



RESEARCH ARTICLE

BANK CREDIT AND ECONOMIC GROWTH: AN EMPIRICAL EVIDENCE FROM INDIAN STATES

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ABSTRACT

The nexus between growth of bank credit and economic growth is well established at national economy level. This study will add to the existing credit-growth nexus literature by analyzing the causal nexus between total credit and growth across the sub national level in India and also examining the effect of credit on economic growth. Kao's residual based cointegration test confirmed the long run association between bank credit and economic growth in 21 states of India for the period 2001-2014. The Dimetrius Herlin panel causality test revealed the bidirectional causality between these two variables. Understanding the potential endogeneity issue, we employed Arellano-Bond (AB) GMM dynamic panel estimation procedure which solves the endogeneity as well as serial autocorrelation problem in the model. The results of the present study revealed that bank credit, capital outlay and developmental expenditure have favorable effect on economic growth of the states. As regards policy implications, the government should enhance credit level with credit risk management and improve public expenditure both in capital outlay and developmental expenditure to sustain higher economic growth.

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INTRODUCTION

The relationship between bank credit and economic growth has been an extensive subject of empirical research in both developing and under developing countries since the development of the innovation theory of Schumpeter (1911). In Schumpeterian world, bank credit plays a pivotal role in economic growth. Fundamentally, bank credit is defined as the aggregate amount of credit/funds provided by commercial banks to individuals, business organizations, industries and government. Individuals obtain credit for both consumption and investment purposes, business organizations and industries borrow loans to invest in plant and machinery and in working capital, whereas government borrows loans to spend for recurrent as well as capital purposes (Timsina, 2014). In other words, bank credit finances production, consumption and capital formation, which further stimulates the economic growth. On the contrary, economic growth may encourage credit expansion through its demand for financial services. The introduction of economic reforms in India, particularly reforms in the banking sector, although boosted and edged up the profits and improved efficiency of the banks, an unwarranted

consequence was the decline in credit to the less developed states and regions (Arora, 2009). In this backdrop, this paper intends to analyze the relationship and causality between bank credit and economic growth. Further, the study attempts to examine the effect of credit on economic growth in case of India. Empirical studies, viz., Mckinnon (1973), King and Levine (1993), Gregorio and Guidotti (1995), Rajan and Zingales (1998), Das and Maiti (1998), Levine et al. (2000), Hassan et al. (2011), Christopoulos and Tsionas (2004), Mishra et al. (2009) Pradhan (2010) and Banerjee (2012) concluded that increase in bank credit (or financial development) leads higher economic growth. Whereas, empirical studies, viz., Chakraborty (2010), Pradhan (2010), Hassan et al. (2011); and Herwadkar and Ghosh (2013) found that economic growth causes bank credit. In addition, there are some empirical studies, viz., Demetriades and Hussein (1996), Blackburn and Hung (1998), Yousif (2002), Calderón and Liu (2003), Bangake and Eggoh (2011), Hassan et al. (2011) and Pradhan (2011) concluded the bidirectional causality between credit development and economic growth. These diverse views generate curiosity about the relationship, as well as, direction of relationship, between bank credit and economic growth among the academicians. However, there are no unanimous opinion on the relationship between credit and economic growth so far. In this backdrop, an attempt has been made to

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examine the relationship between bank credit and economic growth for 21 Indian states (excluding North-East States) in the present study. By applying panel cointegration technique, we found long run relationship between bank credit and economic growth. In addition, bidirectional causality exists between bank credit and economic growth. Hence, the study with the use of advanced econometric technique revisited the causality issue between total bank credit expansion and economic growth in India.

In India, the average economic growth was 4 per cent and the bank credit as percentage of GSDP was 17 per cent during the pre-reform period (1972-73 to 1989-90). During the post-reform period (since 1990-91 to 2013-14), the average economic growth lifted up to 6 per cent and the bank credit was doubled i.e. 34 per cent during the same period. Further, the economic growth rate was 5 per cent during 1990-91 to 1997-98 which moved up to 6 per cent and 8 per cent during the period 1998-99 to 2004-05 and 2005-06 to 2013-14 respectively. Similarly, bank credit was 21 per cent during 1990-91 to 1997-98 which soared up to 28 per cent and 50 per cent during the period 1998-99 to 2004-05 and 2005-06 to 2013-14 respectively. Notably, both the bank credit and economic growth has been consistently and continuously rising since 1990-91 with yearly fluctuation. From this analysis, it is observed that both the bank credit and economic growth are closely associated. The coefficient of correlation between the bank credit and economic growth is 0.34 (statistically significant with p-value=0.06). However, the decline in credit to the less developed states and regions (Arora, 2009) is now a matter of great concern. Therefore, the study attempts to analyze the effect of bank credit on economic growth in Indian context. The uniqueness of the study is that we examined the relationship between bank credit and economic growth for large panel data of 21 Indian states (excluding North-East States) for the period of 2000-01 to 2013-14. No state level panel studies are made in India context in the bank credit and economic growth nexus literature in the best of our knowledge. Hence, this study will add to the existing bank credit and economic growth nexus literature. Besides, we investigated three core objectives in the study. Where, first is to inspect the causal relationship between Bank credit and Economic growth, second is to survey the long run equilibrium relationship of Bank credit and Economic growth and third is to estimate the effect of Bank credit on Economic growth. The rest of the present paper is set out as follows. Section 2 describes the analytical framework while Section 3 explains the issues related to data and methodology pertaining to the empirical exercise undertaken in the study. Section-4 contains the empirical results of the study, which includes the long run association and causal nexus of bank credit and economic growth; and the impact of bank credit on economic growth. Finally, Section 5 concludes with policy implications.

Analytical Framework

The main aim of the present paper is to understand the effect of bank credit on economic growth. The three functions which will be estimated in the study, are given below.

$$Y = f(CD) \quad (1)$$

$$Y = f(CD, CO) \quad (2)$$

$$Y = f(CD, DE) \quad (3)$$

Where, Y= Gross State Domestic Product (GSDP), CD = Total bank credit of the scheduled commercial banks, CO = Capital outlay, DE = Developmental expenditure.

After transferring all variables such as GSDP, CD, CO and DE into logarithmic form, we can write the above function in the following equation form.

$$\ln Y_t = A_t + \mu \ln CD_t \quad (4)$$

$$\ln Y_t = A_t + \mu \ln CD_t + \lambda \ln CO \quad (5)$$

$$\ln Y_t = A_t + \mu \ln CD_t + \gamma \ln DE \quad (6)$$

Bank Credit and Economic Growth

Increase in bank credit creates demand for goods and services which, in turn, creates employment, and generates return on capital. Barring the changes in inflation, availability of bank credit certainly fuels economic growth, at constant or increased supply of goods and services. Thus, growth of an economy is affected by bank credit. Hence, the expected sign of the coefficient of Total Credit is positive.

Government Expenditure and Economic Growth

Public expenditure plays a significant role in the economic development of a country. If it is employed in development programs such as social and economic services sectors, government expenditure yields an increase in the economic growth by increasing the economic growth. In economic literature, the traditional Keynesian macroeconomics believes the positive effect of government expenditure on economic growth. According to Keynes, an increase in the government expenditure is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demand. Hence, in the present study, the sign of the coefficients of both the capital outlay and developmental expenditure is expected to be positive in the model.

Data and Methodology

In the present study, annual data on bank credit spanning from FY 2000-01 to FY 2013-14 for 21 states of India (excluding North-East States) has been taken from Various Volumes of 'Basic Statistical Returns of Scheduled Commercial Banks in India published by RBI. Data on GSDP at market prices at current prices (2004-05 = 100), Capital Outlay and Developmental Expenditure for these 21 states during the same period have been sourced from EPW Research Foundation database. All the variables are transferred in logarithmic form. The present study estimated three models to analyze the effect of bank credit on economic growth in Indian context for the period 2000-01 to 2013-14. All the models are estimated using Arellano-Bond (AB) GMM estimation procedure. In the Model

1, we estimated the effect of bank credit on Economic Growth. In the Model 2, estimation is made by adding the control variable capital outlay (CO) in the Model 1. The Model 3 is estimated by adding the developmental expenditure (DE) in the Model 1. The study utilized four steps of the analysis to achieve the objectives, viz., first step is panel unit root test; second step is to test long run relationship through cointegration approach; third step is to run the panel causality model; and fourth step is to estimate the effect of bank credit on economic growth using dynamic panel data technique. In the first step, to test the stationarity property of the variables the study incorporates four panel unit root tests, viz., Levin, Lin & Chu; Im, Pesaran and Shin; ADF-Fisher and PP-Fisher. Levin, Lin & Chu panel unit root test assumes the common unit root across the cross sections, however, Im, Pesaran and Shin; ADF-Fisher and PP-Fisher panel unit root tests assume the individual unit roots across cross sections.

In the second step, the study uses Kao (1999) Cointegration Tests that is based on Engle-Granger (two-step) cointegration approach. The Engle-Granger (1987) cointegration test is based on an examination of the residuals of a spurious regression performed using I(1) variables. If the variables are cointegrated then the residuals should be I(0). On the other hand if the variables are not cointegrated then the residuals will be I(1). Kao proposes four DF-type statistics and an ADF statistic. The first two DF statistics are based on assuming strict exogeneity of the regressors with respect to the errors in the equation, while the remaining two DF statistics allow for endogeneity of the regressors. The DF statistic, which allows for endogeneity, and the ADF statistic involve deriving nuisance parameters from the long-run conditional variances. To find the causal relationship of the variables, in the third step, the study follows Pairwise Dumitrescu Hurlin Panel Causality Tests approach where we can decide the unidirectional or bidirectional or non-causality causal relationship among the variables. In the fourth step, to see the long run coefficients, the study again follows Generalized Method of Moments (GMM) methods. GMM incorporates the econometric problems induced by non-stationary of the regressors, presence of heteroscedasticity and endogeneity or simultaneity bias.

Econometric Estimation Procedure (GMM)

The GMM estimation technique was applied to analyse the relationship between bank credits and economic growth. This dynamic panel data model considers the dynamic structure between the predictor and outcome variables (Baltagi, 1995). The application of panel data approach in the estimation take care of unobserved or missing variables. But, the associations permits the state specific effects (Arellano-Bond, 1991). In the dynamic panel data approach, the dynamic effects are introduced in the model in the form of current and past shocks and also by taking first differences of the variables as instruments. The dynamic panel data approach can be presented in the following equation form.

$$y_{it} = \delta y_{it-1} + \beta x_{it} + u_{it}$$

where y_i is the explained variable for $i=1,2,\dots,n$ different states in the panel and $t=1,2,\dots,t$ refers to the (yearly) time period. δ

is a scalar, x is $k \times 1$ vector of explanatory variables, μ_i denotes the state effect for state i and u_{it} is the error term of regression. Estimation will be biased if we include the lagged dependent variable along with the fixed effects. To contain the bias effects, the first differences of explanatory variables are used in the GMM estimation system. We applied Sargan test to check whether the instruments are correlated with the error term or not. Further, we also used the Arellano-Bond (AB) test to check that estimates are

The Sargan test is used to check the suitability of the instruments and that they are not correlated with the error term, while the Arellano-Bond (AB) test is used to check that a serial correlation problem does not affect estimates. The GMM procedure has the advantage that potential endogeneity of variables usually does not significantly affect the estimated parameters.

Empirical Evidence

It is observed from the scatter plot (Fig: 1) that both the growth rate of credit and economic growth are positively correlated. The calculated partial correlation coefficient between economic growth rate and growth rate of Bank credit ratio is 12% which is statistically significant at 5% level for all the states in the sample. The relationship between economic growth and total bank credit; economic growth and capital outlay; and economic growth and developmental expenditure for 21 states are depicted in the Fig.2, Fig.3 and Fig.4 respectively in the appendix.

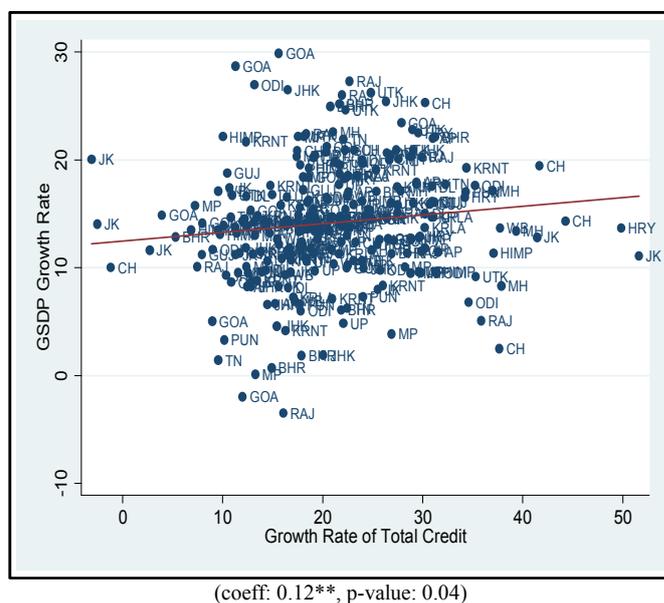


Fig. 1. Scatter Plot of Growth Rate of Total Credit and Economic Growth in 21 States

This empirical section has four sub-sections that are (i) identifying unit root for all variables, (ii) examining the long-run association among the variables, (iii) investigating the causal nexus between economic growth and bank credit and (iv) analyzing the effect of bank credit on economic growth.

Table 1. Panel Unit Root Test

Variable	Levin, Lin & Chu t-stat (p)		Im, Pesaran and Shin W-stat (p)		ADF-Fisher $\chi^2(p)$		PP-Fisher $\chi^2(p)$	
	Level	1 st diff	Level	1 st diff	Level	1 st diff	Level	1 st diff
LCD	-7.72 (0.00)	-7.84 (0.00)	0.55 (0.71)	-5.48 (0.00)	49.01 (0.21)	100.70 (0.00)	58.18 (0.05)	112.90 (0.00)
LCO	-4.33 (0.00)	-13.07 (0.00)	1.51 (0.93)	-9.91 (0.00)	35.24 (0.76)	164.12 (0.00)	44.22 (0.38)	163.32 (0.00)
LDE	5.50 (1.00)	-15.88 (0.00)	9.27 (1.00)	-10.84 (0.00)	11.14 (1.00)	172.49 (0.00)	9.84 (1.00)	224.90 (0.00)
LGSDP	5.17 (1.00)	-8.47 (0.00)	9.79 (1.00)	-6.43 (0.00)	7.99 (1.00)	115.02 (0.00)	0.49 (1.00)	161.51 (0.00)

Panel Unit Root Test of the Variables

We first examined the stationarity property of all variables by applying panel unit root tests. Four panel unit root tests, viz., Levin, Lin & Chu; Im, Pesaran and Shin; ADF-Fisher and PP-Fisher are used in the study. The panel unit root results are presented in Table-1. The four panel unit root tests such as Levin, Lin & Chu; Im, Pesaran and Shin; ADF-Fisher and PP-Fisher are performed for all variables. The results indicate that all variables viz., LCD, LCO, LDE and LGSDP are integrated of order one i.e. I (1). This implies that all variables are non-stationary at level but stationary at their first difference.

Kao (1999) Residual Co-integration Test

Since all variables are found to be integrated of same order, we further moved ahead to evaluate the long run relationship between bank credit and economic growth in the model 1. The cointegrating relationship among the variables such as economic growth, bank credit and capital outlay has been examined in the model 2. Finally, the long run association among the variables such as economic growth, bank credit and developmental expenditure has been tested in the model 3. We used Kao (1999) residual based cointegration test to describe the long run association among these variables. The results are presented in Table-2.

Table 2. Kao (1999) (residual-based) Co-integration Test

Models	Test	t-Statistic	Prob.
Model 1	ADF	-5.28***	0.00
Model 2	ADF	-5.94***	0.00
Model 3	ADF	-6.49***	0.00

Note: *** denotes 1 percent level of significance

Pairwise Dumitrescu Hurlin Panel Causality Tests

Cointegration does not imply the direction of causality between two variables. Hence, after ensuring the cointegration between bank credit and economic growth, we further examined their causal relationship. The Pairwise Dumitrescu Hurlin Panel Causality test has been applied in the analysis. The results are presented in Table-3. The results indicate the bidirectional causality between bank credit and economic growth. Hence, bank credit causes and caused by economic growth in India.

Arellano-Bond (AB) Dynamic Panel-Data Estimation

After the confirmation of the existence of potential endogeneity problem (as there exists the bidirectional

causality) and having ensured that all variables are of same order, we move ahead to estimate the equation-4, equation-5 and equation-6. The AB Dynamic Panel-Data Estimation approach is used to estimate these equations. The estimated results are presented in Table 4.

Table 3. Pairwise Dumitrescu Hurlin Panel Causality Tests

Lag-1	W-Stat.	Zbar-Stat.	Prob.
Null Hypothesis			
LCD does not homogeneously cause LGSDP	10.12	18.76	0.00
LGSDP does not homogeneously cause LCD	3.03	3.77	0.00

Table 4. Arellano-Bond Dynamic Panel-Data Estimation

Dependent Variable for all Models: LGSDP

	Model 1	Model 2	Model 3
Cons	1.06*** (0.00)	0.97*** (0.00)	1.26*** (0.00)
LCD	0.18 *** (0.00)	0.14*** (0.00)	0.18*** (0.00)
LCO		0.02*** (0.00)	
LDE			0.07*** (0.00)
Number of Obs.	252	252	252
AR (1)	0.73*** (0.00)	0.82*** (0.00)	0.59*** (0.00)
AR (2)	0.04 (0.59)	-0.02 (0.72)	0.11 (0.08)
Sargan Test	16.57 (0.08)	16.41 (0.13)	17.19 (0.10)

Note: *** denotes 1 percent level of significance. LGSDP = logarithmic transformation of Gross State Domestic Product, LCD = logarithmic transformation of total credit, LCO = logarithmic transformation of capital outlay, LDE = logarithmic transformation of developmental expenditure. The null hypothesis of the Sargan test is that the instruments are not correlated with the residuals (i.e. over identifying restrictions are valid.). The AB test's null hypothesis is that there is no serial correlation.

In all models, bank credit is found to be positive and highly significant. The coefficient of bank credit is 0.18 which suggests that 1 per cent increase in bank credit, GDP growth increases by 0.18 per cent. The coefficient of capital outlay in the model 2 is 0.02 which means 1 per cent rise in capital outlay leads to a 0.18 per cent increase in growth rate of GDP. Similarly, in the model 3, the coefficient of developmental expenditure is 0.07 which implies that 1 per cent increase in developmental expenditure leads to a 0.07 per cent increase in growth rate of GDP. The difference between model 2 and 3 are because of more of the development expenditures are to maintain, operate and repair of existing capital outlay which in turn creates more economic growth rather than creating a similar new capital assets financed by capital outlay.

Conclusion

The relationship between bank credit and economic growth is one of the most discussed issues among the academicians and practitioners. In general, bank credit plays a pivotal role in economic growth. Because bank credit may stimulate the capital accumulation and rate of saving that further induce the economic growth. It is pertinent to mention that the Banks should keep track of Risk-Weighted Assets (RWA) while expanding its credit activities. Otherwise, more risk capital will affect the bottom line of Banking Sector and Banks will be demotivated. Conversely, economic growth may fuel credit development through its demand for more banking activities. In this backdrop, the present study investigated the causal nexus between bank credit and economic growth for a large panel data of 21 Indian states (excluding Northeast states) for the period of 2000-01 to 2014-15. Further, the study examined the long run association and causal nexus between bank credit and economic growth through Kao's residual based cointegration test and pairwise Dumitrescu Hurlin panel causality test respectively. In addition, we also estimated the effect of bank credit on economic growth using Arellano-Bond (AB) GMM dynamic panel estimation procedure. Kao (1999) cointegration test established the long run relationship between bank credit and economic growth. Further, we concluded the cointegration between bank credit, economic growth and capital outlay using the same cointegrating technique. Furthermore, the study also recognized the long run association between economic growth, bank credit and developmental expenditure using Kao's residual based panel cointegration procedure. The pairwise Dumitrescu Hurlin panel causality test concluded bidirectional causal relationship between bank credit and economic growth. More specifically, bank credit causes and is also caused by economic growth. After identifying the endogeneity issue, we used Arellano-Bond (AB) GMM dynamic panel estimation procedure to analyse the effect of bank credit on economic growth. The AB dynamic panel estimation procedure addresses the potential endogeneity as well as serial autocorrelation problem in the model. The results of dynamic panel estimates suggest that bank credit, capital outlay and developmental expenditure have favourable effect on economic growth. Since, bank credit has favorable effect on economic growth, the government of India should make policies that favor more credit allocation in the economy. At the same time, banks needs to maintain risk-return trade off across loan portfolios and ensure asset quality for sustainable growth. Improvement in technology and innovation should be applied in credit selection, evaluation, monitoring and controlling the credit risk. Thus, effective credit and risk management practices should be exercised which would improve the asset quality in particular and the economic growth in general. Capital outlay and developmental expenditure have also significant and positive effect on economic growth. Hence, the government of India with more cautious should encourage public expenditure. This should happen revenue surplus and fiscal deficit. There should be high degree of transparency and accountability of government spending reviewing mechanism with performance budget in various sectors of the economy in order to prevent the channelizing of public funds into private accounts of government officials and workers. Therefore, it is essential to

improve quality and accountability of expenditures, an outlay to outcomes budgeting methodology (i.e., program performance budgeting (PPB)) to be practiced for prioritizing the allocation of public funds, improving program planning, monitoring and evaluation, increase transparency, accountability, and consequently, the quality of public services delivery. A proper process driven expenditure review mechanism should be put into place to track the outcome of the expenditures.

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Appendix

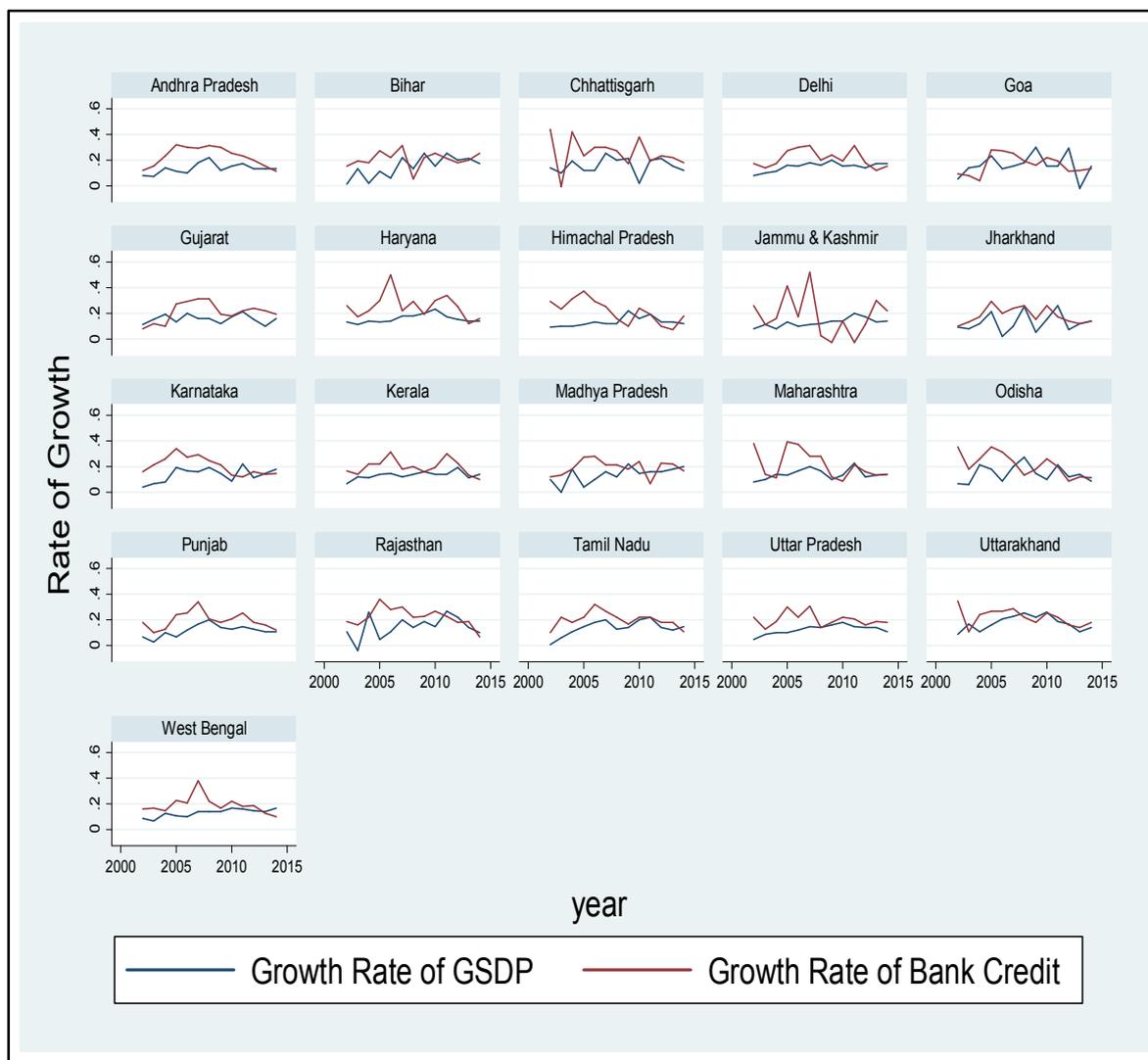


Fig. 2. Trends in GSDP Growth Rate and Growth Rate of Bank Credit for 21 States

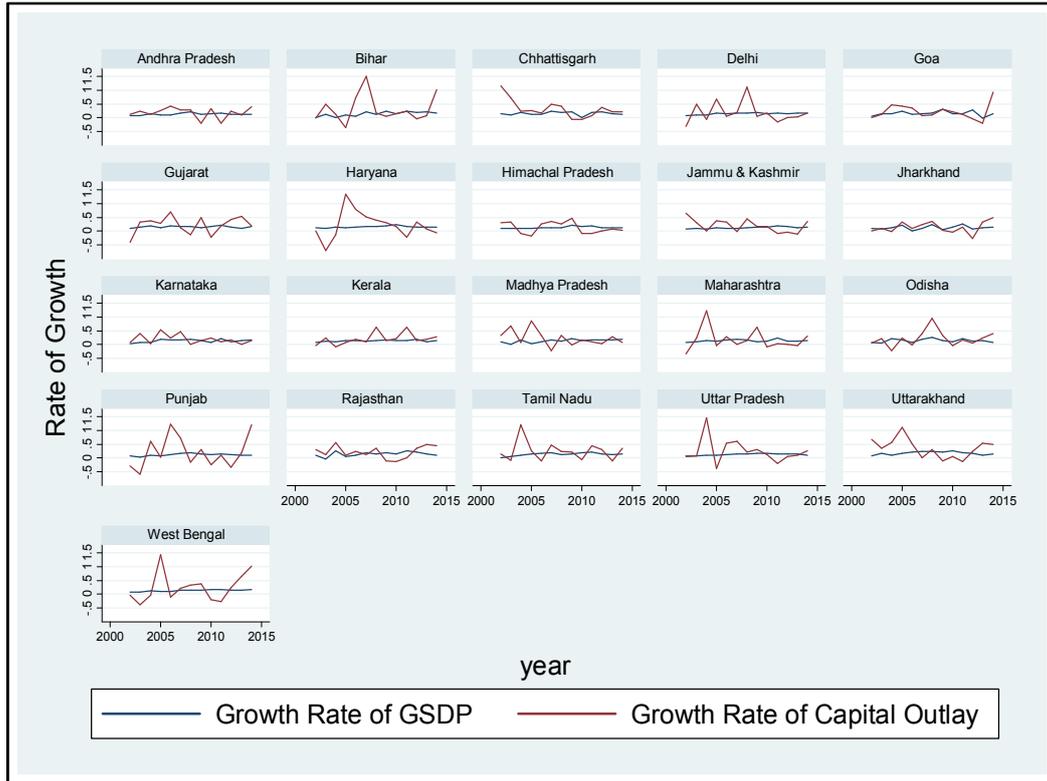


Fig. 3. Trends in GSDP Growth Rate and Growth Rate of Capital Outlay for 21 States

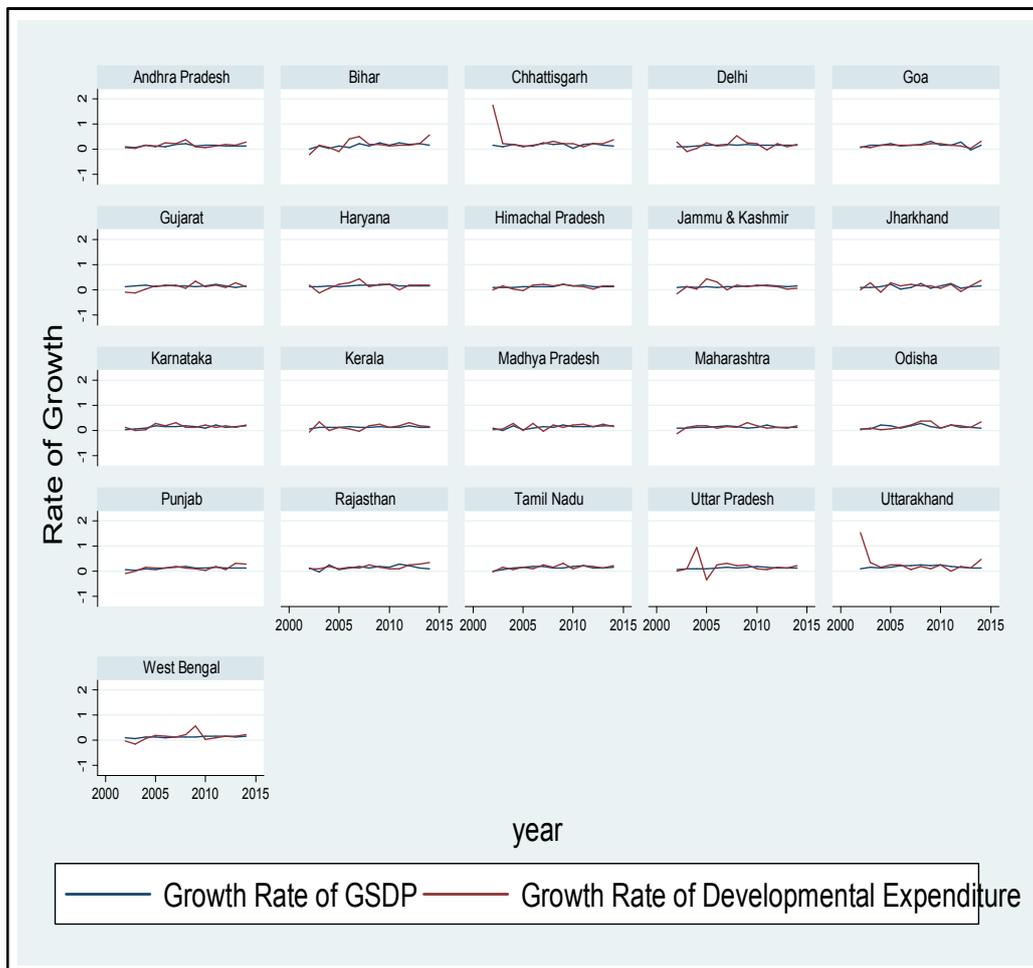


Fig. 4. Trends in GSDP Growth Rate and Growth Rate of Developmental Expenditure for 21 States
