT) is defined as domestic credit to the private sector as a share of GDP is used as the broad indicator of financial development (Khan and Senhadji, 2000; Levine, Loayza and Beck, 2000; Boyd et al, 2001 and Levine, 2004; Honohan, 2004) and (2) (LM3) is measured as the ratio of broad money stock (M3) to nominal GDP, which is often called the monetization variable of financial development (McKinnon Shaw, 1973; and King and Levine, 1993; Odhiambo, 2008; Jeanneney and Kpodar, 2008). It shows the real size of the financial sector of a growing economy.

Economic growth: The economic growth is measured by per capita real GDP (LPGDP) (Honohan, 2004; Jalilian and Kirkpatrick, 2005; Beck et al, 2007).

Control variable: To capture the macroeconomic stability, India's Consumer price index is used as a proxy variable (INF) because the high rate of inflation is considered to have a disproportionately negative impact on the poor because the poor have relatively limited access to financial instruments that hedge against inflation (Romer and Romer, 1998; Easterly and Fischer, 2001). All the variables are taken in their natural logarithm.

The data used has been obtained from different sources, including Handbook of Statistics on Indian Economy published by the Reserve Bank of India, National Sample Survey Organization (NSSO) and a database of the World Bank.

Model Specification

The used model equation is given below:

$$LPOV = F\ (LFD, LPGDP, LINF) \qquad \ldots\ldots (1)$$

Where, LPOV is per capita consumption expenditure as a proxy for poverty reduction, LFD represents financial development variable, LPGDP is the per capita gross domestic product (PGDP), LINF is a consumer price Index and L implies that the variables have been transformed in natural logs.

We have made two models to estimate the effect of financial development on per capita expenditure, they are given below. In model A and B, all the variables are same except the proxy variable of financial development. In model A, domestic credit to the private sector as a share of GDP (CREDIT) is used as a proxy for financial development and in model B, it is replaced with the ratio of broad money to GDP (LM3).

Model A: LPOV = f (LCREDIT, LPGDP, LINF)
Model B: LPOV = f (LM3, LPGDP, LINF)

5.2.4 Methodology

Co-integration with ARDL

In this study, the recently developed ARDL-bounds testing approach is used to examine the long-run co-integration relationship between each proxies of financial development and poverty reduction variable. The ARDL modelling approach was originally developed by Pesaran and Shin (1995, 1999), Pesaran, et al. (1996), and Pesaran and Pesaran (1997); later extended by Pesaran et al. (2001). This method is employed because of the superiority of the ARDL approach on other co-integration techniques (As discussed earlier in Chapter 3.1). In this paper the ARDL approach to co-integration estimates the following unrestricted error correction model (UECM) regression

$$\Delta LPOV_t = \delta_1 T + \delta_2 (LCREDIT)_{t-1} + \delta_3 LPGDP_{t-1} + \delta_4 LCPI_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta LPOV_{t-i} + \sum_{i=1}^{q} \beta_i \Delta (LCREDIT)_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LCPI_{t-i} + \varepsilon_t \quad \ldots. (1)$$

$$\Delta (LCREDIT)_t = \delta_1 T + \delta_2 LPOV_{t-1} + \delta_3 LPGDP_{t-1} + \delta_4 LCPI_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta (LCREDIT)_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LPOV_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LCPI_{t-i} + \varepsilon_t \quad \ldots. (2)$$

$$\Delta LPOV_t = \delta_1 T + \delta_2 L(M3)_{t-1} + \delta_3 LPGDP_{t-1} + \delta_4 LCPI_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta POV_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LM3/GDP_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LCPI_{t-i} + \varepsilon_t \quad \ldots. (3)$$

$$\Delta LM3_t = \delta_1 T + \delta_2 POV_{t-1} + \delta_3 LPGDP_{t-1} + \delta_4 LCPI_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta LM3_{t-i} + \sum_{i=1}^{q} \beta_i \Delta POV_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LPGDP_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LCPI_{t-i} + \varepsilon_t \quad \ldots. (4)$$

Where the series are as defined earlier and T is time trend and L implies that the variables have been transformed in natural logs. The first part of the equation (3-6) with δ_2, δ_3, and δ_4 refer to the long run coefficients and the second part with α, β, μ, σ refers to the short run coefficients.

The null hypothesis of no co-integration $H_0: \delta_2 = \delta_3 = \delta_4 = 0$ and the alternative hypothesis $H_1: \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$ implies co-integration among the series (equation 1-4).

The first step in the ARDL test is to estimate equation (1-4) by OLS in order to test for existence of a long run relationship among variables by conducting an F-test (Wald test). Then in the second step, once the co-integration is established the conditional ARDL long run model for $LPOV_t$ can be estimated. This involves selection of the orders of ARDL (q, q_1, q_2, q_3) models using AIC. The third and final step involves estimation of short run dynamics. For short run behavior of the variables, we use error correction version of the ARDL model as follows:

$$\Delta LPOV_t = \mu + \sum_{i=1}^{q} \alpha_i \, \Delta LPOV_{t-i} + \sum_{i=1}^{q_1} \beta_i \, \Delta (LCREDIT)_{t-i} + \sum_{i=1}^{q_2} \theta_i \, \Delta LCPI_{t-i} + \sum_{i=1}^{q_2} \sigma_i \, \Delta LCPI_{t-i} + \sum_{i=1}^{q} \mu_i \, \Delta LPGDP_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad \ldots.(5)$$

$$\Delta LPOV_t = \mu + \sum_{i=1}^{q} \alpha_i \, \Delta LPOV_{t-i} + \sum_{i=1}^{q} \beta_i \, \Delta LM3_{t-i} + \sum_{i=1}^{q_2} \theta_i \, \Delta LCPI_{t-i} + \sum_{i=1}^{q_2} \sigma_i \, \Delta LCPI_{t-i} + \sum_{i=1}^{q} \mu_i \, \Delta LPGDP_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad \ldots.. (6)$$

Where $\alpha, \beta, \theta, \mu, \sigma$ are short run dynamic coefficient to equilibrium and ϕ is the speed adjustment coefficient. To ascertain the goodness of fit of the ARDL model, diagnostic and stability tests are conducted. The stability test is conducted by employing the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ).

Granger non-causality Test:

To complement the above, we have also carried out Granger non-causality test developed by Toda and Yamamoto (1995) which is valid regardless of whether series is I (0), I (1) or I (2), non co-integrated or co-integrated of any arbitrary order. Hence, to estimate the causality between two proxies of financial development and poverty reduction, the study uses following models. (Odhiambo, 2009).

Model A- Domestic credit to the private sector (% GDP) and Poverty Reduction

$$\Delta LPOV_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LPOV_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta(LCREDIT)_{t-i} + ECM_{t-1} + \mu_t \quad \ldots. (7)$$

$$\Delta LCREDIT_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta(LCREDIT)_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LPOV_{t-i} + ECM_{t-1} + \mu_t \quad \ldots..(8)$$

Model B- Monetization variable (% GDP) and Poverty Reduction

$$\Delta LPOV_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LPOV_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LM3_{t-i} + ECM_{t-1} + \mu_t \quad \ldots.. (9)$$

$$\Delta LM3/GDP_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LM3_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LPOV_{t-i} + ECM_{t-1} + \mu_t \quad \ldots.. (10)$$

Where: ECM_{t-1} = lagged error-correction term obtained from the ARDL model estimation.

Although the existence of a long run relationship between the proxies of financial development, economic growth, inflation and poverty suggests that there must be granger causality in at least one direction, it does not indicate the direction of temporal causality between the financial development and poverty variables. The direction of the causality in this case can only be determined by F statistics and lagged error correction term. While the t-statistics on the coefficient of the lagged error correction term represents a long run causal relationship, the F-statistics for the explanatory variable represents the short run causal effects. (Odhiambo, 2009; Narayan and Smyth, 2006). It should, however, be noted that even though the error correction term has been incorporated in all the equation (7-10), only equation where the null hypothesis of no co-integration is rejected will be estimated with an error correction term.

5. 2.5 Empirical Results

Before we conduct tests for co-integration, we have to make sure that the variables under consideration are not integrated at an order higher than one. Thus, to test the integration properties of the series, we have used Ng-Perron unit root test. The results of the stationarity tests are presented in Table 5.2.1. The results show that all the variables are non-stationary at levels. The next step is to difference the variables once in order to perform stationary tests on

differenced variables. The results show that after differencing the variables once, all the variables were confirmed to be stationary. It is, therefore, worth concluding that all the variables used in this study are integrated of order one i.e. difference stationary I (1). In addition, it is also important to ascertain that the optimal lag order of the underlying equation (1) to (4) is chosen appropriately so that the error terms of the equations are not serially correlated. Consequently, the lag order should be high enough so that the conditional ECM is not subject to over parameterization problems (Narayan, 2005; Pesaran 2001). In this paper we have used Akaike Information Criterion (AIC) to select the optimal lag order and we have also carried out several misspecification tests, including tests of autocorrelation, normality and heteroscedasticity to ensure that the classical regression assumptions were not violated. The results of these tests are presented in Table – 5.2.2.

Table 5.2.1: Unit root test: Ng-Perron Test (With Trend and Intercept)

	MZa	MZt	MSB	MPT
LPOV	0.60054	0.32441	0.54019	72.3082
LCREDIT	-2.74149	-1.15357	0.42078	32.6822
LM3	-12.1769	-2.44117	0.20048	7.62511
LPGDP	-0.23984	-0.12655	0.52764	63.0102
LCPI	-14.2874	-2.66378	0.18644	6.43029
ΔLPOV	-19.4896	-3.06623	0.15733	5.00927
ΔLCREDIT	-19.8231	-3.14709	0.15876	4.60405
ΔLM3	-17.9374	-2.98984	0.16668	5.11006
ΔLPGDP	-19.8374	-3.06851	0.15468	5.07842
ΔLCPI	-35.8634	-4.23395	0.11806	2.54437

Note: Δ denotes the first difference of the series.

Table 5.2.2: Lag Selection Criteria

Lags	AIC	LM	ARCH Test	Jarque Bera	Ramsey's RESET
2	-11.6634	1.5961 (0.146)	0.2541 (0.782)	0.495 (0.785)	1.7434 (0.195)
3	-11.5735	0.9584 (0.432)	0.5814 (0.627)	0.274 (0.871)	1.3954 (0.229)
4	-11.5464	0.9400 (0.455)	0.6712 (0.650)	0.371 (0.827)	0.9761 (0.704)

Note: Values in the parentheses are probability values.

Having established that the series are I (1) and selected the optimum lag length, the next step is to employ the ARDL approach to co-integration in order to determine the long run relationship

among the variables. By applying, the procedure in OLS regression for the first difference part of the equation (1) to (4) and then test for the joint significance of the parameters of the lagged level variables when added to the first regression. The F-Statistics tests the joint Null hypothesis that the coefficients of lagged level variables in the equation (1) to (4) are zero. Table 5.2.3, reports the result of the calculated F-Statistics for all the estimated equations.

Table 5.2.3: ARDL bounds testing procedure, tests of long run procedure

Test Equation	Lags		
	2	3	4
F (LPOV| LCREDIT, LPGDP, LCPI)	4.905*	3.651	2.542
F (LCREDIT| LPOV, LPGDP, LCPI)	0.621	1.510	3.704
F (LPOV| LM3, LPGDP, LCPI)	4.802*	3.090	2.604
F (LM3| LPOV, LPGDP, LCPI)	1.668	1.464	3.225

Note: *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

When the poverty reduction variable was the dependent variable (equation 1 and 3), the calculated F-statistics were 4.905 and 4.802 respectively. Thus the calculated F-statistics turns out to be higher than the upper-bound critical value at the 5 percent level for both the equations. This suggests that there is a co-integrating the relationship between poverty reduction, financial development, economic growth and inflation. The results suggest that the null hypothesis of no-co-integration cannot be rejected for equation (2) and (4).

Since our result of bound test supported the existence of co-integration of equation with poverty reduction as the dependent variable, we estimated the long run coefficients for those two specifications in this study (equation1: Model A and equation 3: Model B). Table – 5 shows a positive and statistically significant relationship between credit to GDP ratio and poverty reduction and 1 percent rise in credit to GDP ratio reduces the poverty by 10 percent. Further, it can be seen from Table – 5.2.4, in addition to the financial development indicator, a positive and significant relationship is also found between economic growth and poverty reduction for both the models. In contrast, inflation is negatively and statically related to poverty reduction. There are evidences that financial development leads economic growth in India which in turn reduces poverty (Ahmed and Ansari, 1998; Kamat and Kamat, 2007). Price instability reduces per capita

consumption expenditure, hence increases poverty. The coefficient of CPI is negative and statistically significant in both the models (at 10%).

Table 5.2.4: Long Run estimates, dependent variable is LPOV

	(Model A)		(Model B)	
LCREDIT	0.1083**	(2.2825)	----	
LM3	----		0.1150	(1.1170)
LPGDP	0.9475***	(19.1520)	0.9821***	(11.7636)
LCPI	-0.1282*	(-1.6335)	-0.2713*	(-1.7260)
TREND	0.00251	(0.3829)	0.01341	(1.2205)
Robustness Indicators				
R^2	0.99937		R^2	0.99930	
Adjusted R^2	0.99921		Adjusted R^2	0.9991	
F Statistics	6516.1	[0.000]	F Statistics	5876.0	[0.000]
D.W. Stat	2.3806		D.W. Stat	2.3492	
Serial Correlation,	F = 1.9450	[0.173]	Serial Correlation,	F = 1.6250	[0.212]
Heteroscedasticity,	F=.51065	[0.479]	Heteroscedasticity,	F=1.6352	[0.208]
Ramsey Test	F=.064843	[0.801]	Ramsey Test	F=1.3692	[0.251]

Note: Figures in parentheses (#) and [#] are estimated t-values and p-values respectively. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

Table 5.2.5: Error Correction representation for the selected ARDL Model, dependent variable is ΔLPOV

Regressor	**ARDL (2, 2, 2, 0)**			
	Equation 5 (Model A)		**Equation 6 (Model B)**	
ΔLCREDIT	-0.0555	(-1.6232)	-----	
ΔLM3	-----		0.02278	(0.9775)
ΔLPGDP	0.7042***	(0.0000)	0.7034***	(10.012)
ΔLCPI	-0.0385*	(-1.8210)	-0.0537***	(-2.950)
ΔTREND	0.7567E-3	(0.4225)	0.0026**	(2.0047)
ECM_{t-1}	-0.3007**	(-2.9456)	-0.1980**	(-2.1885)
Robustness Indicators				
R^2	0.89697		R^2	0.8857	
Adjusted R^2	0.87199		Adjusted R^2	0.85806	
D.W. Stat	2.3806		D.W. Stat	2.3492	
SE regression	0.010044		SE regression	0.0105	
RSS	0.00332		RSS	0.0036	
F-stat.	57.4576	[0.000]	F-stat.	51.1690	[0.000]

Note: Figures in parentheses (#) and [#] are estimated t-values and p-values respectively. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

The short-run relationship of the impact of financial development on poverty reduction is presented in Table – 5.2.5. As can be seen from the table, financial development indicators have an insignificant impact on the poverty reduction in the short run. However, economic growth had a significant and positive impact on the poverty reduction in short-run also. This implies that, the indirect channel is stronger than the direct channel of financial development in poverty reduction in Indian economy. The coefficient on the lagged error-correction terms (-0.19 and -0.30) suggests that once shocked, convergence to equilibrium is relatively rapid. The coefficient implies that a deviation from the equilibrium level of poverty reduction in the current period will be corrected by 20 to 30 percent in the next period and it takes 4 to 5 years to resort to equilibrium.

It is found that there is a long run relationship between [poverty, credit, economic growth and inflation] and [poverty, M3, economic growth and inflation] in model A and model B, the next step is to test for the causality between the variables by incorporating the lagged error-correction term into equation 7 to 10 respectively. The causality in this case is examined through the significance of the coefficient of the lagged error-correction term and joint significance of the lagged differences of the explanatory variables using the Wald test. The results of these causality tests are reported in Table – 5.2.6.

Table 5.2.6: Granger non Causality test

Dependent Variable	Casual Flow	F- Statistic	t- Test on ECM
Model (A)- Poverty Reduction and Domestic Credit to private sector			
Poverty Reduction (LPOV)	Credit (LCREDIT) ⟶ Poverty reduction (LPOV)	3.5347**	-2.946**
Credit (LCREDIT)	Poverty reduction (LPOV)⟶ Credit (LCREDIT)	2.3175	--
Model (B)- Poverty Reduction and Monetization variable			
Poverty Reduction (LPOV)	Monetization variable (LM3) ⟶ Poverty Reduction (LPOV)	7.9091*	-2.188**
Monetization variable (LM3)	Poverty Reduction (LPOV) ⟶ Monetization variable (LM3)	1.2051	--

Note: *, ** and *** indicate significant at 1, 5 and 10 percent level of significance, respectively.

The empirical results are reported in Table – 5.2.6, they show that there is a significant unidirectional causality running from financial development to poverty reduction and is not sensitive to the proxy used to measure financial development. The result applies equally irrespective of whether the causal relationship is tested in the short run or in the long run dynamics. The short-run and long-run unidirectional causality from financial development to poverty reduction in Model A and Model B is supported by F-statistics and the coefficient of the lagged error correction term in, which are statistically significant.

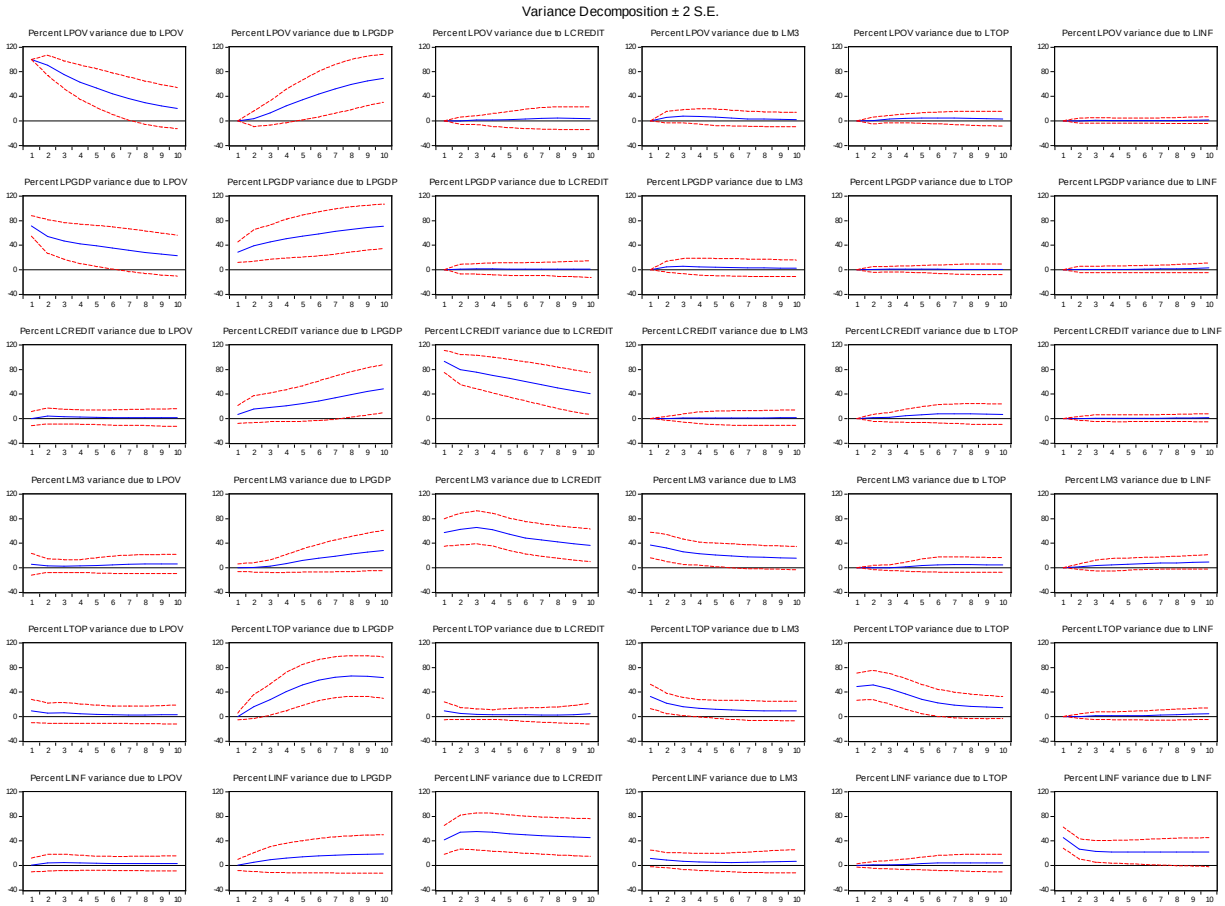
It is not practical to forecast unrestricted VAR in the short term, which is over identifying, though, the aware of prediction errors is essential to clarify the interrelation among variables included in the model. Variance Decomposition is employed for this purpose to divide each variable fluctuated share to react to the shock given to variables, pattern, for this reason we can measure a variable share on other variables changes over time. The results of Variance Decomposition are illustrated in Figure 1, and the table form is presented in table 8. It is specifically mentioned in the results of Variance Decomposition related to LPOV variables.

Based on Table 5.2.7 the LPOV explanatory has increased over the time through financial variable, i.e. LCREDIT as the second year, 0.1175% of poverty reduction variable changes are explained by LCREDIT and this is increased to 2.7649% in the fifth year and in the long run in the tenth, this impact is increased to 3.6373%. If take the case of another financial variable LM3, the LPOV explanatory is 12.3905% of poverty reduction variable changes are explained by in the tenth period. Thus, LM3 variables play the most important role to define human capital variable in Indian economy.

Table 5.2.7: Variance Decomposition of LPOV

Period	S.E.	LPOV	LCREDIT	LM3	LPGDP	LINF
1	0.020987	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.036901	84.76234	0.117551	14.41140	0.174671	0.534044
3	0.050517	86.13967	2.460419	10.46226	0.463909	0.473750
4	0.067083	83.54135	2.246910	11.63512	0.936481	1.640140
5	0.080428	81.41002	2.764942	12.42485	1.007480	2.392714
6	0.093719	80.82963	2.934416	12.24152	1.309951	2.684478
7	0.106138	79.76997	3.011089	12.77882	1.445335	2.994781
8	0.116851	79.52324	3.205539	12.59959	1.565943	3.105689
9	0.127064	79.21462	3.382918	12.51602	1.648867	3.237574
10	0.136363	78.90502	3.637373	12.39057	1.689099	3.377931

Figure 5.2.1: Variance Decoposition±2SE



Stability test

To check the stability, the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests proposed by Brown et al. (1975) have been applied. The results (figure 5.2.2, 5.2.3) suggest parameter consistency under both tests as the plots are within the critical bounds of 5 percent level of significance.

Figure 5.2.2: Stability Test of Model A

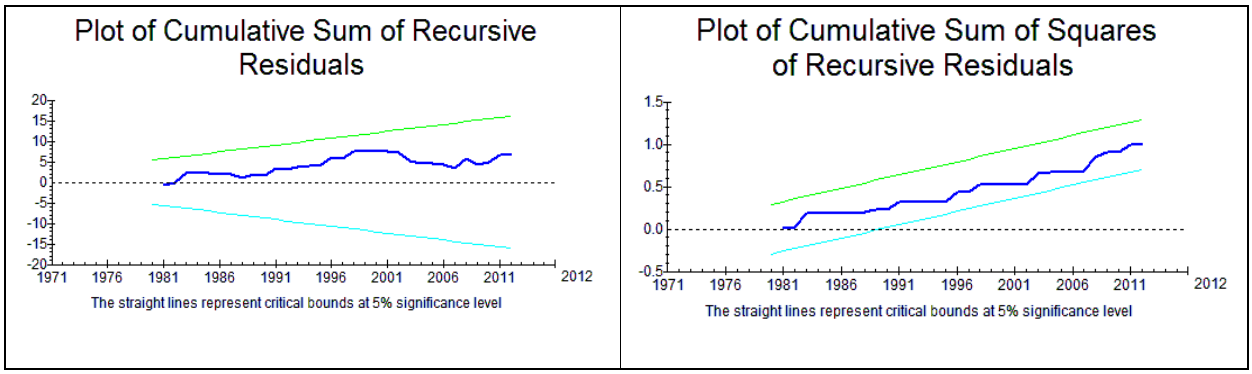
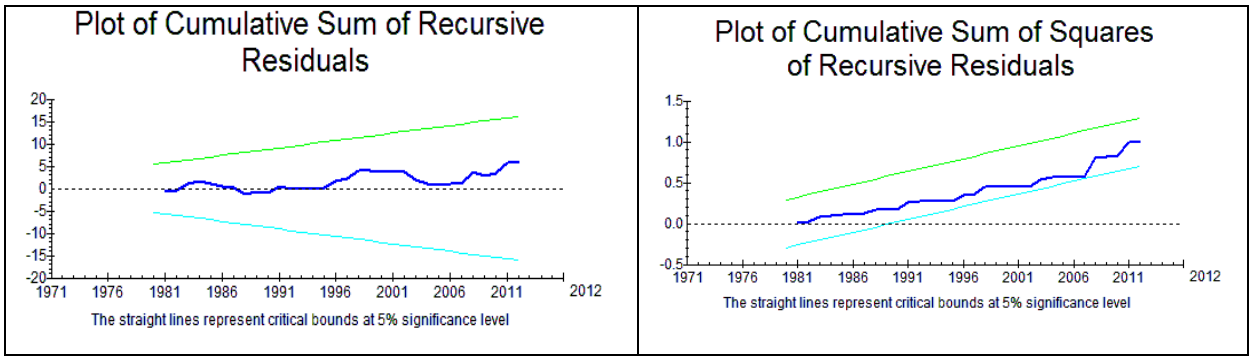


Figure 5.2.3: Stability Test of Model B



5.2.6 Summary and Conclusions

In this paper an attempt is made to test the long run and causal relationship between financial development and poverty reduction in India for the period 1970 – 2012. The present study uses ADF, DF-GLS, KPSS and Ng-Perron test to check the stationarity properties of the variable, ARDL bound testing approach to co-integration to test long-run co-integrating relationship and Granger causality test is used to test causality. The study uses two proxy variables of financial development, (1) CREDIT; domestic credit to the private sector (% GDP) and (2) monetization variable (M3), against per capita consumption, a proxy for poverty reduction. The study attempts to answer one critical question; does financial development lead to poverty reduction in India? In other words, do the benefits that resulted from financial sector development in India trickle down to the poor directly or indirectly?

The empirical results of the study confirmed a long-run co-integrating relationship with causality running from financial development and economic growth to poverty reduction without feedback. There is a positive and unidirectional causality running from financial development to poverty reduction. The results apply irrespective of whether the causality is estimated in the short-run or in the long-run. This implies that poverty in India can be reduced by financial inclusion and financial accessibility to the poor. For a fast growing economy with respect to financial sector development this may have far-reaching implication towards inclusive growth.

Notes

[1]The procedure is adopted for three reasons. Firstly, the bounds test is simple as opposed to other multivariate co-integration technique such as Johansen and Juselius (1990), it allows co-integrating relationship to be estimated by OLS once the lag order is selected. Secondly, the bound test procedure does not require the pre testing of the variables included in the model for unit root. These approaches require that all the variables to be integrated of the same order (I (1)). Thirdly, the test is relatively more efficient in small sample data sizes as is the case of this study. Fourth the error correction method integrates the short-run dynamics with long-run equilibrium without losing long-run information.

[2] The Engle-Granger (1987), Johansen (1992) and Johansen-Juselius (1990) co-integration approaches require that variables should be integrated at a unique level of integration.

5.3 Financial development, economic growth and human development

5.3.1 Introduction

The relationship between financial development and economic growth has received emphasis from numerous empirical and theoretical academic works since the 19th century. Some of them suggest that financial development is an essential and significant element for economic growth and a well developed financial system has a positive impact on economic performance by enhancing intermediation (Levine, 1997; McKinnon, 1973; Schumpeter, 1911; Shaw, 1973; Singh, 2007). Since the emergence of the endogenous growth theorists in the early 1990s, the link between Human Capital (HC) and growth has also been widely acknowledged in the literature. Evidences suggest that economic growth enhances human development in the long run. Researchers agreed that financial development is an essential element in economic growth and a well developed financial development has a positive impact on economic performance by enhancing intermediation efficiency through reduced transaction and monitoring costs (Khalid Zaman et al). The relationship between economic growth and human development suggest that nation may enter either into a virtuous cycle of high growth and high growth of human development or a vicious cycle of low growth and low human development (Ranis, 2004).

The study is organized in the following manner. An introduction has been discussed in section 5.3.1 above. Section 5.3.2 reviews the empirical studies. Section 5.3.3 presents data, variable description and model specification. Section 5.3.4 provides the methodology used in this chapter while the empirical results are presented in section 5.3.5. Section 5.3.6 concludes the study.

5.3.2 Literature review of the empirical studies

Since the revolutionary contributions of Schumpeter (1911), Robinson (1952), Goldsmith (1969), McKinnon (1973), and Shaw (1973) on the relationship between Economic Growth and Financial Development has remained an important issue of debate among researchers and policymakers.

The relationship between economic development and human development has frequently been considered in both empirical and theoretical studies. There have been some other efforts in establishing relationships between human capital and economic growth Benhabib and Spiegel

(1994), Mankiw et al. (1992), Romer (1990), Ranis et al. (2000), Ranis (2004). Ramirez et al. (1998) examined the links between economic growth and human development in Sub-Saharan countries for the time period 1970–1992. The result reported that there exists a strong positive relationship in both directions (from human development to economic growth and vice versa) and that public expenditures on social services and female education are especially important links determining the strength of the relationship between economic growth and human development. Pradhan and Abraham (2002) explored the role of human development policy on the economic growth of Indian states for the period 1980–97. The findings suggest that human development position of the states is strongly determined by the human development policy pursued in Indian states. Chi (2008) concluded that the human capital indirectly had an immense impact on economic growth in China through investment on physical capital. Zhang and Zhuang (2011) examined the effect of the combination of human capital on economic growth in thirty one Chinese States over the period 1997-2009 by using Generalized Methods of Moments (GMM) and considered. The results indicated that higher education was more effective than the primary and the secondary education on economic growth in China.

The studies of De Gregorio (1992), Pagano (1993), De Gregorio (1996), Outrivelle (1999) and Evans et a.l (2002) Papagni (2006); which emphasizes on the role of human capital in financial development. De Gregorio (1992) suggested that human capital accumulation raises saving rate in the long-run but in the case of short run it lowers the productivity of investment. The low level of human capital reduces overall savings in the economy and increases domestic credit to the private sector to cater for education matters. Outreville (1999) examined the relationship between the level of financial development and socio-economic variables reflecting different levels of development of human capital for 57 developing countries. He concluded that that both human capital and socio-political stability are important factors in explaining financial development. Evans et al (2002) found a positive relationship between money and human capital and also provides evidence for complementary between Financial Development and Human capital. The study also concluded that a developed financial system is an essential accompaniment to human resources in the growth process. Kuri (2011) investigated the association between the process of financial inclusion and the level of human development in the context of different states of India. The study concluded that the level of human development and

financial inclusion are positively correlated which states that having a high level of human development are also the states with a relatively high level of financial inclusion.

Kendal (2012) investigated the relationship between banking sector development, human capital and economic growth in states of India. The study reported that a decline in the ratio of credit to net domestic product from 75% to 25% preceding as an average of 4% decrease in growth rate. Hakeem (2012) studied the link between human capital and financial development in South Africa for the period of 1965-2005. The study found that there is a weak relationship between financial development and all the proxies of human capital used, except life expectancy at birth and secondary school enrollment.

Zaman et al. (2012) examined the impact of financial indicators on human development in Pakistan by using annual data over the period 1975-2010 for Pakistan. The results indicated that different financial indicators played an important role on increasing human capital, and financial development indicators had a balanced long term and significant relation with human capital in Pakistan except market capitalization. The results of Variance Decomposition suggest that broad, money supply (M2) had the biggest share in changes in human capital measures in Pakistan. Nik et al (2013) explored the relationship between financial development and human capital in Iran over the period 1977-2010 by employing a Vector Auto Regression model. The empirical results of the study indicate that the cash flow has a negative effect on human capital, which is also responsible for an increase in inflation. It is also found that due to the lack of the best financial resource allocation, the facilities provided by the banking system have negative effect on human capital.

5.3.3 Dataset, variables and Model specification

Data and Variable identification:

The annual time series data is employed for the Indian economy for the period 1980-2013.

Economic growth: Economic growth is measured by Per capita Gross Domestic Product at factor cost (PGDP) (base year 2005=100).

Financial development: To measure financial development, three proxy variables are used in this study: (1) the ratio of domestic credit to the private sector to GDP [1] (LCREDIT) (Kar et al.

2011; Colombage 2009; Khan and Senhadji 2003; Zaman et al. 2012) (2) Domestic credit provided by the banking sector as a share of GDP (LBR) (Nik, 2013). (3) The ratio of broad money supply as percentage of GDP (LM3). This indicator is the most efficient and the oldest indicators applied in financial development. (Bittencourt, 2012; Odhaimbo, 2009; Kar et al., 2011; Zaman et al. 2012).

Human development: Human development index [2] (LHDI) is used as a proxy for human development. It is calculated as per the UNDP's formula for HDI calculation.

All the variables in the data set are first transformed into the natural logarithm for standardization and equalization of the variables.

The data have been taken from different sources, including various series of the Reserve Bank of India reports; International Financial Statistics (IFS) Yearbooks published by the International Monetary Fund, World Bank Statistical Yearbooks and UNDP reports.

Model Specification

The used model equation is given below:

LHDI = F (LFD, LPGDP) ….. (1)

Where, LHDI denotes the human development index, LFD represents financial development variable and LPGDP is the per capita gross domestic product (PGDP) and L implies that the variables have been transformed in natural logs.

Model (A): LHDI= F (LCREDIT, LPGDP)
Model (B): LHDI= F (LBR, LPGDP)
Model (C): LHDI= F (LM3, LPGDP)

We have made three models, model (A), model (B) and model (C). In model A, B and C, all the variables are same except the proxy variable of financial development. In model A, proxy of financial development is the ratio of domestic credit to the private sector to GDP (LCREDIT) whereas in model (B) it is replaced by the domestic credit provided by the banking sector as a

share of GDP (LBR) and in model (C), the ratio of broad money supply as percentage of GDP (LM3) is used as proxy variable for financial development.

5.3.4 Methodology

HDI calculation

Methodology used in the calculation of HDI at national level is not same for over the years. The methodology is same for HDI 1981, HDI 1991 and HDI 2001. It has been changed in HDI 2011. The calculation of HDI in 2011 differs from that in the National Human Development Report (NHDR) 2001 and that in the global HDR 2010. Due to this reason, we cannot compare the HDI values and ranks for states across the two NHDRs.

Table 5.3.1: Comparison between Indicators in NHDR

Comparison between Indicators in *NHDR*	*NHDR 2001*	*India HDR 2011*	*Global HDR 2010*
Health	Life expectancy at age 1 Infant mortality rate	Life expectancy at birth	Life expectancy at birth
Education	Literacy rate (7 years and above) Intensity of formal education	Literacy rate (7 years and above) Adjusted mean years of schooling	Mean years of schooling Expected years of schooling
Income	Inequality adjusted per capita real consumption expenditure	Inequality adjusted per capita real consumption expenditure	Gross National Income per capita (US$)

Source: NHDR (2011)

In NHDR (2011), The Health Index and Education Index differ from the indicators used in NHDR (2001). The Health includes life expectancy at birth, which indicates a long and healthy life and is the most comprehensive indicator of the state of health of the population. Along with good health a person should be educated enough to enhance his/her capabilities and skills to earn and be aware. To construct the Education Index, the two indicators used are ‘adjusted mean years of schooling’ and ‘literacy rate for population 7 years and above’. India Human Development Report 2011 has used life expectancy at birth instead of life expectancy at age one and Infant Mortality Rate (IMR) for constructing the Health Index. Life expectancy at age one

abstracts out the impact of IMR from life expectancy at birth. In addition, the correlation between life expectancy at birth and at age one is as high as 0.98. Therefore, in this Report life expectancy at birth, for which more recent data were available, was used in the construction of health index. Also, since the National Council of Educational Research and Training (NCERT) School Educational Survey's latest round was not available, mean years of schooling using National Sample Survey (NSS) data for 2007–08 (which provides data on level of education—primary, secondary, and so on rather than class-wise data as provided by NCERT) has been used for calculating the Education Index for both periods.

In the present study, we have used the specification of HDI provided by NHRD (2001) due to the availability of data of older years.

Calculation of HDI (NHDR 2001)

HDI= 1/3 * $\sum_i (Xi)$

Where HDI is for the j^{th} State, i goes from 1 to 3; and

$X_i = (X_i – X_i^*) / (Xi^{**} – X_i^*)$

Where i^{th} indicator; Xi** and Xi* are the scaling maximum and minimum norms, such that:

X1: Inflation and inequality adjusted per capita consumption expenditure

X2: Composite indicator on educational attainment

X3: Composite indicator on health attainment

X2 = [(e1 * 0.35) + (e2 * 0.65)]

Where e1 is literacy rate for the age group 7 years and above and e2 is adjusted intensity of formal education.

X3 = [(h1 * 0.65) + (h2 * 0.35)]

Where h1 is life expectancy at age one, and h2 is the infant mortality rate.

(Source: NHDR, 2001)

Co-integration with ARDL

To empirically analyze the long run relationship and dynamic interaction of economic growth with financial development and controlled variables, the model has been estimated by the auto regressive lag (ARDL) co-integration procedure developed by Pesaran et al. (2001) because the superiorty of the ARDL technique over other co-integration approaches (As discussed in chapter 3.1). The unrestricted error correction model (UECM) of ARDL model is used to examine the long run & the short run relationship takes the following form.

$$\Delta LHDI_t = \delta_0 + \delta_1 T + \delta_2 LFD_{t-1} + \delta_3 LPGDP_{t-1} + \sum_{i=1}^{q} \alpha_i \, \Delta LHDI_{t-i} + \sum_{i=1}^{q} \beta_i \, \Delta LFD_{t-i} + \sum_{i=1}^{q} \mu_i \, \Delta LPGDP_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots (2)$$

Where the series is as defined earlier and T is time trend and L implies that the variables have been transformed in natural logs. The first part of the equation (1) with δ_2 and δ_3 refer to the long run coefficients and the second part with α, β and μ refer to the short run coefficients. The null hypothesis of no c0-integration $H_0: \delta_2 = \delta_3 = 0$ and the alternative hypothesis $H_1: \delta_2 \neq \delta_3 \neq 0$ implies co-integration among the series (equation 2).

ARDL bound Test procedure

The first step in the ARDL test is to estimate the equation (2) by OLS in order to test for the existence of a long run relationship among variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of variables i.e. H_0 (null hypothesis) as against H_1(alternative hypothesis) as stated earlier. In the second step, once the co-integration is established the conditional ARDL long run model for $LHDI_t$ can be estimated as:

$$\Delta LHDI_t = \alpha_0 + \sum_{i=1}^{q} \delta_1 \; LHDI_{t-i} + \sum_{i=1}^{q} \delta_2 \, LFD_{t-i} + \sum_{i=1}^{q} \delta_3 \, LPGDP_{t-i} + \varepsilon_t \quad \ldots\ldots (3)$$

This involves selecting the orders of ARDL (q, q_1, q_2, q_3, q_4) models using SIC. The third and final step, we obtain the short run dynamic parameters by estimating an error correction model with the long run estimates. This is specified as below:

$$\Delta LHDI_t = \mu + \sum_{i=1}^{q} \alpha_i \, \Delta LHDI_{t-i} + \sum_{i=1}^{q_1} \beta_i \, \Delta LFD_{t-i} + \sum_{i=1}^{q_2} \omega_i \, \Delta LPGDP_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad \ldots. (4)$$

Where $\alpha, \beta, \sigma, \omega$ are short run dynamic coefficient to equilibrium and ϕ is the speed adjustment coefficient.

Granger non-causality Test:

To complement the above, we have also carried out Granger non-causality test developed by Toda and Yamamoto (1995) which is valid regardless of whether series is I (0), I (1) or I (2), non co-integrated or co-integrated of any arbitrary order. Hence, to estimate the causality between two proxies of financial development and human development, the study uses following models.

Model A- Human development and Domestic credit to the private sector (% GDP)

$$\Delta LHDI_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LHDI_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LCREDIT_{t-i} + ECM_{t-1} + \mu_t \quad \text{…. (5)}$$

$$\Delta LCREDIT_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LCREDIT_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LHDI_{t-i} + ECM_{t-1} + \mu_t \quad \text{.... (6)}$$

Model B- Human development and Domestic Credit provided by banking sector

$$\Delta LHDI_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LHDI_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LBR_{t-i} + ECM_{t-1} + \mu_t \quad \text{…. (7)}$$

$$\Delta LBR_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LCREDIT_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LHDI_{t-i} + ECM_{t-1} + \mu_t \quad \text{.... (8)}$$

Model C- Human development and Monetization variable (% GDP)

$$\Delta LHDI_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LHDI_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LM3_{t-i} + ECM_{t-1} + \mu_t \quad \text{.... (9)}$$

$$\Delta LM3_t = a_0 + \sum_{i=1}^{n} a_{1i}\Delta LM3_{t-i} + \sum_{i=1}^{n} a_{2i}\Delta LPOV_{t-i} + ECM_{t-1} + \mu_t \quad \text{.... (10)}$$

Where: ECM_{t-1} = lagged error-correction term obtained from the ARDL model estimation.

5.3.5 Empirical Results

Stationarity test and Lag length selection before co-integration

The time series data frequently show the property of non-stationarity in levels and the resulted estimates usually provide spurious results. Accordingly, the first step in any time series empirical analysis was to test for the stationarity properties of the variables to remove the problem of

inaccurate estimates. The other important step was to check the order of integration of each variable in a data series in the model to establish whether the data under hand suffer unit root and how many times it needed to be differenced to gain stationarity.

Thus, before we conduct tests for co-integration, we have to make sure that the variables under consideration are not integrated at an order higher than one. In this study, we have used ADF, DF-GLS, KPSS and Ng-Perron unit root test to check the stationarity properties of the variables. The results of the stationarity tests are presented in Table 5.3.2 and 5.3.3. The results show that all the variables are non-stationary at levels. The next step is to difference the variables once in order to perform stationary tests on differenced variables. The results show that after differencing the variables once, all the variables were confirmed to be stationary. It is, therefore, worth concluding that all the variables used in this study are integrated of order one i.e. difference stationary I (1). In addition, it is also important to ascertain that the optimal lag order of the model (A) to (C) is chosen appropriately so that the error terms of the equations are not serially correlated. Consequently, the lag order should be high enough so that the conditional ECM is not subject to over parameterization problems (Narayan, 2005; Pesaran 2001). The results of these tests are presented in Table – 5.3.4.

Table 5.3.2: Stationarity Test of Variables (With Trend and Intercept)

	ADF	DF-GLS	KPSS	Stationarity Status
LHDI	-1.2663	-1.4178	0.1761	
ΔLHDI	-5.2961	-4.8540	0.0948	I (1)
LCREDIT	0.6840	-0.8984	0.1718	
ΔLCREDIT	-2.4800	-2.4636	0.1127	I (1)
LBR	-0.0789	0.544051	0.6411	
ΔLBR	-2.4360	-2.3588	0.1386	I (1)
LM3	-1.7478	-1.8128	-2.7583	
ΔLM3	-2.6235	-2.7583	0.10463	I (1)
LPGDP	2.2805	-1.0908	0.7228	
ΔLPGDP	-3.9109	-3.9799	0.4757	I (1)

Source: Author's own Calculation by using E-views 7.0

Δ denotes the first difference of the series. L implies that the variables have been transformed in natural logs.

Table 5.3.3: Unit root test: Ng-Perron Test

Variables	With constant and trend				With constant			
	MZa	MZt	MSB	MPT	MZa	MZt	MSB	MPT
LHDI	-6.1447	-1.7065	0.2777	14.7896	1.6928	1.5613	0.9223	8.0240
LCREDIT	-1.4656	-0.7551	0.5152	51.4995	1.9638	1.7629	0.8977	67.7616
LBR	-2.1686	-0.9226	0.4254	36.0090	1.4621	0.7663	0.5241	25.7000
LM3	-6.8734	-1.8528	0.2695	13.2585	0.5712	0.3622	0.6342	29.616
LPGDP	-3.1622	-1.0795	0.3413	24.9370	0.7181	0.3802	0.5295	23.2609
ΔLHDI	-14.358	-2.6562	0.1849	6.47925	-14.3974	-2.6522	0.18421	1.8177
ΔLCREDIT	-6.7334	-1.8300	0.2717	13.5359	-6.2022	-1.7610	0.2839	3.9501
ΔLBR	-6.4516	-1.7943	0.2781	14.1241	-6.2826	-1.7712	0.2819	3.9031
ΔLM3	-14.360	-2.6250	0.1828	6.6556	-13.6739	-2.5934	0.1896	1.8726
ΔLPGDP	-15.420	-2.6632	0.1727	6.5608	-14.3764	-2.6427	0.1838	1.8481

Note: Δ denotes the first difference of the series and represents the natural logarithm.

Table 5.3.4: Lag Length Selection

	Lag order	Log L	LR	FPE	SIC	HQ
Model A	1	210.9483	200.1474*	2.22e-10*	-13.1547*	-13.5433*
Model B	1	223.0353	201.8670*	9.64e-11	-13.988*	-14.3769*
Model C	1	232.7986	189.0847*	4.92e-11*	-14.6617*	-15.0503*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
SIC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Co-integration among financial development indicators and human development

The paper estimates the ARDL bound test approach to co-integration. We used SIC to select a minimum lag order of 1 for conditional ARDL-VECM. By applying, the procedure in OLS regression for the first difference part of the equation (1) and then test for the joint significance of the parameters of the lagged level variables when added to the first regression. The F-Statistics test the joint Null hypothesis that the coefficients of lagged level variables are zero. Table 5.3.5, reports the result of the calculated F-Statistics & diagnostic tests.

The result shows that with private credit and broad money variable as the independent variable (Model A and C), the calculated F-statistics were 4.919 and 4.891 respectively. Thus the

calculated F-statistics turns out to be higher than the upper-bound critical value at the 5 percent level for both the models. This suggests that there is a co-integrating the relationship between human development, financial development and economic growth. The diagnostic test confirms the statistical soundness of the models.

Table 5.3.5: ARDL Bounds test

Panel I: Bound testing to co-integration:
Estimated Equation : *LHDI = F (LFD, LPGDP)*

Indicators	Model 1	Model 2	Model 3
Optimal lag	1	1	1
F – Statistics	4.919	3.5702	4.8919

Panel II: Diagnostic Tests:

Diagnostic Tests Indicators	Model (A)	Model (B)	Model (C)
Normality J-B value	1.2543	0.0069	1.3667
Serial Correlation LM Test	0.0738	1.2457	0.0456
Heteroscedasticity Test (ARCH)	0.1494	0.0183	0.4213
Ramsey Reset Test	3.1523	2.1253	1.3144

The estimated long run coefficient of ARDL test for three model specifications is reported in table 6. It is clear from the estimated results that all the three indicators of financial development have expected positive signs but only LM3 is significant at 1% level in model (C). The estimated coefficient reveals that a 1% rise in monetization variable increases human development index (HDI) by 17%. The proxy for economic growth is positively related with human development index (HDI) and significant at 1% in all three models. These results suggest that financial development indicators contribute in the human development index via the channel of economic growth (LPGDP).

Table 5.3.6: Estimated Long Run Coefficients using ARDL Approach (Dependent variable: LHDI)

Regressor	**Model (A)**		**Model(B)**		**Model (C)**	
LPGDP	0.3374***	(11.730)	0.33750***	(13.4061)	0.2333***	(5.3723)
LCREDIT	0.0110	(0.2834)	----		----	
LBR	----		0.01832	(0.01832)	----	
LM3	----		----		0.17000***	(2.5506)
CONST	-2.8302***	(-35.6851)	-2.8663***	(-27.1484)	-2.8153***	(-55.4643)
Robustness Indicators						
R^2	0.99406		0.99407		0.99516	
Adjusted R^2	0.99342		0.99343		0.99465	
F Statistics	1562.0	[0.00]	1563.3	[0.00]	1920.5	[0.00]
D.W. Stat	2.2120		2.1941		2.2944	
Serial Correlation,	F =0.9706	[0.33]	0.89279	[0.35]	1.6791	[0.20]
Heteroscedasticity,	F=0.3556	[0.85]	0.04885	[0.82]	0.2601	[0.61]
Ramsey Test	F=3.6652	[0.06]	2.5883	[0.11]	1.4014	[0.24]

Note: Figures in parentheses (#) and [#] are estimated t-values and p-values respectively. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

Table 5.3.7 presents the Error Correction Model (ECM) estimates of all the model specifications. The ECM version of ARDL model includes an error correction term (ECM_{-1}). The coefficient of the error correction term is an adjustment coefficient capturing the proportion of the disequilibrium in economic growth in one period which is corrected in the next period. The larger the error term, the faster the economy's return to the equilibrium rate of growth; following a shock. The value of the error correction term ought to lie between 0 and -1. The value of -1 indicates that 100% of the disequilibrium in the growth is corrected in the following year. The estimated error correction terms of all the models are significant at 1% level. They are -0.48, -0.45, -0.56 respectively for Model 1,2 and 3. All the models have a valid error correction parameters with a negative sign and statistically significant at the 1 % level. All the three indicators of financial development (LCREDIT, LBR and LM3) have positive. But LM3 is the only variable which is significant both in the short run and long run.

Table 5.3.7: Error Correction Representation for the Selected ARDL Model (Dependent variable: ΔLHDI)

Regressor	**Model (A)**		**Model (B)**		**Model (C)**	
ΔLPGDP	0.1486 *	(2.7788)	0.15282***	(2.9661)	0.13172***	(2.7888)
ΔLCREDIT	0.00487	(0.28630)	----		----	
ΔBR	----		0.00829	(0.32432)	----	
ΔLM3	----		----		0.0959*	(2.5474)
ΔCONST	-1.2464***	(-2.8830)	-1.2979***	(-2.8939)	-1.5890***	(-3.8767)
ECM_{t-1}	-0.4830***	(-2.8958)	-0.45281***	(-2.9208)	-0.56443***	(-3.8887)
Robustness Indicators						
R^2	0.89697		0.84360		0.8836	
Adjusted R^2	0.87199		0.76256		0.8175	
D.W. Stat	2.3806		2.1941		2.2944	
SE regression	0.0100		0.0111		0.0100	
RSS	0.00332		0.00346		0.0028	
F-stat.	57.4576	[0.000]	3.0058	[0.047]	5.8088	[0.003]

Note: Figures in parentheses (#) and [#] are estimated t-values and p-values respectively. *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively. Δ denotes the first difference of the series

Causality among financial development indicators and human development

After testing the co-integration, the next step is to test for the causality between the variables by incorporating the lagged error-correction term in equation 4 to 9. The causality in this case is examined through the significance of the coefficient of the lagged error-correction term and joint significance of the lagged differences of the explanatory variables using the Wald test. The results of these causality tests are reported in Table – 5.3.8. The empirical results show that there is a significant unidirectional causality running from financial development and economic growth to human development index and is not sensitive to the proxy used to measure financial development. The result applies irrespective of whether the causal relationship is tested in the short run or in the long run dynamics. The short-run and long-run unidirectional causality from financial development and economic growth in the human development index is supported by F-statistics and the coefficient of the lagged error correction term in equation 4 to 9, which are both statistically significant.

Table 5.3.8: Granger non causality test

Dependent Variable	Casual Flow	F- Statistic	t- Test on ECM
Model A- Human development and Domestic Credit to private sector			
LHDI	LCREDIT → LHDI	3.2311*	-2.8958
LCREDIT	LHDI → LCREDIT	0.0976	
Model B- Human development and Domestic Credit provided by banking sector			
LHDI	LBR → LHDI	2.9687*	-2.9208
LBR	LHDI → LBR	2.5355	
Model C- Human development and broad money			
LHDI	LM3 →LHDI	13.4651***	
LM3	LHDI → LM3	0.1836	-3.8887

Note: *, ** and *** indicate significant at 10, 5 and 1 percent level of significance, respectively.

To check the stability, the cumulative sum of recursive residuals (CUSUM) and the CUSUM square (CUSUMSQ) tests proposed by Brown et al. (1975) have been applied. The results suggest parameter consistency under both tests. The plots are within the critical bounds of 5 percent level of significance.

Figure 5.3.1: Stability Test of Model (A)

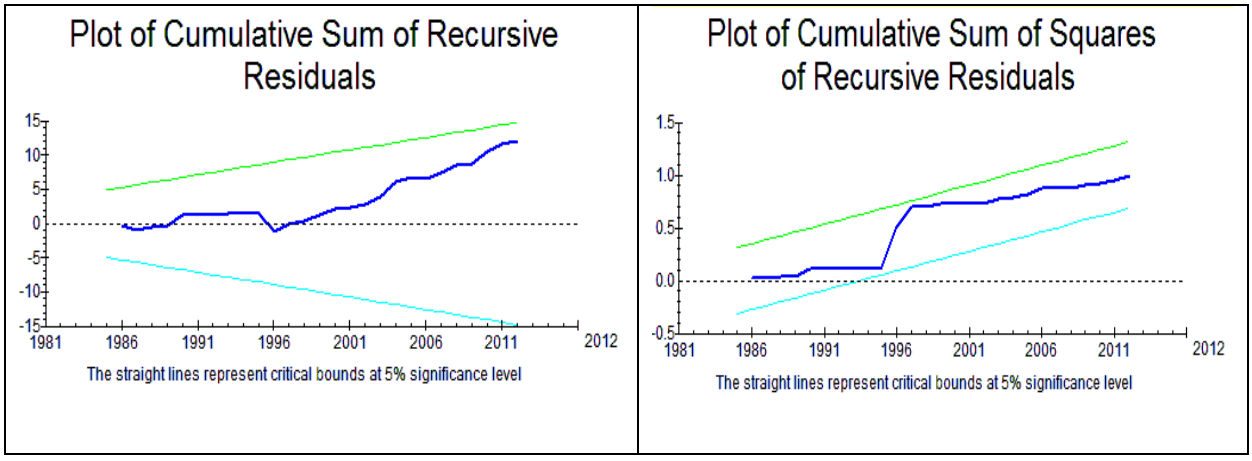


Figure 5.3.2: Stability Test of Model (B)

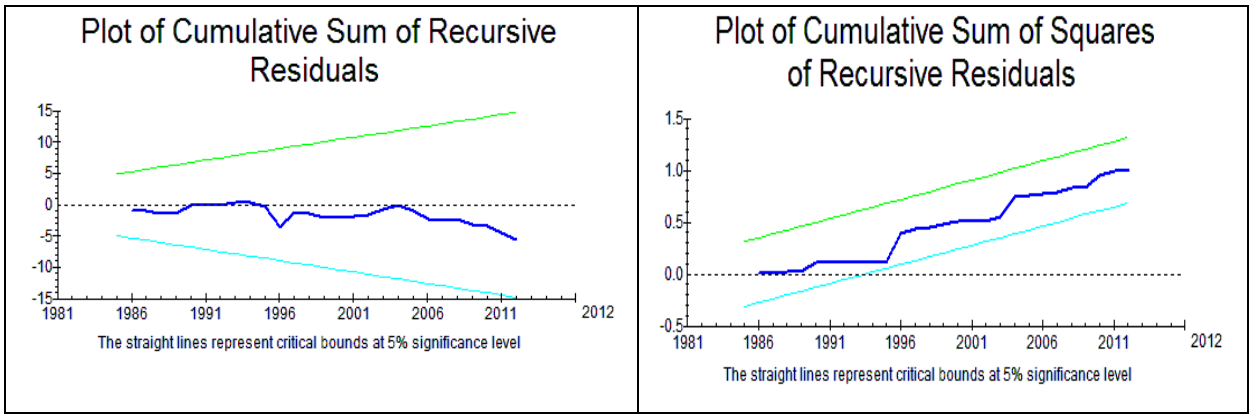
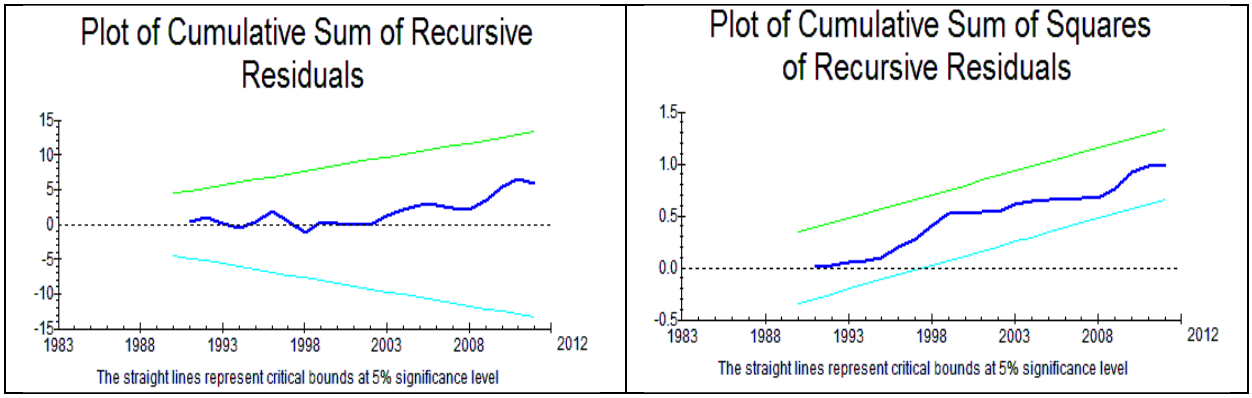


Figure 5.3.3: Stability Test of Model (C)



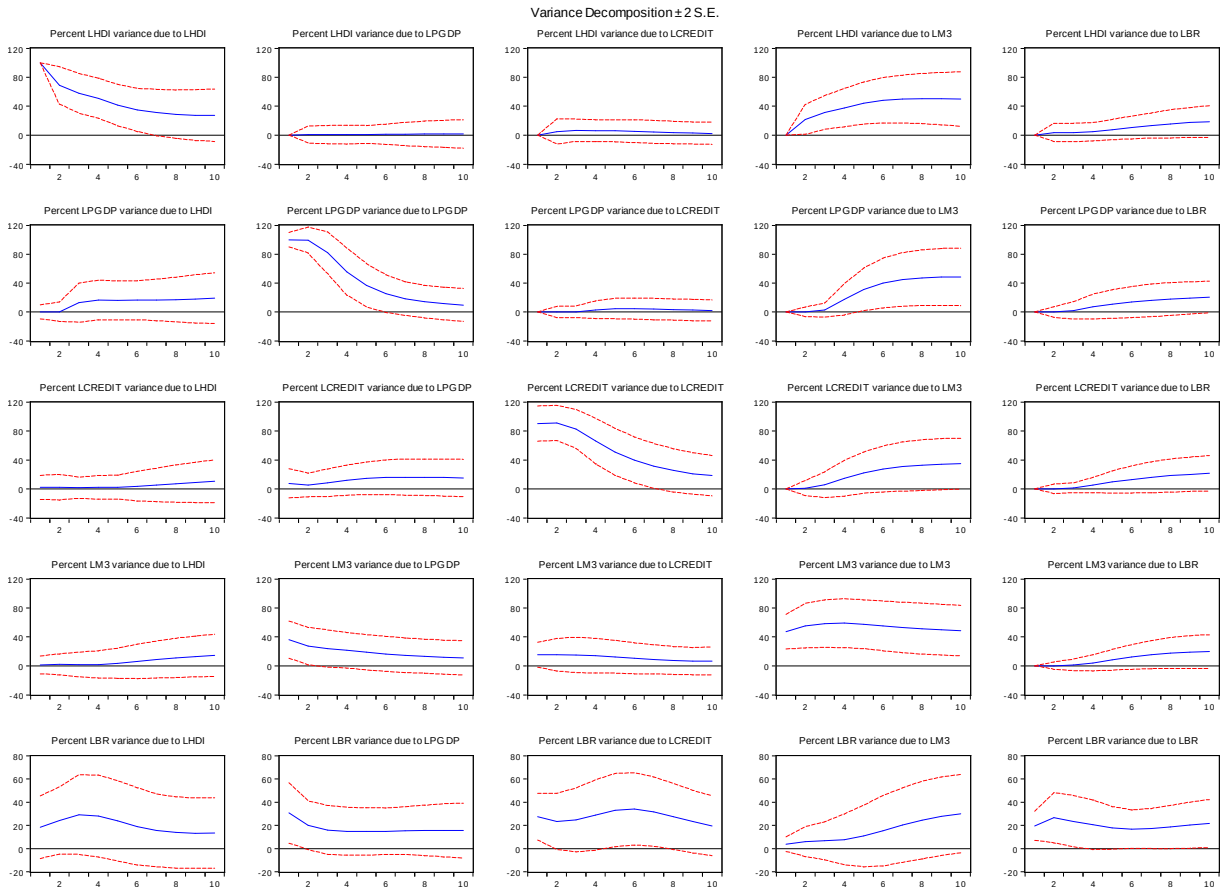
Variance decomposition analysis

The Variance Decomposition analysis indicates the percentage of forecast error variance in one variable that is due to errors in forecasting itself and each of the variables. The results of Variance Decomposition are illustrated in Table 5.3.9 and individual graphs are presented in F Figure 5.3.4. The column SE is the forecast error of the variable to be forecast at different lengths into the future. The empirical results show that the LHDI explanatory has increased over the time through economic growth variable as the second year, 7.17% of human development variable changes are explained by financial variables. However, LM3 variables play the most important role to define human development in India.

Table 5.3.9: Variance Decomposition of LHDI

Period	S.E.	LHDI	LCR	LBC	LM3	LPGDP
1	0.0097	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.0120	69.37087	2.770319	0.373712	20.31262	7.172480
3	0.0132	58.29246	4.000831	0.659909	27.80745	9.239350
4	0.0147	51.51377	3.828127	0.741699	34.95733	8.959074
5	0.0169	42.45615	4.106968	0.576465	45.15058	7.709839
6	0.0194	36.21601	4.023510	0.443726	52.93936	6.377385
7	0.0220	32.88653	3.497778	0.344788	58.12342	5.147481
8	0.0248	30.99746	2.879926	0.282976	61.67166	4.167975
9	0.0274	30.09988	2.351022	0.250082	63.83706	3.461962
10	0.0299	29.90318	2.092431	0.237961	64.79779	2.968638

Figure 5.3.4: Variance Decoposition±2SE



Stability test

To check the stability, the cumulative sum of recursive residuals (CUSUM) and the CUSUM square (CUSUMSQ) tests proposed by Brown et al. (1975) have been applied. The results suggest parameter consistency under both tests. The plots are within the critical bounds of 5 percent level of significance.

5.3.6 Summary and Conclusions

The objective of the study is to empirically investigate the influence of financial indicators on human development in India by using the annual data from 1980 to 2013. Specifically, the study explores the influencing direction between different financial indicators and human development and compares the magnitude of different indicators on human development. For this purpose the study uses domestic credit to the private sector to GDP ratio; Domestic credit provided by the banking sector as a share of GDP and the ratio of broad money supply (M3) to GDP ratio as the proxy for financial development indicators and the HDI is used as a proxy for human development indicator. The data are analyzed with econometric techniques, including the ARDL approach to co-integration, Granger causality test and Variance Decomposition etc. The ARDL bound test approach confirms the long run relationship between human development index and financial development indicators. The direction of the causality between the variables is tested by granger causality test. The results of causality suggest that unidirectional causality runs between financial development indicators and human development index. The result of variance decomposition analysis concludes that the broad money supply (LM3) is the only indicator, among all the financial development indicators, has the largest share to influence changes in human development, i.e., 64.7977%.

Endnote

[1] See Levine, 1992; Demirguc-Kunt and Levine, 1999; Khan and Senhadji, 2000; Levine, 2004; Shahbaz et al, 2008; Shahbaz 2009.

[2] The Human Development Index (HDI) is a composite statistic of life expectancy, education, and income indices. It is calculated by Old method (before 2010 Report) of UNDP.

CHAPTER 6

Overview and policy implications of the study

The main objective of macroeconomic policy is to achieve high economic growth with low and stable inflation. In this connection a vibrant financial system is emerging as a precondition to economic growth in recent years in many developing economies. Consequently, the policy makers are realizing the role of financial development as necessary for inclusive growth and sustainable development for developing economies. Therefore, the inter-linkages between financial development, inflation and economic growth have been subjected to extensive empirical scrutiny in many countries over the years.

Empirical research on the relationship between financial development, inflation and economic growth has been truly extensive and covered various issues with a view to resolve some of them for the conduct of macroeconomic policy. However, due to heterogeneous characteristics of nations the solutions to the issues are amicable to all the economics. Further, in a developing economy like India, the issues regained its importance due to institutional, financial and structural changes in the recent years. Though, efforts were made to evaluate the inter-linkages by taking into account the recent changes in various markets, they have not been successful due to various reasons. Hence the present study is initiated to examine some of the unresolved issues and some new issues associated with the relationship between financial development, inflation and economic growth in the context of Indian economy.

The first issue of the present study is to investigate the relationship between financial development and economic growth. The issue is investigated at national and state level. For the national level, the autoregressive distributed lag approach to co-integration is used for the annual time series data 1982-2013. The study made use of three models on the basis of proxy of financial development i. e. (1) The ratio of private sector credit to GDP; (2) The ratio of market capitalization to GDP and (3) The sum of credit to the private sector and market capitalization as a ratio of GDP is used as the broad indicator of financial deepening and (4) financial development index. Economic growth is measured by Per capita Gross Domestic Product at factor cost (base year 2005=100). Beside these variables, three control variables such as call money rate as a proxy of policy rate, trade openness and price stability indicator, composite

consumer price index with base year 2005=100) were also included while examining their role in the economic growth.

To examine the long run co-integrated relationship and short run dynamics the present study employed auto regressive distributed lag (ARDL) bounds test proposed by Pearson (2001). The bounds F-test results confirm the existence of the long run relationship between economic growth and financial development indicators. The detailed analysis of ARDL test coefficients revealed that the bank-based, market-based indicators of financial development and financial development index have a positive and significant impact on economic development in India. This is consistent with the view that financial development can act as an "engine of growth" and plays a vital role in the process of economic growth (Kamat and Kamat, 2007; Banerjee and Ghosh, 2010 and Sahoo, 2013) and contrary to Paramati and Gupta (2011); Hye (2011). The study also worthwhile to mention that call money rate is one of the important policy variables for economic growth in India. This indicates that investment demand in India also dependent on the change in short term interest rates. The findings of granger causality test indicate that short-run unidirectional causality running from financial development to economic growth. It is found that bidirectional causality exists between economic growth and financial development variable, inflation and economic growth, trade openness and economic growth.

The panel data evidence (state level) also confirms that there exists a long run co-integration relationship between financial development and economic growth during the study period (1993-2013). The results of fully modified OLS (FMOLS) test suggest that both credit and deposit are positively and statistically associated with economic growth at the state level in Indian economy. However, the number of bank branches is not a significant variable in explaining economic growth. The results of panel Granger causality suggest that there exists unidirectional causality from per capita credit to the economic growth and the number of bank branches; per capita deposit to economic growth. There is bi-directional causality between per capita credit and per capita deposit.

The results of our study suggest that reforms in the financial sector will enhance the economic growth of Indian states and not just the growth of the sectors alone. Here it also noted that just

increase the number of bank branches is not sufficient for enhancing financial accessibility and hence economic growth. The findings suggest that it is necessary to increase the business and transactions of banks that is to increase in credit and deposits that will decide the extent of financial accessibility and will encourage the economic growth. The policy implication of the study is that current economic policies should recognize the finance-growth nexus in order to maintain sustainable economic development in the country.

The empirical findings provide important policy insights in Indian context. As the Indian financial sector is largely bank-centric, the performance of the banking sector is crucial in the development process of the economy. Given the potential of more credit disbursement by Indian banks, there is still scope for them to channelize credit to the productive sectors of the economy. The state level study also reflects the importance of the banking sector development in economic growth. Therefore, Indian banks need to develop strong linkages with the real sector to develop the ability to maintain high growth in the economy. Therefore, the present study recommends for appropriate reforms in financial markets and also in external sector to attain a high rate of economic growth and suggests fresh insights to policy makers on crafting appropriate policies that will support economic growth in India.

In order to encourage economic growth in Indian economy, attention must be paid to policies geared towards banking sector development. This calls for an efficient allocation of financial resources combined with sound regulation policies of the banking system. A sound financial system brings confidence among the investors so that resources can be effectively mobilized in, turn it increase productivity in the economy. A credible and reliable stock market system is necessary to ensure for the smooth-functioning of the financial system. It also takes care of the productivity of the economy (Yartey; 2008 and Levine; 1991). Further, the Government should reduce macroeconomic instability by controlling inflation towards growth-enhancing targets while promoting policies to reduce high lending rates on credit. Subsequently, from our key findings, we recommend caution in the choice of financial development indicators as policy instruments in the design and implementation of growth policies. Because, it is found that the impact of financial development on economic growth is sensitive to the chosen proxy of financial development.

In conclusion, a long-run impact of finance and growth is detected and it is also implied that an increase in financial intermediaries can have a positive impact on economic growth. The impact of financial sector development on economic growth is positive. Thus, an important implication that we can deduce from the empirical analysis is that the relationship or the direction of causality between financial development and economic growth supports the supply leading hypothesis in Indian economy.

The second issue of the present thesis deals with the tradeoff between inflation and economic growth. For this purpose the study uses two different methodologies proposed by Sarel (1996) and Espinoza et al. (2010) by using quarterly time series data from 2004:Q1 to 2014:Q2. In the present study inflation is measured by WPI inflation (base year 2004-05), growth rate of real GDP is used to measure the economic growth.

On the relation between inflation and economic growth, we have strong evidence in favor of the existence of the nonlinear relationship for Indian economy. As a result, this warrants the use of threshold estimation techniques to estimate the threshold level of inflation. The empirical estimates of the study suggest an inflation threshold rate of about 6.5-6.75% for Indian economy based on the study period. The relationship reverses when WPI-inflation is beyond 5.5% and inflation effect on growth turns negative. This study also provides evidence of a shift in regime, indicating the possible negative impact of inflation on economic growth beyond 6.75% WPI-inflation. It is also possible that the estimated threshold rate of inflation may vary over time because of the changing structure of the economy and the sources of inflationary pressures. The empirical findings serve as a confirmation that the recent escalating oil price does bear an inflationary threat to Indian economy. The oil price is inflationary for the general price index (WPI).

To wind up, as is now well-known, the Indian economy has experienced inflation in excess of threshold level in the last decade because of increasing costs for food and fuel, the high fiscal deficit and other supply shocks, which is negatively affecting the economic growth. Our findings may be useful to Reserve Bank of India as a guide for inflation targeting tool in Indian economy. The findings recommend that bringing inflation below the threshold level of 6.75 percent should be the goal of macroeconomic policies. The outcome of the paper will be relevant to monetary policy makers and academicians interested in this trade-off. This empirical result may explain the

fact that once inflation gets above a certain level generally known as threshold level, economic growth is prone to negative effects from high inflation.

The Indian economy has experienced significant changes to the growth–inflation mix and also devastated by the current economic crisis in last one decade or so. We detect a threshold level of approximately 6.75 percent. The empirical findings show that there exists statistically significant structural break in the relation between economic growth and inflation at 6.50 per cent and 6.75 percent. For the first break at 6.5%, there is positive impact on growth, which is statistically significant. We also found that inflation hurts economic growth when it goes beyond the threshold level of 6.75 percent and encourages economic growth below this threshold level. This study provides support of a shift in regime indicating possible unfavorable impact of inflation on economic growth beyond 6.75%. Thus, in the presence of such significant changes the understanding of inflation and growth trade-off could be more important for monetary policy. That is, according to our results and the empirical evidence on the relationship between inflation and economic growth, the inflation targeting is far from being a serious problem to attain a sustained economic growth in the country if inflation remains below the threshold level.

The policy implications arising from this study are straightforward. Macroeconomic policies require a broader viewpoint, creating a balance between the need for stabilization and development. The study suggests that the inflation should be kept below 6.75 percent to gain benefits from the low inflation. Thus, the level of inflation for monetary policy should be kept lower than the inflation threshold level, considering the existence of significant lags in the transmission of monetary policy measures. The policy implications arising from this recommends for the development of institutional arrangements for controlling and fighting inflation and for maintaining macroeconomic stability, and for encouraging the positive effect of inflation on economic growth. Additionally, the use of estimated threshold level in the monetary policy framework remains indistinct because the estimated threshold in the present study should be seen only as a broad reference benchmark not as a rigid guide to policy.

The third issue is the relationship between financial development and inclusive growth. This issue is again categorized in three categories.

(1) Financial development, economic growth and income inequality

In this study, we employed the ARDL bounds testing approach to co-integration to examine a long-run relationship between financial development and income inequality in India using annual data from 1982-2013. Financial development is defined by taking domestic credit to the private sector as a share of GDP and market capitalization as a share of GDP. This is a better measure compared to M3 as a share of GDP (See Levine, 1992; Demirguc-Kunt and Levine, 1999; Khan and Senhadji, 2000; Levine, 2004; Shahbaz et al, 2008; Shahbaz 2009). The income inequality is measured by the Gini coefficient. Economic growth is measured by real GDP per capita (PRGDP). Price stability is represented by a composite index of the consumer price index (CPI) and (Exports+Imports)/GDP captures the impact of trade openness on inequality of income. GDP per capita considers the impact of financial development of steady state distribution of income. All the variables are taken in their natural logarithms.

Additionally, the study also investigated the existence of the Greenwood-Jovanovich (GJ) hypothesis between financial development and income inequality. The study used ADF, DF-GLS, KPSS and Ng-Perron unit root tests to check the stationarity property of the series. All variables are non-stationary in their level, but first stationary at first difference. The series is co-integrated. By employing the ARDL co-integration test, the empirical evidence showed a significant steady-state co-integrating the relationship between the Gini coefficient, financial development and economic growth.

Our empirical findings suggest that development of financial systems results in higher income inequality for Indian economy. Both the coefficients of a long run and short run of the ARDL suggest that financial development aggravates income inequality; it widens the gap between poor and rich. Finally, the study provides no evidence to support the presence of a non-linear effect in the finance-inequality relationship, providing no support to the Greenwood and Jovanovic (1990) hypothesis in India. This may be due to underdeveloped financial markets and yet to reach maturity to trigger the onset of inverted U-Shaped relationship, this result supports Ang (2010). It is also found that both economic growth and price instability worsen the income inequality, whereas trade openness reduces the income inequality. Thus, it is suggested that the Indian economy can benefit from liberalization if they are properly prosecuted and appropriately managed.

The study found that both in the short run and long run, the impact of financial development, economic growth, and inflation on inequality are negative, but the impact is not significant in the case of the financial development variable. These findings have important policy implications to India's economic development. To lower the income gap between poor and rich, further steps have to be taken to strengthen the rural financial systems, and effective policy measures should adopt to accelerate financial development in rural areas. The policy implication can be categorized: (1) by increasing the bank branches in rural area so that they can be befitted by development of financial services (2) Price instability/inflation also aggravates the inequality so monetary policy and the long-term vision of the RBI should be geared towards low inflation policies (3) the negative and significant coefficient of economic growth on income inequality is also alarming, because it suggest that the supply leading hypothesis (finance led economic growth) is not sustainable. Thus, growth sustainable policies should be revised in order to check the efficiency of these policies. (4) Policy of micro-credit through micro-finance institutions should be adopted in order to reduce the income gap (5) the U-shaped, instead of the inverted U-relation between financial development and income inequalities did not support the outcome of the GJ hypothesis. This could be due to serious policy lapse that needs to be addressed, sooner rather than later (Tiwari et. al, 2013). (6) The poor ought to be exposed to opportunities for a better life by providing easy access to capital for human capital formation and innovation. The allocation of resources will increase the income of the poor individuals. A sustained long run path is achievable only through technological innovation and proper human capital development.

Thus, it is recommended that the financial sector should receive proper attention of policy makers, keeping in mind that mismanagement could lead to problems in income gap.

(2) Financial development, economic growth and poverty reduction

Financial development is believed to be an important factor in the economic growth of an economy. To date, there are many studies have noted that a well-functioning financial system that mobilizes savings, allocates resources and facilitates risk management contributes to economic growth. But the main question arises whether financial development reduces poverty or not. In this study, the long-run causal relationship between financial development and poverty reduction is examined for Indian economy over the time period 1970-2013, using auto regressive distributed lag (ARDL)-bounds testing approach by Pesaran et al. (2001) to examine this linkage.

In other words, do the benefits that result from financial sector development trickle down to the poor? The study uses two proxy variables of financial development, (1) domestic credit to the private sector (% GDP) and (2) monetization variable (broad money as a share of GDP). Per capita household consumption expenditure is used for poverty reduction variable and economic growth is measured by per capita gross domestic product. To capture the macroeconomic stability, India's Consumer price index is used as a proxy variable. The stationary properties are checked by Ng-Perron unit root test because it does not suffer from severe size distribution properties when error term has negative moving-average root, as can be the case with others tests. Ng-Perron (2001) test utilizes GLS de-trended data which are based on modified SIC/AIC, while DF, ADF, Philip Perron and DF-GLS unit root tests are based on non-modified information criteria.

The empirical findings of ARDL co-integration test suggests that there exists a co-integrating the relationship between financial development, economic growth and poverty reduction variable. It is found that both in the long run and short run financial development indicator positively associated with poverty reduction variable, which implies that financial development indicators reduces poverty. But the long run coefficients are not significant. The coefficient of economic growth reduces poverty, both in the long run and short run. But the price instability/inflation aggravates the poverty. In sum, we conclude from the above results that further financial development as well as rapid economic growth will become an important priority to reduce poverty in Indian economy.

The results of non granger causality suggest that there is a positive and unidirectional causality running from financial development to poverty reduction. The result applies equally irrespective of whether the causal relationship is tested in the short run or in the long run dynamics. This implies that any measure that promotes financial development is going to effectively reduce poverty.

Furthermore, the empirical findings of the study recommend that in order to reduce poverty in Indian economy, the negative impact of inflation on poor individuals should be tackled. This issue addresses the urgent need to reduce the inflationary pressure for the purpose of poverty alleviation. The finding implies that poverty in India can be reduced by trade openness, financial

inclusion and financial accessibility to the poor. For the fast growing economy with respect to financial sector development this may have far-reaching implication towards inclusive growth.
It is recommended that policy makers need to focus on policies geared towards financial development opportunities because of the indirect impact on reducing poverty for Indian economy.

(3) Financial development, economic growth and human development

Human development is considered a vital input to economic growth, standing alongside financial capital as one of two key determinants of economic growth in classical growth models (Ederer et al. 2011). The process of financial development is considered to facilitate an environment for tackling distortions in human development of an economy. The objective of the study is to empirically examine the effect of financial development indicators on human development in India in India using annual data from 1980-2013. The Ng-Perron unit root test is used to check for the order of integration of the variables. To measure financial development, three proxy variables are used in this study: (1) the ratio of domestic credit to the private sector to GDP; (2) Domestic credit provided by the banking sector as a share of GDP; (3) The ratio of broad money supply as a percentage of GDP. Economic growth is measured by GDP per capita. Human development index (HDI) is used as a proxy for human development. It is calculated as per the UNDP's formula for HDI calculation.

The long run relationship and short run dynamics are examined by implementing the ARDL bounds testing approach to co-integration. Granger's non-causality test and Variance decomposition techniques are also used to examine the impact of financial development indicators on human development. The empirical results of ARDL test support the existence of co-integration among the used variables i. e. Financial development indicators, economic growth and human development index during the study period in Indian economy. The results of causality suggest that unidirectional causality runs between financial development indicators and human development index. It is found that that all the three indicators of financial development have expected positive signs, but only broad money supply as a share of GDP is significant at the 1 % level. The estimated coefficient reveals that a 1% rise in monetization variable increases human development index (HDI) by 17%. The result of variance decomposition analysis shows

that the broad money supply is the only indicator, among all the financial development indicators exerts the largest share to influence changes in human capital, i.e., 64.7977%.

Based on the empirical findings some policy recommendations can be drawn: (1) Accessibility of financial services should be increased for poor individuals because it has become an important role to improve human development. The access to financial services for the poor people can provide the opportunity to save and borrow funds which will improve the life expectancy, income and education level of poor people (2) the change of financial development indicators should be taken into account to improve the level of human development in Indian economy.

Based on the empirical findings of the present study few important policy implications can be drawn in the context of Indian context. As the Indian financial sector is largely bank-centric, the performance of the banking sector is quite vital in the development process of the economy. Thus, financial deepening can be achieved through the banking sector development to ensure the high and sustainable economic growth. It is also required to increase the business and transactions of banks that is to increase in credit and deposits that will decide the extent of financial accessibility and will encourage the economic growth. Specifically, government and policy makers must look forward to address the policy issues to foster economic growth with the development of the banking sector. In addition to that the impact of stock market development is also quite significant in explaining economic growth of the country. Hence, parallel expansion of financial institutions and financial markets is necessary for economic growth for Indian economy.

The empirical findings of the present study observed a non-linear relationship between inflation and economic growth, which implies that when inflation exceeds the estimated threshold level (6.75%), economic growth is obstructed. Therefore, threshold level of inflation could be of use in providing policy guidance to policy makers in regulating economic growth for Indian economy.

However, the impact of financial development on income distribution is regressive. Therefore, to reduce the income gap between poor and rich, financial policies should enhance financial accessibility to the grass root level of the economy. In this regard the study recommends

financial inclusion for Indian economy and expansion for financial accesabilities through branch banking. Further, it is found that financial development indicators are positively associated with poverty reduction and human development. But the magnitude of this effect is sensitive to the chosen proxy of financial development. Thus, this impact can't be generalized for all the indicators of financial development.

In sum, we can conclude that further development of the financial sector as well as high economic growth has become an important objective to reduce the high level of prevailing poverty in India. In addition to that, it will also improve the level of human development in Indian economy.

Specific Contributions

In an attempt to examine the issues related to the interrelationships between financial development, inflation and economic growth, the present study empirically evaluated complex relationships in the context of Indian economy. The findings of the research would certainly help the policy makers in understanding the issues revolve round the above interrelationship clearly and guide them to achieve high and sustainable inclusive growth for the economy.

The present study is conducted to fill the research gaps existing in the issues related the topic of the research in the following areas.

(i) In the context of exploring the relationship between financial development and economic growth, the study distinguished the role of stock market development indicators, from that of banking sector development indicators in explaining their role in the economic growth.

(ii) The study also supports the above findings by extending the research with state level panel data for 28 Indian states instead of only major Indian states. The study uses the state gross domestic product (GSDP) instead of net domestic state product (NSDP) as a proxy for economic growth due to the presence of different depreciation rates across states.

(iii) There are few studies conducted in exploring the relationship between inflation and economic growth revealed non-linearity of inflation-output growth nexus. However, in the view

of the structural changes of Indian economy and changes in the methods of calculating price index recently, there was a need to the empirical analyze with the new dataset in order to capture more recent picture of inflation-growth nexus. Hence, the present study included the highest number of commodity baskets (676 baskets of commodities) inflation data, which would provide new insights to monetary policy makers on crafting appropriate policies for achieving economic growth.

(iv) There is hardly any study to analyze the relationship between financial development and income inequality in Indian context, exploring the role of market based indicator and bank based indicator of financial development. Further, there is hardly any study to include Gini coefficient as a proxy for income inequality in India and apply ARDL techniques of co-integration, using the basic principles of GJ Hypothesis and provide short run and long run dynamics for India. So the contribution of the study is to fill these research gaps.

(v) Similarly, the issue of financial development and poverty reduction linkage is also hardly explored in Indian context. Hence, the present study examined the causal relationship between financial development and poverty reduction by using modern econometric techniques.

(vi) Additionally, this study also fills the research gap of the relationship between financial development and human development in India. Towards this objective, the study calculated the human development index and developed a time series data for future use of the researchers working on the related areas. By including the above index, the study examined the causal relationship between financial development indicators and Human Development Index (HDI) in India by using modern econometric techniques.

Limitations of the study

(i) Majority of earlier studies in the context of exploring the above mentioned relationship have taken M3/GDP as a proxy of financial development. However, the unavailability of the above mentioned indicator, the study has taken the ratio of credit amount as a share of the state's output, the ratio of deposit amount as a share of the state's output and number of all scheduled commercial bank branches as a proxy of financial development in Indian states.

(ii) The study used the wholesale price index as a proxy of inflation instead of the consumer price index.

(iii) Further, the per capita consumption expenditure is used as a proxy for poverty reduction while the study examined the relationship between financial development and poverty in Indian economy. Though the poverty headcount ratio is more appropriate proxy variable to indicate the poverty. But due to incompatibility of the NSSO data on poverty headcount, the same is not used in the study.

(iv) The study has calculated human development index (HDI) for Indian economy based on the old method of NHDR (2000).

Future Scope of Work

(i) In the future, it is recommended to use some other suitable proxy i.e. (M3/GDP) of financial development of the state level study.

(ii) The study can use the consumer price index instead of the wholesale price index as a proxy of inflation to reexamine the effects of threshold inflation on economic growth for Indian economy.

(iii) The issue of financial development and income inequality can be analyzed by using the state level data for Indian economy.

(iv) The poverty head count ratio can be taken as a proxy of poverty reduction variable in exploring the impact of financial development on poverty.

(v) The human development index can be calculated by using the modified method of NHDR (2011). Hence, the issue of financial development and human development can be re-examined by including the modified human development index.

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List of Publications and Presentations

Publications from the Ph.D. thesis

1. Madhu Sehrawat, A.K. Giri (2015), "Financial Development and Income Inequality in India: An Application of ARDL Approach", ***International Journal of Social Economics***, 42 (1), 64-81.

2. Madhu Sehrawat, A.K. Giri (2015), "Re-examining the Threshold Effects in Inflation–Growth Nexus: Evidence from India", ***International Journal of Economics and Empirical Research***, 3 (2), 57-67.

3. Madhu Sehrawat, A.K. Giri (2015), "Financial development and economic growth: Empirical evidence from India", ***Studies in Economics and Finance***, 32 (3), 340-356.

4. Madhu Sehrawat, A.K. Giri (2014), "The relationship between Financial Development Indicators and Human Development in India", ***International Journal of Social Economics***, 41(12), 1194 – 1208.

5. Madhu Sehrawat, A.K. Giri (2013), "Inflation and Financial Sector Development: Evidences from Indian Economy", ***International Journal of Multidisciplinary Research***, 2 (3), 118-121.

6. Madhu Sehrawat, A.K. Giri (2013), "Inflation in India: Empirical Analysis using VAR Approach", ***International Academic Research Journal of Economics and Finance***, 2 (1), 1-8.

7. Madhu Sehrawat, A.K. Giri, "Financial development and poverty reduction in India: an empirical investigation", (Accepted for publication, ***International Journal of Social Economics)***.

8. Madhu Sehrawat, A.K. Giri, "The role of Financial development in economic growth: Empirical evidence from Indian States", (Accepted for publication, ***International Journal of Emerging Markets***).

9. Madhu Sehrawat, A.K. Giri, "Impact of Inflation on Financial Development: Evidence from India", (Accepted for publication, ***Journal of Economic Policy and Research***).

Peer reviewed paper presentations

1. Madhu Sehrawat, A.K. Giri, "Measuring Core Inflation in India: An Empirical Evaluation of Alternative Methods" paper presented at 20th Biennial Conference of AIEFS, IGIDR, Mumbai, 2nd -3rd August, 2013.

2. Madhu Sehrawat, A.K. Giri, "Does financial development lead to poverty reduction in India? An Empirical Investigation" paper presented 50th Indian Econometric Society Conference, ***IGIDR, Mumbai***, 22nd -24th December 2013.

3. Madhu Sehrawat, A.K. Giri, "Financial development and economic Growth: empirical evidence from India" paper presented at National Seminar of Input Output Economics: Application of Planning, Growth & Development Issues in Indian Economy, ***Gokhale Institute of politics and Economics, Pune***, 31st Jan- 2nd Feb 2014, India.

4. Madhu Sehrawat, A.K. Giri, "The relationship between Financial Development Indicators and Human Development in India: An application of ARDL Approach" paper presented at 4th International Conference on Applied Econometrics, ***IBS Hyderabad***, 20th -21st March 2014, Hyderabad.

5. Madhu Sehrawat, A.K. Giri, "Financial Development and Poverty reduction: Panel data analysis of Asian Countries" paper presented at National Seminar on Applications of Panel Data, ***Centre for Economic and Social Studies (CESS), Hyderabad***, 25th-26th March 2014.

6. Madhu Sehrawat, A.K. Giri, "Financial development index, trade openness and economic growth in India: re-examining the nexus" paper presented at Empirical Issues in International Trade and Finance (EIITF), ***IIFT Delhi Campus, New Delhi***, 18th-19th December, 2014.

7. Madhu Sehrawat, A.K. Giri, "An empirical relationship between financial development indicators and human capital in some selected Asian Countries" paper presented at 2nd International Conference on Economics and Finance, ***Kathmandu, Nepal***, 26th– 28th February 2015.

Brief Biography of the Candidate

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