DYNAMIC ECONOMETRIC MODELS
DOI: http://dx.doi.org/10.12775/DEM.2018.001 Vol. 18 (2018) 5−34

Submitted March 10, 2018
Accepted June 15, 2018

ISSN (online) 2450-7067
ISSN (print) 1234-3862

*Shravani Sharma and Supran Kumar**

Dynamics of Financial Development and Economic Growth: Panel Data Analysis for Selected Indian States

A b s t r a c t. With the help of standard refined panel analysis techniques the present study analysed the dynamics of causal relationship between financial development and economic growth for selected Indian states. Mainly focusing on banking level indicators the present attempt measured the extent of financial development in the selected Indian states. Three major econometric techniques including panel unit root tests, cointegration tests and finally the panel error correction model have been implemented for identifying the relationship between variables. Firstly, the series was tested for cross-sectional independence and then checked for the presence of unit roots. The results of both first and second generation unit root indicated an integration of order one for all the variables and a long-run relationship between financial development and respective economic growth indicators was confirmed by the Pedorni's and Westerlund's cointegration tests. The results of the present study emphasized on the critical role of credit provided by banks in the process of long run economic growth across states. Apart from this the results of the study highlighted a very relevant fact that the Indian economy has a lot of scope in harvesting the less financially developed areas of the states which can run rapidly on the greeny path of dynamic and sharp long term sustainable economic growth.

K e y w o r d s: causality; economic growth; financial development; panel data; unit root.

J E L Classification: G21; C23; O40.

* Correspondence to: Shravani Sharma, Faculty of Management, School of Business, Shri Mata Vaishno Devi University, Katra, Jammu & Kashmir (India), E-mail: shravanisharma06@gmail.com; Supran Kumar, Faculty of Management, School of Business, Faculty of Management, Shri Mata Vaishno Devi University, Katra, Jammu & Kashmir (India) E-mail: suparn329@yahoo.co.in.

Introduction

The pace of provincial and national economic growth of an economy is primarily depicted by positive and continuous transformation in the level of production of goods and services. The continuous evolvement in the production of goods and services directly depends upon the capability of an economy in efficient utilization of its available physical and human resources. Moreover, effective aggregation of physical and human capital is basically catalysed and promoted by productive financial intermediation (Fitzgerald, 2006). This accumulation requires regular mobilization of foreign and domestic savings by discovering the productive projects, meanwhile also keeping proper checks on the working of these projects (Goldsmith, 1969) and here, it is pertinent to mention that the monitoring of a project is facilitated by an effective and sound financial system.

Financial system is considered as the mainstay of an economy. Effective and conducive financial system is instrumental in providing sound and progressive business environment. However, endowment of this environment as well as financial infrastructure is indeed a crucial challenge faced by a nation. It is suggested that countries which do well in terms of financial development for constant period of time are equally productive on the front of reduction of their poverty level and generation of better infrastructure as well (Barro, 1996). Thus, financial development entails for the establishment and development of financial institutions which consequently promote growth and investment process. Available literature on financial development and economic growth specifies that apart from managing the savings of individuals as well as groups, credit allocation in financial system plays a very prominent role since it is considered as the key for rational and inclusive economic development. Modern concept of economic growth suggests that rational allocation of capital investment increases the effectiveness of financial institutions which in turn promotes emergence and growth of an economy (Yang and Yi, 2007).

Financial development is considered as one of the major policy areas for enhancing the economic efficiency and simultaneously economic growth of an economy. In the present context, financial system is one of such inputs which propel the economic growth of a country with its slow accumulation. There are variety of ways through which the financial system can affect the economic growth of any economy. Here, it is worth mentioning that a more developed financial system accesses and thus, in turn utilizes correct information about the borrowers of funds (Boyd and Prescott, 1986). Moreover, a more developed and sound financial system will also provide more reliable database regarding the prospective clients to deal with and thus, will in turn help in channeling the resources to higher yielding projects. So, development

of financial intermediaries helps in increasing economic growth (Greenwood and Jovanovic, 1990). Different channels through which the financial intermediaries diligently ascertain the authentication of the borrowers includes the mortgage system, interests rates, collateral requirements and so on (Tiwary and Thampy, 2015). These above mentioned channels not only make the utilization of funds effective but also create an environment for proper mobilisation of funds within an economy as well as for attracting funds from other economies as well (Boyd and Smith, 1998). The other prime channel through which the financial system can affect the growth of an economy is by offering more competitive and effective products. Hence, a financial system which provides a proper system to effectively manage the high return projects directly helps in boosting the economic growth. Though, there is ample of indication that financial development plays a vital role in endorsing economic growth of the industrialized countries (Beck and Levine, 2004), but evidences are relatively mixed in case of developing or emerging economies. With uncertain market condition, it has become imperative to identify the channels of finance to economic growth as the aforesaid matters have important policy implications. Assuming financial development as an engine to economic growth policy makers should focus on the creation and promotion of modern financial institutions including banks, non-banks, and stock markets in order to promote genuine and long-term economic growth.

However, on the other hand, there are studies (Patrick, 1966; Stern, 1989; Ram, 1999; Akinboade, 2000; Favara, 2003; Majid and Mahrizal, 2007; Demetriades and James, 2011; Nain and Kamaiah, 2014 and Kumar et al., 2015) which do not agree to this view and have rejected any causal role for financial development in the growth process. If this contrasting argument is the accurate depiction of reality, then all the policy work and efforts to encourage financial development would be premature and in fact will lead to uneconomical use of limited resources. Moreover, unnecessary emphasis on financial development will also turn away attention from other, perhaps more, urgent policy options to spur economic growth such as labour training and skill development programs to improve productivity, legal reforms to induce investment, and export promotion schemes etc. Apart from this, majority of the studies that deal with this concern consider economic growth at the aggregate level, where it is very simple to establish and explain a causal relationship between financial development and economic growth (Misra, 2003, Acharya et al., 2009, Giri and Mohapatra, 2012, Nain and Kamaiah, 2014 and Sharma and Bardhan, 2016). In Indian context, there have been dearth of studies that deal with the impact of domestic financial development on economic growth at regional and empirical level. To put it briefly, 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. Thus, focusing on the development of the aforementioned issue the present study is an attempt in the direction to uncover the relationship between the financial development and economic growth with the help Indian context.

1. Literature Review

Significant research studies are available on the aspect of financial development and economic growth and other related issues contributed by academicians, researchers and institutions. The writings on the relationship between financial development and economic growth can be traced from the pioneering work of Schumpeter (1911), Robinson (1952), McKinnon (1973), Shaw (1973) and Lucas (1988) etc.

Goldsmith (1969) using data of 35 countries for the period 1860–1963 studied the relationship between financial development and economic growth and identified that financial development exerts a causal influence on economic growth. The study concluded with a positive correlation between economic growth and financial development. In a similar study Gregorio and Guidotti (1995) by highlighting the importance of the efficiency of the financial system more specially the credit component instead of volume of investments uncovered the long-run relationship between the growth in financial system and growth of the economy. The study revealed that efficient allocation of credit in the financial system plays a significant role in uplifting the economic condition of the Latin American countries. The reason for this was attributed towards the introduction of financial liberalization. By examining the casual relationship between the financial development and economic growth in Indian context, Bhattacharya and Sivasubramanian (2003) suggested that there exists a one-way causal relationship from financial development to economic growth.

By focusing on Egypt, Abu-bader and Abu-Qarn (2007) identified a bi-directional relationship between financial development and economic growth. Furthermore, the study also uncovered that the relationship between the two is catalysed by increasing resources for investment and enhancing efficiency.

In another study, Hassan et al. (2011) provided substantiated evidence on the link of financial development and economic growth in various low and middle-income countries. In context of developing countries the study indicated a positive relationship between financial development and economic growth. Similarly, Al-Malkawi et al. (2012) in an empirical study uncovered a negative and statistically significant relationship between financial development and economic growth for United Arab Emirates. Lacth and Gurgul

(2012) by considering differnt aspects of financial development identified unique causality from stock market development to economic growth and from economic growth to banking sector development in poland.

Furthermore, focusing on significant parameters of financial development various studies identified uni-directional causal relationship from credit provided by banks to the development of economic growth. Osman (2014) examined impact of private sector credit on the economic growth of Saudi Arabia using ARDL model and concluded that there is long-run as well as short-run relationship between private sector credit and economic growth of Saudi Arabia. The study suggested bank credit to private sector as an important contributor towards the economic growth of Saudi Arabia. Similarly, Emecheta and Ibe (2014) concluded a positive and statistically significant relationship between bank credit to private sector, broad money and economic growth in Nigeria. In a more recent study Korkmaz (2015) found a significant role of domestic credit provided by banking sector on economic growth for selected Europian economies. Furthermore, there are some studies in the recent literature which support the uni-directional causality hypothesis from economic growth to bank credit. In a study Onuorah and Ozurumba (2013) suggested a uni-directional relationship running from economic growth to credit provided by banks. Similarly, Obradovic and Grbic (2015) suggested that economic growth contributes to financial deepening. The study identified a uni-directional causality running from private enterprise credit to economic growth of Serbia. In a more recent study Aydi and Aguir (2017) considering Southern Mediterrean countries indicated a strong positive relationship between financial development and economic growth. The study focused more on the advancement and more innovation of banking sector. In a somewhat similar study Witkowska and Kompa (2017) identified strong relationship between change in the political envionment and the development of the financial system in poland. Bist (2018) considering a panel of 16 African countries highlighted the presence of long-run relationship between financial development and economic growth with a positive relationship from the indicators of financial development towards the economic growth. The study emphasized on extending of credit facility to the private sector in these countries for achieving more growth. In another study Younis and Bechtini (2018) uncovered one-way causality from financial development to inequality in income in BRICS countries. In another study Nyasha and Odhiambo (2018) illustrated the crucial role of financial development in accelarting economic growth in South Africa.

In Indian context considering 25 states, Mishra (2003) studied the relationship between financial credit provided by banks and the economic growth and indicated a positive relationship between the two. Furthermore,

using multivariate cointegration and error correction techniques for Indian economy, Kamat and Kamat (2007) suggested strong evidence in favour of finance-led growth hypothesis and suggested finance as a strong and leading indicator for the economic growth. Moreover, the results of the study also provided relevant evidence that improvement in the stock market enhances the infrastructural growth of the economy. On the similar lines, the study conducted by Singh (2008) indicated long-run as well as short-run relationship between financial development and economic growth. In another attempt to identify the relationship between financial development and economic growth, Arora (2012) presented a multi-purpose and multi-dimensional representation of the bank credit. The study proposed that the credit provided by banks acts as a base for growth, globalization, urbanization, removing the inequalities between rural and urban areas, small and large borrowers and finally economic growth. The study subsequently, advocated a broader role of credit, which is growth oriented as well as developmental in nature. In another study, Acharya et al. (2009) investigated the relationship between the financial development and economic growth in different sets of Indian states including BIMARU and nine other states using the credit outstanding as an indicator of financial development and confirmed the relationship between financial development and growth in Indian states. Hye (2011) identified the relationship between financial development and economic growth by constructing an index of financial development including four financial variables. The findings of the study suggested that during most of the years the index negatively related with economic growth of the country. Giri and Mohapatra (2012) supported the supply leading hypothesis and highlighted the importance of financial development for better growth in Indian context. In the similar context, Ray (2013) also highlighted the positive role of financial development in the economic growth of India during 1990–91 to 2010–11. However, using aggregate data, Nain and Kamaiah (2014) found no evidence of causality between financial development and economic growth in India. Similarly, Kumar et al. (2015) employed Toda and Yamamoto Granger-causality tests for South Africa for data over the period 1971 to 2011 and confirmed the absence of causality between financial development and economic growth, thus indicating that these two variables evolve independently with each other. Similarly, Kumar and Chauhan (2015) did not find any evidence of causality between saving deposits with commercial bank and economic growth of India.

The existing literature on the subject matter centred on different variables, covering different countries/states, utilizing different econometric techniques, considering different time frames, and hence, presented varied results too. Though, there are many studies in Indian context uncovering the

relationship between the two however, most of them either focused on few numbers of states or the time frame considered was inadequate. Therefore, testing the same relationship with larger data set will provide better and reliable results. Moreover, the literature focusing on the pooled data of states with empirical data is also very limited in Indian context. Thus, in this regard the present study contributes to the literature by providing evidence and hence, fulfilling the gap by undertaking panel data analysis of 23 Indian states over a period of 17 years. Hence, the present study is pursued in this direction to fill the existing gap.

2. Research Methodology

2.1. Sources of Data and Variables Used

There is significant advantage of using panel data or pooled data over cross-sectional and /or time-series data as the panel data increases the degree of freedom for estimation of parameters and hence facilitates the use of multivariate analysis techniques (Hassan et al., 2011). The present study utilized the state level data of Union of India for the period of 1997–1998 to 2015––2016 and the data have been compiled from the various reports of Reserve Bank of India including Handbook of Statistics on Indian Economy, Basic Statistical Returns of Scheduled Commercial banks, Branch Banking statistics for the aforesaid duration. A total of 23 states comprising Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal have been selected for the estimation of the relationship between financial development and economic growth. Although, the study has tried to capture the overall scenario of the financial development and economic growth nexus by including all the major states, yet the union territories of India are kept out of the preview of the present study.

At present, India is a federation of 29 states and 6 union territories. For the purpose of the analysis, the present study has left out the state of Delhi and the six union territories, as these are smaller geographical units, working and process are different. Among the remaining 29 stat0.es, three states namely Uttaranchal, Jharkhand, and Chhattisgarh, and Telengana carved out of the states of Uttar Pradesh, Bihar, Madhya Pradesh and the state of Andhra Pradesh respectively, were formed in the year 2000 and later. For analysing the data for these four states two major techniques were available: (i) Merging the data of these newly formed states with their parent states and (ii) the other option to analyse these states would have been to split the data

before 2000 between new states and their parent states. For this, data at district level would be needed, which is not available in public domain for most of the variables used in the study. Thus, the present study has merged these newer states with their parent states for the purpose of research modelling estimation and consequent analysis.

In recent years, the structure of employment and income generation in the Indian economy has gone through some critical changes. India, a primarily agrarian and rural economy, is the eleventh largest economy in the world in terms of nominal GDP and the fourth largest in the world in terms of purchasing power parity (IMF reports, 2011). India is currently the second fastest growing economy (after China), which registered 8.9 per cent growth during 2010 and after a slight slowdown, it is again reaching new heights.
An attempt has been made to incorporate a comprehensive list of variables (refer Table 1), which reflects the general and informative results about different indicators of financial development. By considering some of the relevant financial development indicators the present study attempted to identify the relationship of financial development and economic growth in Indian context.

The Table 1 provides the summary of different studies alongwith the nature of data taken, the indicators used, etc. In India scheduled commercial banks accounted for around 70 per cent of the total assets of the financial system (Inoue and Hamori, 2010) so the present study has focused on the banking sector as a measure of financial development. Banking sector development is defined as the development in the quality, quantity and effectiveness of the banking services (Pradhan et al., 2011). This procedure involves the interaction of many activities and cannot be measured by a single indicator (Levine and Zervos, 1998; Rousseau and Wachtel, 2000; Beck and Levine, 2004; Naceur and Ghazouani, 2009). Most of the studies given in Table 1 focused on banking level indicators and considering the above mentioned literature the present study has focused mainly on credit, deposits, number of branches and their per capita deposits and credits etc. measure as financial development indicators.

In the present endeavour, for carrying out the estimations, the per capita state domestic product (PCSDP) and state domestic product (SDP) have been used as the proxy for economic development. On the other hand, the financial variables (proxy of financial development) used in the study for state level data are – (1) the number of branches of banks (NOF) (2) The outstanding credit of all the scheduled commercial banks of the state to the different sectors(OC) (3) Per capita credit (PCC) (4) per capita deposit of all scheduled commercial banks of selected states(PCD) (5) population per office(PPO) (6) Number of debit accounts (DA) and (7) Number of credit ac-

counts (CA). The above mentioned indicators are primarily considered as the indicators of depth of the financial institution in a country thus, it is presumed that higher the depth higher will be the economic growth (Inoue and Hamori, 2010). These measures are widely accepted and frequently used in the finance-growth relationship literature (Kendall, 2012; Aghion et al., 2007; Jayaratne and Strahan, 1996; King and Levine, 1993a). For making the data comparable all the values are taken in their respective logarithmic form. The use of multiple indicators for financial development helps in better understanding of different aspects and processes of financial development. Three major econometric techniques including panel unit root tests, cointegration tests and finally the panel error correction model have been implemented for identifying the relationship between variables.

Table1. Different indicators of financial development

S.No	Studies	Period	Name/Number of Economies	Type of Data	Financial Development Indicators
1	King and Levine (1993a, 1993b)	1960–1989	80	Cross-Section Data	i) Liquid liabilities of financial system divided by GDP ii) Ratio of bank credit divided by bank credit by central bank domestic asset, iii) Ratio of credit allocated to private enterprise to total domestic credit, iv) Credit to private sector to GDP.
2	Gregorio and Guidotti (1995)	1960–1985	80	Pooled Cross-Section data	i) Bank Credit ii) GDP
3	Berthelemy and Varoudakis (1995)	1960–1985	91	Panel Data	i) Money supply ii) GDP
4	Demetriades and Lunitel (1996)	1961–1981	India	Time-series	iii) Bank deposit liabilities i) GDP
5	Demetriades and Lunitel (1996a)	1962–1982	Nepal	Time-series Data	i) Bank deposit liabilities ii) GDP
6	Rajan and Zingales (1998)	1980–1990	55	Panel Data	i) The ratio of credit to private sector to GDP, ii) Accounting standards
7	Levine and Zervos (1998)	1976–1993	41	Time-series Data	i) Ratio of market capitalization to GDP, ii) Ratio of total value of trades to GDP, iii)turnover ratio

Table1. Continued

S.No	Studies	Period	Name/Number of Economies	Type of Data	Financial Development Indicators
8	Rousseau and Wachtel (2000)	1980–1995	47	Panel Data	i) Liquid liabilities, ii) Stock Market capitalization, iii) Stock Market value traded
9	Beck et al (2000)	1960–1995	63 for cross-sectional and 77 for panel	Cross-section and Panel Data	i) Private credit to GDP ii) GDP
10	Safdari et al.(2011)	1975–2008	Iran	Panel	i) Trade to GDP ratio ii) The share of gross fixed capital formation to nominal GDP
11	Sharma and Ranga (2014)	2000–2012	India	Time-series	i) Saving deposits with commercial bank ii) GDP
12	Kumar and Chauhan (2015)	1975 to 2013	India	Time-series	i) Saving deposits with commercial bank ii) GDP
13	Sherawat and Giri(2015)	1993–2012	India	Panel Data	i) Credit as a share of state output ii) Deposit as a share of state output iii) Number of scheduled commercial bank branches
14	Sharma and Bardhan (2016)	1980–2011	India	Panel Data	i) Per capita deposits ii) Per capita credit iii) Per capita GDP

2.2. Panel Unit Root Test

To identify the nature and pattern of data in the dataset under consideration, a series of panel unit root test were employed in the present analysis. Otherwise problem with spurious regression could be faced. The literature on stationarity measurement has divided the unit root tests into first generation unit root test (Levin, Lin and Chu (LLC), Breitung, Hadri, Im Pesaran Shin test (IPS)) (Maddala and Wu, 1999; Breitung, 2000; Hadri, 2000; Levin et al, 2002 and Im et al., 2003) and second generation unit root tests (O'Connell; Breitung and Das; Moon and Perron, Bai and Ng and Pesaran developed by O'Connell, 1998; Breitung and Das Moon and Perron, 2004; Bai and Ng, 2004; Breitung and Das, 2005 and Pesaran, 2007) (Hurlin, 2004 and Hu et al., 2006). The first generation unit root tests are in-turn divided into homogeneous model hypothesis tests (Levin, et al., 2002; Breitung, 2000 and Hadri, 2000) and heterogeneous model hypothesis tests (Im et al., 2003 and Maddala and Wu, 1999). Although, cross-sectional units in the present study are the states of India which more or less comes under homo-

geneous model hypothesis, yet to reinforce the results in the present attempt tests from heterogeneous hypothesis model have also been implemented.

In case of IPS test, for analysing the presence of unit root, the model is specified as follows:

$$Y_{it} = \beta_i y_{it-1} + \sum_{j=1}^{p} \emptyset_{ij} \Delta y_{i\,t-j} + X_{itp} + \epsilon_{it} \quad (1)$$

where $i = 1,2,...,N$ are the number of cross-sections over period $t = 1,2,\ldots,T_i$ Here, y_{it} stands for each variable under consideration in our model, β is auto-regressive coefficient and ϵ is the error term. The null and alternate hypothesis of the respective model:

$$H_0 : \beta_i = 0, \text{ for } i = 1, 2,\ldots, N. \quad (2)$$

This indicates that a unit root is present and thus, the model would be non-stationary in this case.

$$H_1: \beta_i < 0, \text{ for } i = 1, 2,\ldots, N. \quad (3)$$

IPS test uses different unit root test for all the cross-sections and the final test statistics is represented as $\bar{t}$ is the average of individual ADF statistics.

$$\bar{t} = 1/N \sum_{j=1}^{N} (t)_{pi}$$

where t_{pi} is the individual t-statistic for testing the null hypothesis. Under the null hypothesis of non-stationarity IPS show that the t-statistic follows asymptotically a standard normal distribution. IPS provides simulated critical values for t for different number of cross-sections N, series length T.

On the other hand, LLC estimates the simple regression equation of differenced concerned variable as follows:

$$\Delta x_{it} = \propto + \delta x_{it-1} \sum_{r=1}^{s} \emptyset_{ij}\, \Delta\, x_{it-j} + u_{it} \quad (4)$$

where, x is the variable under consideration, δ is the coefficient, u is the error term and $i = 1, 2,\ldots, N$ implying the number of cross-sections and $t = 1,2,\ldots, T$.

The LLC unit root test has developed a procedure utilizing pooled cross-section time-series data to test the null hypothesis that each individual time-series contains a unit root. Under LLC the unit roots are tested using ADF regression

The LLC test involves that rejection of the null can occur even when only a small sub-set of series are stationary (Divino et al., 2009). Apart from this, the LLC test assumes that errors are independent across all cross-sections (Banerjee, 1999). In the present study, comparison of the results from the above mentioned types of tests would enable overall comparison of cross-section results.

Literature reveals that not considering the cross-sectional dependence across cross-section units may affect the sample behaviour of the panel unit root test which subsequently results to the incorrect decision in a unit root test (O'Connell, 1998, Banerjee 1999; Pesaran, 2007). In order to evade this under-performance of the unit root tests, the present study carried out second generation panel unit root test which takes care of cross-sectional dependence and also allows for parameter heterogeneity and serial correlation between cross-section units in the panel (Pesaran, 2007).

Pesaran (2007) panel unit root test takes care of cross-sectional dependence by augmenting the DF regression (Dicky and Fuller, 1979) with cross-sectional mean and its lag. This test is known as cross-sectionally augmented Dicky–Fuller (CADF) test and is based on the following regression.

$$\Delta y_{i,\,t} = \alpha_i + {}^{p_i}\mathrm{y}_{i,t-1} + \beta_o y_{t-1} + \beta_1 \Delta y_t + \epsilon_{i,t} \tag{5}$$

where y_t is the average of y at time t for all N observations. The presence of lagged cross-sectional average and its first difference accounts for the cross-sectional dependence through a factor structure. CADF regression is run for each cross-sectional unit and then average is taken over all the cross-sections (similar to Im et al. 2003) and the resulting test statistic is calculated as follows:

$$\mathrm{CIPS}(N,T) = \frac{1}{N}\sum_{i=1}^{N} t_i(N,T) \tag{6}$$

where, $t_i(N, T)$ is the statistic obtained from individual CADF regression of i_{th} cross-sectional unit and where CIPS stands for cross sectional augmented IPS (Im et al., 2003) unit root test)

2.3. Panel Cointegration Tests

Long-run relationship between the variables after unit root is demonstrated with panel cointegration tests. The present study implemented Pedroni (1999) for testing panel cointegration for the selected states of union of India. Pedroni (1999) cointegration test is a combination of seven statistics including Panel v-Statistic, Panel rho-Statistic, Panel PP-Statistic, Panel ADF-Statistic, Group rho-Statistic, Group PP-Statistic, Group ADF-Statistic. These statistics are estimated on the basis of cointegrating regression equation

$$Y_{i,\,t} = \beta_0 + \beta_{1i} X_{1i,t} + \ldots + \beta_{Ni} X_{Ni,t} + E_{i,t}\,, \tag{7}$$
$$t = 1,\ldots,T;\; i = 1,\ldots,S$$

where, T is the number of observations over time, S denotes the number of individual members in the panel, and N is the number of independent variables. It is assumed here that the slope coefficients, β_{1i} ,.., β_{Ni} and the member

specific intercept β_0 can vary across each cross-section. To compute the appropriate panel cointegration test statistics, the cointegration regression in (7) is estimated by applying OLS for each cross-section (Orsal, 2007).

Secondly, the present study also utilised the four panel cointegration tests of Westerlund (2007) which having sufficient sample properties and high power relative to popular panel cointegration tests (e.g. Pedroni, 2004) and is also applicable in the situation of cross-section dependencies between the data.

2.4. Dynamic Panel Causality and Long-term Relationships

Pedronis' heterogeneous panel cointegration tests are only able to specify whether the variables are cointegrated and if a long-run relationship exists between them. Since, the mentioned model does not indicate the direction of causality, the present study estimated the two-step panel-based Vector Error Correction Model (VECM) proposed by Engle and Granger (1987) and uses it to conduct causality test on the financial development and economic growth relationship for the specified data of the study.

To identify the cointegration relationship, consider a two variable system equation:

$$Y_{it} = \beta X_{i\,t}$$

where, Y and X are two variables of interest, t is the time period and i is the number of cross sections.

The corresponding panel VEC model is:

$$\Delta Y_{it} = \beta_{1j} + \sum_{k=1}^{p} \alpha_{1ik}\ \Delta Y_{it-k} + \sum_{k=1}^{q} \eta_{1ik}\, \Delta X_{it-k} + \lambda \mathrm{ECT}_{1it\text{-}1} \qquad (8)$$

$$\Delta X_{it} = \beta_{2j} + \sum_{k=1}^{p} \alpha_{2ik}\ \Delta X_{it-k} + \sum_{k=1}^{q} \eta_{2ik}\, \Delta Y_{it-k} + \lambda \mathrm{ECT}_{2it\text{-}1} \qquad (9)$$

where, Δ is a first-difference operator applied to the variables; p and q are the lag lengths; i represents state i in the panel (i = 1, 2…., N); t denotes the year in the panel (t = 1, 2, …., T); Y and X are the variable of interest; ECT is error correction term which is derived from the cointegration equation.

The present study estimated the long-run equilibrium relationship given by the lagged Error Correction Term (ECT), which is a measure of the extent by which the observed values in time t-1 deviate from the long-run equilibrium relationship and in case the variables are cointegrated any such deviation at time t-1 should make alterations in the values of the variables in the next time point in an effort to force the variables back to the long-run equilibrium relationship (Ageliki et al., 2013).

3. Results and Discussion

To study the casual relationship among different indicators of financial development and economic growth, Panel VECM is implemented in the present study. However, before testing the extent and pattern of causality, the data-set is tested for cross-sectional dependence and stationarity. The present study examined the cross-sectional independence using Friedman test (Pala, 2016) having null hypothesis of no cross-section independence. The test is beneficial for the panel having small time period and large cross-section. The test is a non-parametric in nature where Spearman's rank correlation coefficient is used to estimates the cross-sectional dependency for the estimates.

Table 2 reveals that Friedman test-statistic is highly significant for economic growth and measures of financial development. Hence, evidence of cross-sectional dependence in the data-series indicates that Indian states for these relevant indicators are cross-sectionally dependent or correlated due to various observed and unobserved common factors (Sharma and Bardhan, 2016; Mishra and Mishra, 2014).

Table 2. Cross-sectional dependence test for panel data

Test	Statistics	Probability
Friedman test (chi-square)	260.96*	0.00

Note: *: Statistically significant at 1 per cent level of significance Friedman's test statistic showed an asymptotically χ^2 distribution with T-1 degrees of freedom.

Further, to test the order of integration of the variables under consideration literature provides two types of unit root tests. The first generation panel unit root tests are mainly based on the restrictive assumption of cross-sectional independence (Levin et al., 2002 (LLC); Im et al., 2003 (IPS); Maddala and Wu, 1999; Breitung, 2000). Literature reveals that not considering the cross-sectional dependence across cross-section units may affect the sample behaviour of the panel unit root test which subsequently results to the incorrect decision in a unit root test (O'Connell, 1998, Banerjee 1999; Pesaran, 2007). In order to evade this under-performance of the unit root tests, the present study carried out second generation panel unit root test which takes care of cross-sectional dependence and also allows for parameter heterogeneity and serial correlation between cross-section units in the panel (Pesaran, 2007).

Pesaran (2007) panel unit root test takes care of cross-sectional dependence by augmenting the dicky fuller regression (Dicky and Fuller, 1979).

Here, Pesaran (2007) panel unit root test in the presence of cross-sectional dependence fails to reject the null hypothesis of unit root at level for all the variables (Table 3). However, first differenced series of state level

per capita GDP, SDP and indicators of financial development are stationary except for population per office and outstanding credit.

Table 3. Second generation panel unit root test with cross-sectional dependence

Variables	Level	First Difference	Order of Integration
SDP	1.95	–4.13*	I(1)
PCSDP	0.12	–4.24*	I(1)
POP	18.64	17.52	–
CA	0.21	–2.80**	I(1)
DA	6.13	–3.17*	I(1)
NOF	2.92	–3.63**	I(1)
OC	–0.05	–1.23	–
PCC	3.50	–3.47*	I(1)
PCD	2.72	–4.27*	I(1)

Note: *: Statistically significant at 1 per cent level of significance; **: statistically significant at 5 per cent level of significance.

In order to check the robustness of the model, the present study also estimated the unit root using the first generation individual panel unit root test like Im, Pesaran, Sin; Fisher-ADF; Fisher-PP tests and common root test like Levin, Lin, Chu which propose the null hypothesis in favour of unit root too. The assumptions regarding the common unit root indicates that the tests are estimated using common autoregressive parameters for all the series included in the panel data-set, while the individual unit root tests provide different autoregressive coefficients in individual series in the panel data-set. The most widely used panel unit root tests in the literature involve the Levin et al. (2002) and Im et al. (2003). Thus, for studying the robustness of the model, the present study utilised both type including common and individual unit root tests for analysis. Further, the lag length criterion for group or pool unit root test is the automatic lag length selection that entails the information matrix criterion based for the number of lag difference terms and the Newey-West automatic bandwidth selection. The lag values used for the computation of the model were on the basis of the default values.

The null hypothesis for the panel unit root test is that the variables involve the presence of unit root. The test statistics for all the variables used in the data-set are shown in Table 4. All the variables accepted unit root hypothesis of non-stationary at levels except for LLC test in case of outstanding credit. The statistically insignificant values for rest all the tests statistics (refer Table 4) in the level form suggest the presence of unit root and hence, confirm the data to be non-stationary.

Table 4. First generation panel unit root tests

Variables		LLC**	IPS**	ADF**	PP**
PCC	Level	3.29	6.70	10.54	12.23
	First Difference	–6.55*	–10.95*	202.37*	2530.66*
PCD	Level	2.63	6.47	121.60*	366.04*
	First Difference	–7.39*	–16.37*	297.91*	3339.01*
PS	Level	7.33	6.21	15.66	14.91
	First Difference	–5.91*	–3.52*	80.48*	158.15*
NOF	Level	17.75	13.99	9.52	1.44
	First Difference	0.80	1.60	45.43	64.33
OC	Level	–2.51*	–0.60	38.42	35.52
	First Difference	19.01	3.44	16.51	223.74*
DA	Level	13.02	10.08	15.51	42.33
	First Difference	–4.18*	–6.03*	142.47*	1186.30*
CA	Level	4.34	7.63	5.48	5.18
	First Difference	–2.67*	–3.76*	92.39*	203.65*
SDP	Level	–5.10*	1.78	32.13	218.95*
	First Difference	–9.71*	–8.12*	156.84*	523.58*
PCSDP	Level	2.96	3.19	19.78	99.67
	First Difference	–11.98*	–12.18*	222.09*	352.34*

Note: *: Statistically significant at 1 per cent level of significance. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. Automatic lag length selection based on SIC: 0 to 3. Newey-West automatic bandwidth selection and Bartlett kernel.

Again by analysing the data in the first difference, the statistically significant values of all the statistics for all variables (except for number of bank branches and outstanding credit) rejects the null of unit root and thus, substantiate the data to be stationary at the first difference. In other words, authentication of Levin, Lin and Chu t stat; Im, Pesaran and Shin, W-stat; ADF-Fisher, Chi-square; PP-Fisher, Chi-square statistics less than the critical value of 1 per cent level of significance authenticate the rejection of null hypothesis, thus, validating the absence of unit root in the first differenced variables except for number of bank branches and outstanding credit. These results imply that for the respective states the variables are integrated of order one $I(1)$.

Comparison of the results of both the first generation unit root test with that of the second generation unit root provides consistent results for most of the indicators of financial development as well as of the economic growth. However, the variables number of bank branches and population per office are $I(1)$ in one type of test but not in the other, so the present study proceeds with both number of bank branches as well as population covered by the banks for further analysis as deleting a variable for analysis is not appropriate. However, outstanding credit is not taken into consideration for further analysis as the results of both first as well as the second generation unit root

test substantiate that the variable is stationary and hence can't be taken for further analysis.

The results of the panel unit root test suggest that the variables under consideration are non-stationary in their level forms and thus, the application of OLS/GLS or other techniques would yield inconsistent and biased results (Ramirez, 2006). Thus, it becomes necessary to move forward towards panel cointegration analysis to test the long-run relationship, if exists, between the variables. The panel cointegration test examines the presence of a long-run relationship between the variables (Ghali, 1998; and Basu et al., 2003). The cointegration test is estimated using the Pedroni (1999, 2004) as well as through Westerlund (2007) test which takes the cross-section dependence aspect also. The Pedroni (1999, 2004) test provides seven statistics and which are further grouped into two sub-dimensions: the "panel statistics" or "within dimension," which corresponds to the unit root statistic against homogenous alternatives (Breitung and Pesaran, 2008); and the "group mean statistics" or "between dimension," which involve the averaging of the individually estimated autoregressive coefficients for each country, individually. The null hypothesis for all the seven Pedroni tests is that there is no cointegration between variables involved in the model. Another important aspect of the Pedroni (1999, 2004) statistics is analysis of the test using critical value of −1.64. This means that a test statistic of less than −1.64 implies rejection of the null for all other tests except the v-statistic. For the panel-v, the critical value is 1.64. Thus, a test statistic greater than 1.64 indicates that the null hypothesis of no cointegration is rejected. According to Lund (2010) if the results indicate inconsistency, the panel ADF and group ADF should be implemented. The result of Pedroni's cointegration between number of credit accounts and SDP of the respective states suggests that all the four within dimensions panel cointegration test for the respective states reject the null hypothesis of no cointegration between the variables and overall all the seven statistics too rejected the null hypothesis of no cointegration at 1 per cent level of significance (refer Table 5).

Similarly, for the second situation of number of debit accounts and SDP of the selected states suggests that all the seven statistics are statistically significant and thus, rejected the null hypothesis of no cointegration. Similar results are obtained both in case of population per office and number of bank branches as well. In a similar way, the relationship of per capita credit and per capita SDP also reject the null hypothesis for all the Pedroni (2004) major statistics. Likewise, the relationship between per capita deposits and per capita SDP too reveals that all the seven statistics are significantly rejecting the null of no cointegration. The panel ADF and group ADF show consistent results. The Pedroni (2000) test rejected the null hypothesis of no cointegra-

tion in the important tests like Panel variance test, panel ADF and group ADF thus, on the whole, the results of the panel cointegration explicate that cointegration lies in all the specified empirical models and the results clearly point to a statistically significant long-run relationship between SDP and the discussed financial variables in different models.

Table 5. First generation panel cointegration test

Pedroni's Cointegration Test						
Method	SDP and CA Test Statistic(p-value)	SDP – DA Test Statistic(p-value)	SDP – Pop Test Statistic(p-value)	PCSDP – PCC Test Statistic(p-value)	PCSDP – PCDA Test Statistic(p-value)	SDP – NOF Test Statistic(p-value
Within dimension/Panel statistic						
Panel v-statistic (+)	20.98*	20.97*	24.74*	–1.52	1.35**	14.92*
Panel ρ-statistic	–11.89*	–13.22*	–10.38*	–8.30*	–9.08*	–12.71*
Panel PP-Statistic	–7.35*	–8.60*	–4.55*	–13.05*	–14.04*	–8.00*
Panel ADF-statistic	–3.44*	–3.93*	–3.47*	–8.85*	–8.59*	–9.86*
Between dimensions/Group mean statistic						
Group ρ-statistic	–3.29*	–3.74*	–2.96*	–5.02*	–5.35*	–3.64*
Group PP-Statistic	–14.13*	–14.92*	–11.48*	–16.05*	–16.08*	–15.26*
Group ADF-statistic	–8.72*	–8.14*	–8.82*	–12.31*	–11.79*	–11.48*

Note: *: Statistically significant at 1 per cent level of significance, **: statistically significant at 10 per cent level of significance. The Pedroni (2004) statistics are one-sided tests with a critical value of −1.64 (ko−1.64 implies rejection of the null), except the *v*-statistic that has a critical value of 1.64 (1.64 suggests rejection of the null); Selection of lags is based on Schwarz Information Criterion (SIC). Newey-West automatic bandwidth selection and Bartlett kernel.

Since, the variables in our study are cross-sectionally dependent (Table 2) and Pedroni's test of cointegration assume cross-sectional independency so the study moved further with analysis of the so called second generation panel cointegration tests that allow for cross-sectional dependence. Table 6 shows that two of the four Westerlund's panel cointegration tests; that are one each for the panel (P_τ) and group mean statistics (G_α), confirmed the presence of cointegration. Hence, the above mentioned tests reinforce the results and highlight the presence of cointegration among the variables taken into consideration.

3.1. Panel Vector Error Correction Model (VECM)

The causality test is conducted using VECM technique if the variables are integrated to the same order as well as cointegrated (Moudatsou and Kyrkilis, 2011; Fowowe, 2011; Emirmahmutoglu and Kose, 2011). The question of long-run causal relationship between financial development and economic growth is now examined more thoroughly with the use of panel vector error correction models. Defining the lagged residuals, the dynamic error correction models are estimated for the variable sets differently. The estimated results are presented in Tables 1.7. The short-run causality is estimated by the statistical significance level of the coefficients of the first differenced variables while the long-run causality is determined by the statistical significance of the respective error correction term (ECT) values using t-tests (Minija, 2012).

In the first case (SDP-CA) the statistical significant value of the t-statistics of SDP for the relation CA=*f*(SDP) suggests that in short run the economic growth helps in the advancement of credit in the financial system. However, the statistically insignificant value of the ECT values for the same relation does not provide any evidence of the long run relationship from SDP to number of credit accounts. Considering the other relation where SDP=f(CA) suggests that although, in short run credit do not have a significant impact on the economic growth, but the statistically significant ECT value (Kamal, 2015 and Bhanumati and Azhagaiah, 2014) illustrates that higher credit allocation in the long run in turn helps in boasting the growth of the economy. The estimated coefficient of the residual from the VECM test (ECT) with statistically significant value and a negative sign confirms the long-run equilibrium relation between the independent and dependent variable at 1 per cent level of significance. Here, the speed of adjustment implies that 2.5 per cent of the disturbance in the short-run will be corrected each year. The results are in line with the previous study of Sharma and Bardhan (2016) thus, this evidence emphasize on the critical role of bank credit in the process of long run economic growth across states. It has been suggested that in the absence of developed financial markets small and medium-sized industries which are considered the backbone of an economy, in particular, the economies very often fail to expand due to the dearth of funds. Further, expansion of credit not only supports industrial activities but also helps in generation of more physical and human capital which are also essential elements of economic growth. Since, small firms are generally considered labour intensive and are supposed to generate more employment opportunities so for a typical developing economy such as India, providing better credit facility has a positive implications on economic growth (Sharma and Bardhan, 2016). This also highlights that credit and

economic growth affect each other directly thus, suggesting a key indicator for enhancing the regional as well as national economic growth. Similarly, in case of SDP-DA the statistical significant value of ECT for the relation DA=*f*(SDP) suggests that in long run, economic growth does provide a strong evidence of causality towards the financial development, though the statistically insignificant values for SDP for the same relation suggests that in the short run there is no impact of this variable on deposits as a whole. Considering the other relationship SDP=*f*(DA) the results indicate that accumulation of deposit in the short run enhances economic growth in the long run thus, reinforce the results obtained in Table 5 and 6. The above findings verify that deposits are crucial indicator and are significantly beneficial to the economic growth of the Indian states. Higher deposits with the intermediaries means channelling of surplus funds to the deficit units of the economy hence, transforming deposits into loans and other advances (Naira, 2016). The results are in line with the earlier studies of Bhanumurty and Singh (2013) and Sehrawat and Giri (2015) which suggest a bi-directional causality and emphasis that economic growth has a critical role in financial development and that financial development leads to further development of economic growth of an economy. From the results of this relation it can be inferred that policy makers should emphasis on the measures which enhance the economic growth but they also focus on the development of banking system by considering the long term perspective of the mutual causality between the two which will ultimately benefit the economy as a whole.

Table 6. Second generation panel cointegration test

Westerlund Cointegration Test						
Method	SDP and CA Test Statistic (p-value)	SDP – DA Test Statistic (p-value)	SDP – Pop Test Statistic (p-value)	PCSDP – PCCA Test Statistic (p-value)	PCSDP – PCDA Test Statistic (p-value)	SDP – NOF Test Statistic (p-value)
G_t	–1.78*	–1.94*	–1.49*	–1.72*	–2.36*	–1.74*
G_α	–4.82	–4.97**	–4.52	–4.65	–10.62*	–4.51
P_t	–8.18*	–7.84*	–8.84*	–7.09*	–9.17*	–10.65*
P_α	–16.74*	–14.91*	–14.86*	–5.42*	–8.53*	–17.19*

Note: *: Statistically significant at 1 per cent level of significance, **: statistically significant at 10 per cent level of significance, Selection of lags is based on Akie Information Criterion (AIC) and Schwarz Information Criterion (SIC).

Overall the above two findings suggests that it is essential to expand the business and dealings of banks by augmenting the credit and deposits as it decides the degree of financial accessibility and in turn promotes the economic growth in the long run.

Further, the statistically significant value of coefficients of SDP in next scenario of PPO=*f*(SDP) points towards an important short-run relationship suggesting that with the increase in economic growth, the population served by the banks will also increases. With the increase in SDP of the state the circulation of the money will increase and hence, more people will utilize the services of the bank. Moreover, considering the broader perspective higher population covered under the banking system will slowly and steadily enhance the economic growth in the long run. This is indicated by the statistically significant coefficient of ECT in the SDP= *f*(POP).

Further, the statistically significant value of coefficient of SDP in next scenario of NOF=*f*(SDP) points towards an important short-run relationship illustrating that with the increase in economic growth, the number of branches within a state will increase and hence, the population served by the banks. Ardic and Damar (2006) considered it as the indicator of financial depth and suggested that with the increase in number of branches the domestic competition increases and thus, results in the better financial services and in-turn helps in the long run growth.

The short run dynamics of per capita credit and economic growth presented in Table 7 suggest that a short-run increase of bank credit inturn induces an increase in economic growth in the selected Indian states. However in the long-run, the magnitude of per capita credit coefficient is quite small and insignificant indicating that per capita credit partially determines the magnitude of real economic growth in the short-run only. This can be inferred that the growth of bank credit influences per capita SDP of the selected Indian states, but the reverse is not necessarily true. In other words, it can be argued that economic growth in Indian states is caused by the expansion and improvement of the banking system in the long-run.

A significant relationship between the another proxy of financial development, the bank accounts (deposits) per person suggests that with 1 per cent increase in the deposits the economic growth will increase with the same amount. Moreover, the estimated coefficient of the residual from the VECM test (ECT) with statistically significant value and a negative sign confirms the presence of long-run equilibrium relation between the independent and dependent variable at 5 per cent level of significance. The speed of adjustment implies that 1.6 per cent of the disturbance in the short-run will be corrected each year. However, the results of the study suggested that there is no significant relationship from economic growth to per capita SDP of the states in short run or in long run.

Table 7. Panel VECM estimation

Dependent Variable			Coeff	t-Stat	Dependent Variable			Coeff	t-Stat	Direction of Causality
SDP	SR	CA	0.107	0.650	CA	SR	SDP	–0.009***	–0.135	CA<–>SDP
	LR	ECT	–0.025*	–2.661		LR	ECT	–0.001	–0.423	
SDP	SR	DA	0.002**	0.051	DA	SR	SDP	–0.429	–2.336	SDP<–>DA
	LR	ECT	–0.038	–0.878		LR	ECT	–0.446*	–6.784	
PCSDP	SR	PCC	0.008*	1.826	PCC	SR	PCSDP	1.752	3.142	PCC–>PCSDP
	LR	ECT	0.014	3.252		LR	ECT	–0.004	–0.378	
PCSDP	SR	PCD	0.010*	0.951	PCD	SR	PCSDP	1.056	3.928	PCD–>PCSDP
	LR	ECT	0.016**	3.075		LR	ECT	0.006	0.437	
SDP	SR	POP	–0.132	–1.050	POP	SR	SDP	0.017**	0.410	POP<–>SDP
	LR	ECT	–0.038*	–3.240		LR	ECT	–0.012	–0.190	
SDP	SR	NOF	0.560	0.345	NOF	SR	SDP	–0.26**	–1.527	SDP<–>NOF
	LR	ECT	–0.162*	–3.288		LR	ECT	–0.031*	–4.462	

Note: *: statistically significant at 1 per cent level of significance, **: statistically significant at 5 per cent level of significance, ***: statistically significant at 10 per cent level of significance; SR: Short-run relationship, LR: Long-run relationship

The results in Table 7 overall suggests a bi-directional causal relationship suggesting that credit is a crucial factor of production, and increasing proper credit allocation in the long-run will enhance the economic growth so there is a need to develop an advance current credit allocation process. So, focus increasing the number of business units of the banks in less developed areas will benefit the economy directly. Thus, overall it is highlighted that policies which affect financial development in short-run or in long-run are likely to have an effect on economic growth and vice-versa.

Conclusions and Policy Implications

With the help of standard refined panel analysis techniques including panel unit root, panel cointegration and panel error correction model for a sample of 23 states of India over the period of 1997–1998 to 2015–2016, the present study analysed the dynamics of causal relationship between financial development and economic growth in the sampled states of the country. The results of the study are robust as the present study have utilised both the first generation and well as the recently developed second generation unit root as well as cointegration tests. Firstly, the series was tested for cross-sectional dependence, and the statistically significant values of cross-correlation data provided evidence in support of cross-sectional dependency. Further, the results of both first and second generation unit root as well as cointegration test that account for cross-sectional dependence were used to examine the data, and the results indicated an integration of order one for all the variables (except for few as mentioned above). The results suggested the

presence of cointegration and causality between financial development inputs and economic growth. The Pedorni's and Westerlund's cointegration test confirm the long-run relationship between financial development and respective economic growth indicators.

Policy implications of the present empirical results are presented as follows. In the present case, a cyclic relationship exits, financial market develops more in terms of credit allocation as a consequence of economic growth which in turn feedbacks a stimulant to real growth. Hence, policies which emphasize more on the financial development and economic growth need to be developed. In the developing economy like India, the financial sector is mainly dominated by commercial banks. Hence, to speed up the financial development of such economies, stringent efforts should be directed towards improvements in the banking sector with easy access to loans.

The analysis reveals that there exists a positive relationship between the number of business units, the population served by the bank and economic growth suggesting that higher the number of bank branches higher will be the population served by the branches and hence, more will be the level of economic growth. These two significant indicators highlight a very relevant fact that the Indian economy has a lot of scope in harvesting the less financially developed geographical areas of the state which can run rapidly on the greeny path of dynamic and sharp long term sustainable economic growth. So, the government needs to provide additional consideration to the banking development in less developed states so as to facilitate economic growth as well as social development and thus, minimize regional disparities in development and economic prosperity at regional and macro level. The banks need to support and assist opening of more bank branches in different states so that the commercial banks should increase the business potential by accelerating both deposits and advances to improve the business and the state government should improve the climate for investment through better governance so that the banking activities for developmental schemes are accelerated.

The bi-directional relationship between credit and economic growth and in short-run the uni-directional causality from per capita credit suggests that the banking system in Indian economy has a lot of scope of flourishing. Any expansion of the domestic credit provided by the banking sector will promote economic growth of the Indian economy and vice-versa. Because the financial sectors in India is still developing, deeper and more efficient financial markets are needed to improve the levels of economic development. Policies should aim at enhancing financial development and economic growth across states rather than concentrating on limited states which, in turn, possibly will help in growth convergence. Moreover, this has a signifi-

cant policy implication that a well-planned financial policy for promoting the development of domestic financial markets encompassing the banking sector is a crucial growth strategy for developing economy like India.

Identification of promising business ventures by keeping an eye on the upcoming market trends will not only help the banks to earn better and safe returns by reducing their non-performing assets but will also enhance the economic growth of our country. Like, there are special credit schemes for small and medium enterprises but it is important to allocate more bank credit to such endeavours as experience of emerging economies like China shows that these enterprises contribute around 90 per cent to the GDP and are also important for employment generation and poverty alleviation.

The two important aspect of the economic growth of Indian economy are agriculture and the industrial sector. Policy makers should make some important and strict decisions to reduce and rationally distribute loans to the non-performing agricultural and industrial sector.

Finally, on the basis of results obtained from the present study it should be recognized that economic growth itself may have the potential to promote further banking-sector development and hence, bring about additional economic prosperity through an interactive feedback effect. So, policy makers should pursue policies that attract lucrative investments in the country which will not only help in generating better avenues but also will create a more competitive environment which in-turn will benefit the economic growth of the country as well as the financial sector.

Further, it is pertinent to mention that the nature of data and the modelling method used in the present study uncovered some important aspect of the relationship between financial development and economic growth. However, extending the present study by capturing more aspect of financial development could provide some more interesting results on the aforementioned aspect.

References

Abu-Bader, S., Abu-Qarn, A. (2007), Financial Development and Economic Growth: The Egyptian Experience, *Journal of Policy Modeling,* 30(5), 887–898, DOI: https://doi.org/10.1016/j.jpolmod.2007.02.001.

Acharya, D., Amanulla, S., Joy, S. (2009), Financial Development and Economic Growth in Indian States: An Examination, *International Research Journal of Finance and Economics*, 24, 117–130.

Ageliki, A., Dimitris, K., George, P. (2013), Integrating the Neighbours: A dynamic panel analysis of EU-ENP trade relations, *Comparative Economic Studies*, 58(1), 1–26, DOI: https://doi.org/10.1057/ces.2015.23.

Aghion, P., Fally, T., Scarpetta, S. (2007), Credit Constraints as a Barrier to the Entry and Post-Entry Growth of Frm's, *Economic Policy*, 22(52), 731–779.

Akinboade, O. A. (2000), The Relationship Between Financial Deepening and Economic Growth in Tanzania, *Journal of International Development*, 12, 939–950, DOI: https://doi.org/10.1002/1099-1328(200010)12:7<939::AID-JID668>3.0.CO;2-I.

Al-Malkawi, H. A. N., Marashdeh, Abdullah, N. (2012), Financial Development and Economic Growth in the UAE: Empirical Assessment using ARDL Approach to Co-Integration, *International Journal of Economics and Finance*, 4(5), 105–115.

Ardic, O. P., Damar, H. E. (2006), Financial Sector Deepening and Economic Growth: Evidence From Turkey Accessed 26 March 2016, http://www.luc.edu/orgs/meea/volume9/PDFS/Damar%20Ardic%20-%20paper.pdf.

Arora, R. U. (2012), Finance and Inequality: a Study of Indian States, *Applied Economics*, 44(34), 4527–4538, DOI: https://doi.org/10.1080/00036846.2011.597736.

Aydi, M., Aguir, A. (2017), Financial Development and Economic Growth: The Empirical Evidence of the Southern Mediterranean Countries, *International Journal of Economics and Financial Issues*, 7(3), 196–209.

Bai, J., Ng, S. (2004), A Panic Attack on Unit Roots and Cointegration, *Econometrica*, 72(4), 1127–1177, DOI: https://doi.org/10.1111/j.1468-0262.2004.00528.x.

Banerjee, A. (1999), Panel Data Unit Roots Tests and Cointegration: an Overview, *Oxford Bulletin of Economics and Statistics*, 61(1), 607–29, DOI: https://doi.org/10.1111/1468-0084.0610s1607.

Barro, R. J. (1996), Determinants of Economic Growth: A Cross-Country Empirical Study, National Bureau of Economic Research, Working Paper 5698, DOI: https://doi.org/10.3386/w5698.

Basu, P., Chakraborty. C., Reagle. D. (2003), Liberalization, FDI, and Growth in Developing Countries: a Panel Cointegration Approach, *Economic Inquiry*, 41(3), 510–516, DOI: https://doi.org/10.1093/ei/cbg024.

Beck, T., Levine. R. (2004), Stock Markets, Banks and Growth: Panel Evidence, *Journal of Banking and Finance*, 28(3), 423–442, DOI: https://doi.org/10.1016/S0378-4266(02)00408-9.

Beck, T., Levine, R., Loayza, N. (2000), Finance and Source of Growth, *Journal of Financial Economics*, 58(1), 261–300, DOI: https://doi.org/10.1016/S0304-405X(00)00072-6.

Berthelemy, J-C., Varoudakis, A. (1995), Clubs de Convergence et Croissance. Le Rôle du Développement Financier et du Capital Humain, *Revue Economique*, 46(2), 217–235, DOI : https://doi.org/10.3406/reco.1995.409640.

Bhanumati, K., Azhagaiah, R. (2014), Causal Relationship between Stock Price and Gold Price in India: A Granger Causality Test Approach, *International Journal of Research in Management, Science and Technology*, 2(2), 22–27.

Bhanumurty, N. R., Singh, P. (2013), Financial Sector Development and Economic Growth in Indian States, *International Journal of Economic Policy in Emerging Economies*, 6(1), 47–63, DOI: https://doi.org/10.1504/IJEPEE.2013.054472.

Bhattacharya, P. C., Sivasubramanian, M. N. (2003), Financial Development and Economic Growth in India: 1970–71 to 1998–1999, *Applied Financial economics*, 13(12), DOI: https://doi.org/10.1080/0960310032000129590.

Bist, P. J. (2018), Financial Development and Economic Growth: Evidence From a Panel of 16 African and Nonafrican Low-Income Countries, *Cogent Economics and Finance*, 6(2), 1–17, DOI: https://doi.org/10.1080/23322039.2018.1449780.

Boyd, J., Prescott, E. (1986), Financial Intermediary Coalitions, *Journal of Economic Theory*, 38(2), 211–232, DOI: https://doi.org/10.1016/0022-0531(86)90115-8.

Boyd, J. H., Smith, B. D. (1998), The Evolution of Debt and Equity Markets in Economic Development, *Economic Theory*, 12(3), 519–560, DOI: https://doi.org/10.1007/s001990050234.

Breitung, J. (2000), The Local Power of Some Unit Root Tests for Panel Data, in: B. Baltagi ed.., Non-stationary Panels, Panel Cointegration, and Dynamic Panels, *Advances in Econometrics*, 15, 161–178.

Breitung, J., Pesaran, M. H. (2008), Unit Roots and Cointegration In Panels, in: L. Matyas, and P. Sevestre eds., *The Econometrics of Panel Data*, third Edition, 279–322, Kluwer Academic.

Breitung, J., Das, S. (2005), Panel Unit Root tests Under Cross-Sectional Dependence, *Statistica Neerlandica*, 59(4), 414–433, DOI: https://doi.org/10.1111/j.1467-9574.2005.00299.x.

Demetriades, P. O., James, G. A. (2011), Finance and Growth in Africa: The broken link, *Economic Letters*, 113 (3), 263–265, DOI: https://doi.org/10.1080/1540496X.2016.1116282.

Demetriades, P. O., Luintel, K. B. (1996), Financial Development, Economic Growth and Banker Sector Controls: Evidence from India, *Economic Journal, Royal Economic Society*, 106(4), 359–374.

Demetriades, P. O., Luintel, K. B. (1996a), Banking Sector Policies and Financial Development in Nepal. Oxford Bulletin of Economics and Statistics, 58(2), 355–372.

Dicky, D. A., Fuller, W. A. (1979), Distribution of Estimators for Autoregressive Time Series with a Unit Root, *Journal of the American Statistical Association*, 74(366), 427–431, DOI: https://doi.org/10.2307/2286348.

Divino, J. A., Teles, V. K., Andrade, J. P. (2009), On the Purchasing Power Parity for Latin-American Countries, *Journal of Applied Economics*, 12(1), 33–54, DOI: https://doi.org/10.1016/S1514-0326(09)60004-0.

Emecheta, B. C., and Ibe, R. C, (2014), Impact of Bank Credit on Economic Growth in Nigeria: Application of Reduced Vector Autoregressive VAR Technique, *European Journal of Accounting Auditing and Finance Research*, 2(9), 11–21.

Emirmahmutoglu, F., Kose, N. (2011), Testing for Granger Causality in Heterogeneous Mixed Panels, *Journal of Economic Modelling*, 28(3), 870–876, DOI: https://doi.org/10.1016/j.econmod.2010.10.018.

Engle, R. F., Granger, C. W. J. (1987), Co-integration and Error-Correction: Representation, Estimation and Testing, *Econometrica*, 55, 251–276.

Favara, G. (2003), An Empirical Reassessment of the Relationship between Finance and Growth, IMF Working Paper, no. 03/123.

Fitzgerald, V. (2006), Financial Development and Economic Growth: A Critical View, Accessed 26 January 2016, http://www.un.org/en/development/desa/policy/wess/wess_bg_papers/bp_wess2006_fitzgerald.pdf.

Fowowe, B. (2011), Financial Liberalization In Sub-Saharan Africa: What Do We Know? *Journal of Economic Surveys*, 27(1), 1–37, DOI: https://doi.org/10.1111/j.1467-6419.2011.00689.x.

Ghali, K. H. (1998), Public Investment and Private Capital Formation in a Vector Error-Correction Model of Growth, *Applied Economics*, 30(6), 837–844, DOI: https://doi.org/10.1080/000368498325543.

Giri, A. K., Mohapatra, G. (2012), Financial Development and Economic Growth: Evidence from Indian Economy, *International Journal of Applied Research and Studies*, 12(1), 1–17, DOI: https://doi.org/10.18488/journal.aefr/2015.5.10/102.10.1159.1173.

Goldsmith, R. W. (1969), *Financial Structure and Development*, Yale University Press, New Haven.

Greenwood, J., Jovanovic, B. (1990), Financial Development and Economic Development, *Economic Development and Cultural Change*, 15(3), 257–268.

Gregorio, J. D., Guidotti, E. P. (1995), Financial Development and Economic Growth, *World Development* 23(3), 433–448.

Gurgul, H., Lach, U. (2012), Financial Development and Economic Growth in Poland in Transition: Causality Analysis, *Czech Journal of Economics and Finance,* 62(4), 347–367.

Hadri, K. (2000), Testing for Stationarity in Heterogeneous Panel Data, *Econometrics Journal*, 3(2), 148–61, DOI: https://doi.org/10.1111/1368-423X.00043.

Hassan, K. M., Sanchez, B., Yu, J. K. (2011), Financial Development and Economic Growth: New Evidence from Panel Data, *The Quarterly Review of Economics and Finance*, 51(1), 88–104, DOI: https://doi.org/10.1016/j.qref.2010.09.001.

Hurlin, C. (2004), Testing Granger Causality in Heterogeneous Panel Data Models with Fixed coefficients, Document de recherche LEO.

Hye, Q. M. A. (2011), Financial Development Index and Economic Growth: Empirical Evidence from India, *The Journal of Risk Finance*, 12(2), 98–111, DOI: https://doi.org/10.1108/15265941111112820.

Im, Kyung, Pesaran, S., Hashem, M., Shin,Y. (2003), Testing for Unit Roots in Heterogeneous Panels, *Journal of Econometrics*, 115(1), 53–74, DOI: https://doi.org/10.1016/S0304-4076(03)00092-7.

Inoue, T., Hamori, S. (2010), How has Financial Deepening Affected Poverty Reduction in India? Empirical Analysis using State Level Panel Data, IDE Discussion paper No.249.

Jayaratne, J, Philip, S. (1996), The Finance-Growth Nexus: Evidence from Bank Branch Deregulation, *Quarterly Journal of Economics*, 111(3), 639–670, DOI: https://doi.org/10.2307/2946668.

Kamal, M. M. K. (2015), An ECM Approach for Long Run Relationship Between Real Exchange Rate and Output Growth: Evidence from Bangladesh, *Dhaka University Journal of Science*, 63(2), 105–110.

Kamat, M., Kamat M. (2007), Does Financial Growth lead Economic Performance in India? Causality-Cointegration using Unrestricted Vector Error Correction Models, MPRA Paper No. 6154.

Kendall, J. (2012), Local Financial Development and Growth, *Journal of Banking and Finance*, 36(5), 1548–1562.

King, R. G., Levine, R. (1993a), Finance and Growth: Schumpeter Might Be Right, *Quarterly Journal of Economics*, 108(3), 717–737, DOI: https://doi.org/10.2307/2118406.

King, R. G., Levine, R. (1993b), Finance, Entrepreneurship, and Growth: Theory and Evidence, *Journal of Monetary Economics,* 32(3), 513–542, DOI: https://doi.org/10.1016/0304-3932(93)90028-E.

Korkmaz, S. (2015), Impact of Bank Credits on Economic Growth and Inflation, *Journal of Applied Finance and Banking*, 5(1), 57–69.

Kumar, R. R., Stauvermann, P. J., Loganathan, N., Kumar, R. D. (2015), Exploring the Role of Energy, Trade and Financial Development in Explaining Economic Growth in South Africa: A revisit, *Renewable and Sustainable Energy Reviews*, 52, 1300–1311, DOI: https://doi.org/10.1016/j.rser.2015.07.188.

Kumar, S., Chauhan, S. (2015), Impact of Commercial Deposit in Banks with GDP in context with Pradhan Mantri Jan Dhan Yojna, BVIMSR's *Journal of Management and Research*, 7(1), 53–59.

Levin, A., Lin, C. F., Chu, C. S. (2002), Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties, *Journal of Economics Metrics,* 108(1), 1–24, DOI: https://doi.org/10.1016/S0304-4076(01)00098-7.

Levine, R., Zervos, S. (1998), Stock Markets, Banks, and Economic Growth, *American Economic Review,* 88(3), 537–558.

Lucas, R. E. (1988), On the Mechanics of Economic Development, *Journal of Monetary Economics*, 101(3), 455–470, DOI: https://doi.org/10.1016/0304-3932(88)90168-7.

Lund, M. T. (2010), Foreign Direct Investment: Catalyst of Economic Growth? PhD thesis, University of Utah, Salt Lake City.

Maddala, G. S., Wu, S. (1999), A Comparative Study of Unit Root Tests with Panel Data, *Oxford Bulletin of Economics and Statistics*, 61(4), 631–52, DOI: https://doi.org/10.1111/1468-0084.0610s1631.

Majid, M. S. A., Mahrizal (2007), Does Financial Development Cause Economic Growth in the ASEAN-countries?, *Savings and Development*, 31(4), 369–398.

McKinnon, R. I. (1973), Money and Capital in Economic Development Brookings Institution, Washington, DC.

Minija (2012), Financial Development and Economic Growth in India. PhD thesis, Pondicherry University.

Mishra, A., Mishra, V. (2014), Examining the Income Convergence among Indian States: Time Series Evidence with Structural Breaks, accessed on 13 September 2016, http://www.isid.ac.in/~epu/acegd2014/papers/VinodMishra.pdf.

Mishra, B. S. (2003), Allocative Efficiency of the Indian Banking System in the Post Reform Period: A State level Analysis, *RBI Occasional Papers*, 24(3), 161–186.

Moon, H. R., Perron, B. (2004), Testing for a Unit Root in Panel with Dynamic Factors, *Journal of Econometrics*, 122, 81–126, DOI: https://doi.org/10.1016/j.jeconom.2003.10.020.

Moudatsou, A., Kyrkilis, D. (2011), FDI and Economic Growth: Causality for the EU and ASEAN, *Journal of Economic Integration* 26(3), 554–577.

Naceur, S. B., Ghazouani, S. (2009), Stock Markets, Banks and Economic Growth: Empirical Evidence from The MENA Region, *Research in International Business and Finance*, 21(2), 297–315, DOI: https://doi.org/10.1016/j.ribaf.2006.05.002.

Nain, M. Z., Kamaiahn, B. (2014). Financial Development and Economic Growth in India: some Evidence from Non-Linear Causality Analysis, *Economic Change Restructuring*, 47(4), 299–319, DOI: https://doi.org/10.1007/s10644-014-9151-5.

Naira (2016), The Impact of Money Deposit Banks on the Economic Development of Nigeria, accessed on 13 September 2016, http://nairaproject.com/projects/1333.html.

Nyasha, S., Odhiambo, N. M. (2018), Financial Development and Economic Growth Nexus: A Revisionist Approach (February 2018), *Economic Notes*, 47(1), 223–229, DOI: http://dx.doi.org/10.1111/ecno.12101.

O'Connell, P. (1998), The Overvaluation of Purchasing Power Parity, *Journal of International Economics*, 44(1), 1–19, DOI: https://doi.org/10.1016/S0022-1996(97)00017-2.

Obradovic, S., Grbic, M. (2015), Causality Relationship between Financial Intermediation by Banks and Economic Growth: Evidence from Serbia, *Prague Economic Paper*, 24(1), 60–72, DOI: https://doi.org/10.18267/j.pep.500.

Onuorah, A. C., Ozurumba, B. A. (2013), Bank Credits: An Aid to Economic Growth in Nigeria, *Information and Knowledge Management*, 33, 1125–1136.

Orsal, D. D. K. (2007), Comparison of Panel Cointegration tests, Humboldt-University Berlin, Germany SBF Discussion Paper No. 29.

Osman, E. G. A. (2014), The Impact of Private Sector Credit on Saudi Arabia Economic Growth GDP: An Econometrics Model Using ARDL. Approach to Cointegration, *International Journal of Social Science,* 3(6), 109–117.

Pala, A. (2016), Which Energy-Growth Hypothesis is Valid in OECD Countries? Evidence from Panel Granger Causality, *International Journal of Energy Economics and Policy*, 6(1), 28–34.

Patrick, H. (1966), Financial Development and Economic Growth in Underdeveloped Countries, *Economic Development and Cultural Change*, 20, 174–189, DOI: http://www.jstor.org/stable/1152568.

Pedroni, P. (1999). Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Repressors, *Oxford Bulletin of Economics and Statistics*, 0305–9049, 653–70.

Pedroni, P. (2000), Fully Modified OLS for Heterogeneous Cointegrated Panels, *Advances in Econometrics*, 15, 93–130.

Pedroni, P. (2004), Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis, *Econometric Theory*, 20, 575–625.

Pesaran, M. H. (2007), A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence, *Journal of Applied Econometrics,* 22(2), 265–312, DOI: https://doi.org/10.1002/jae.951.

Pradhan, P. R. (2011), Financial Development, Growth and Stock Market Development: The Trilateral Analysis in India, *Journal of Quantitative Economics*, 9(1), 134–145.

Rajan, R. G., Zingales, L. (1998), Financial Dependence and Growth, *American Economic Review*, 88(3), 559–586.

Ram, R. (1999), Financial Development and Economic Growth: Additional Evidence, *Journal of Development Studies,* 35(4), 164–174, DOI: https://doi.org/10.1080/00220389908422585.

Ramirez, M. D. (2006), Economic and Institutional Determinants of FDI IN Chile: A Time Series Analysis 1960–2001, *Contemporary Economic Policy*, 24 (3), 459–71, DOI: https://doi.org/10.1093/cep/byj027.

Ray, S. (2013), Does Financial Development Promote Economic Growth in India?, *International Journal of Economic Practices and Theories*, 3(3), 140–151.

Robinson, J. (1952), The Generalization of the General Theory, in: The Rate of Interest and Other Essays. MacMillan, London.

Rousseau, P. L., Wachtel, P. (2000), Equity Markets and Growth: Cross Country Evidence on Timing and Outcomes, 1980–95, *Journal of Banking and Finance*, 24(12), 1933–1957.

Safdari, M., Mahmoodi, M., Mahmoodi, E. (2011), The Causality Relationship between Export and Economic Growth in Asian Developing Countries, *American Journal of Scientific Research,* 25, 40–45.

Schumpeter, J. A. (1911), *Theory of Economic Development*, Munich Duncker and Humblot.

Sehrawat, M., Giri, A. K. (2015), Financial Development, Poverty and Rural-Urban Income Inequality: Evidence from South Asian Countries, *Qual Quant,* 15, 1–14.

Sharma, D., Ranga, M. (2014), Impact of Saving Deposits of Commercial Banks on GDP, *Indian Journal of Applied Research*, 4(9), 95–96, DOI: https://doi.org/10.15373/2249555X.

Sharma, R., Bardhan, S. (2016), Finance Growth Nexus Across Indian States: Evidences from Panel Cointegration and Causality Tests, *Journal of Economic Change Restructuring*, 50(1), 1–20.

Shaw, E. (1973), *Financial Deepening in Economic Development*, New York: Oxford University Press.

Singh, T. (2008), Financial Development and Economic Growth Nexus: a Time-Series Evidence from India, *Applied Economics*, 40 (12), 1615–1627.

Stern, N. (1989), The Economics of Development: A Survey, *The Economic Journal*, 99(397), 597–685, DOI: https://doi.org/10.2307/2978421.

Tiwary, M. K., Thampy, A. (2015), Financial Development and Economic Growth: Evidence from States in India, *Journal of Financial Accounting and Management*, 6(1), 41–86.

Westerlund, J. (2007), Testing for Error Correction in Panel Data, *Oxford Bulletin of Economics and Statistics*, 69,709–748, DOI: https://doi.org/10.1111/j.1468-0084.2007.00477.x.

Witkowska, D., and Kompa, K. (2017), How the Change of Governing Party Influences the Efficiency of Financial Market in Poland, *Dynamic Econometric Models,* 7(1), 147–159.

Yang, Y., Yi, M. (2007), Does Financial Development Cause Economic Growth? Implication for Policy in Korea, *Journal of Policy Modeling,* 30(5), 827–840, DOI: https://doi.org/10.1016/j.jpolmod.2007.09.006.

Younsi, M., Bechtinib, M, (2018), Economic Growth, Financial Development and Income Inequality in BRICS Countries: Evidence from Panel Granger Causality Tests, *Munich Personal RePEc Archive,* MPRA Paper No. 85384.