

Relationship between Commercial Banks Credit and Per capita net state domestic product of India: A Regional Panel data analysis

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Abstract

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. However there are no unanimous opinion on the relationship between bank credit and economic growth. Under these circumstances, an attempt has been taken in this paper to investigate the role of bank credit, capital outlay and government's social sector spending on per capita net state domestic product of India . this study finds that random effect model is better than fixed effect model and expansion of bank credit significantly affecting the per capita net state domestic product, capital outlay also positively and significantly affecting the per capita net state domestic product.

Key Words: Bank credit, Per capita net state domestic product, capital outlay, social sector spending, Panel regression,

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1. Introduction

Generally by the term bank credit we mean aggregate amount of credit or funds provided by commercial banks to individuals , business organisations, industries and government. Individuals use bank credit both for consumption and investment purposes, entrepreneurs borrow loans to invest in plant and machinery and in working capital purposes (Timsima, 2014). Thus we can say that bank credit finances production, consumption and capital formation. Government also borrows to finance in fulfil the various developmental and non developmental plans . The main objectives of all these initiatives is to increase income, production, employment and ultimately economic growth. This 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 Schumpeter's theory of innovation in 1911 (Mohanty & Patyra ,2016). Schumpeter in 1991 confirmed that the services provided by financial institutions could stimulate technological innovation and economic growth by funding productive investment (Batarseh & Ananzeh2015). Thus the relationship between financial developments and economic growth of any nation is not a new

issue. Generally bank credit plays a vital role by providing necessary financial resources to finance various economic activities.

There are various group of researchers regarding the impact of bank credit on economic growth. One group supports that bank credit is essential for promoting economic growth and another group think that it is the economic growth that raises bank credit to the economy for further growth. A third group of found that there exist bidirectional causal relation between these two variables. Bayoumi and Melander (2008) found that GDP decreased by 1.5% when the overall credit decreased by 2.5%, Demetriades and Hussein in 1996 already found such relationship in their study they opined that financing is a major factor in economic growth. Those we supports the hypothesis that is bank credit stimulates economic growth they put forward the logic that is bank finance could enhance the economic growth by increasing saving, improving the efficiency of allocation fund, and promoting capital formation. Robinson(1952), Gurly & Shaw(1967), Goldsmith(1969), king & Levine (1993) are the supporters of this hypothesis. Eatnaz Fuller and Malik(2009) also found that domestic bank credit to the private sector lead to increase output per worker which ultimately increases economic growth. In the same year that is 2009, Arora, found though banking reforms in India improves the efficiency of the banks but it also leads to decline of credit to the less developed states & region. In the literature there is plethora of other studies which aims mainly to investigate the causal relationship between financial development reflected by expansion of bank credit and economic growth. For example King and Levine(1993) , Gregorio and Guidotti (1995), Rajan and Zingales (1998), Das and Maity (1998), Levine etal (2000), Hassan et al (2011), Christopoulous and Tsionas (2004), Pradhan(2010) Banerjee (2012),Mohanty,Kumar &Patra,(2016) etc who support the hypothesis that financial development leads to higher economic growth. On the other hand Chakraborty(2010), Pradhan(2010), Hassan etal(2011), Herwadkar and Ghosh (2013) support the hypothesis that economic growth causes an expansion of Bank credit. In addition there are some other studies by Demetriades and Hussein (1996), Blackburn and Hung(1998), Yousif (2002), Pradhan(2011) found that bidirectional causality exist between financial development through expansion of bank credit and economic growth.

Increase of bank credit creates demand for goods and services which ultimately stimulates employment and raise income that lead to fuels economic growth. Hence it is expected that credit positively affects economic growth. Similarly government's spending also plays an important role in the economic development of a country. If government spends to fulfil various developmental programme for example social sector spending it is expected that it would increase economic growth since in the theory of national income identity we know government's spending play an important role for raising income.

These diverse views generate curiosity about this relationship among the researchers. However there are no unanimous opinion on the relationship between bank credit and economic growth. Under these circumstances, an attempt has been taken in this paper to investigate the role of bank credit, capital outlay and government's social sector spending on per capita net state domestic product of India

2. Research Method

3.1. Variables data

The variables used in this study are per capita net state domestic product- state wise (at constant prices), state wise credit to agriculture, state wise credit to industry by scheduled commercial banks in India and their summation is taken as state wise total credit by scheduled commercial banks, state wise capital outlay, state wise social sector expenditure . Credit to agriculture is bifurcated into two categories, direct finance & indirect finance. The total credit to agriculture is calculated across rural, semi urban , urban and metropolitan centres of the states over time. Similarly credit to industry has many sub categories which is calculated across rural semi urban and metropolitan centres of the states over time (source: Statistical hand book, RBI). The variables are converted into logarithmic form and their acronyms used in this study are shown in the table below.

Table 1 Variables and their acronyms

Variables	acronyms
per capita net state domestic product- state wise (at constant prices),	lpcnsdp
state wise credit to agriculture by scheduled commercial banks	lagcredit
state wise credit to industry by scheduled commercial banks	linduscredit
State wise total credit by scheduled commercial banks	ltotcredit
state wise capital outlay	lcapioutlay
state wise social sector expenditure	lssspend

All the states and union territories are classified under certain regions as defined by RBI. These regions are Northern region, North Eastern region, Eastern region, Central region, Western region, and Southern region. All the data are taken from Handbook of statistics on Indian States, published by RBI, 2017-18. The data are yearly in nature and it covers the time period from 1997-98 to 2017-18. The classifications of regions are shown in the table below.

Table 2 Classification of regions

Regions	States/ Union Territories
Northern Region	Haryana, HP, j& K, Punjab, Rajasthan, Chandigarh, Delhi
North Eastern	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura
Eastern Region	Bihar, Jharkhand, Odisha, Sikkim, West Bengal, Andaman & Nicobar Islands
Central Region	Chhattisgarh, Madhya Pradesh, Uttarpradesh, Uttarakhand
Western Region	Goa, Gujarat, Maharashtra, Dadra & Nagar Haveli, Daman & Diu
Southern Region	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Lakshadweep, Puducherry, Telengana

Panel data are also known as longitudinal or cross-sectional time series data. Through this data set we can observe the behaviours of entities across time. Entities may be individuals, firms, industries, states, countries etc. the main objective of using panel data in economic research is controlling for variables that cannot be observed or measured across entities, or variables that change over time but not across entities. Panel Data regression models are used in this study. A panel data regression may be written as follows.

$$y_{it} = \alpha_i + \beta_k x_{k,it} + \mu_{it} \text{-----} (1)$$

where i is the cross section units (in this study Nations, 1 to 15) and t is the time series units (in this study year 2000 to 2019).

y_{it} is the dependent variable, x'_{it} represents i th independent and control variables. β_k is the coefficient for respective independent and control variables. μ_{it} is the error term.

The individual effects may be either assumed to be correlated with the right hand side variables (fixed effects model: FEM) or be incorporated into the error term (random effects model: REM) and assumed uncorrelated with the explanatory variables (Baum, 2001). Fixed effect model analyses the impact of variables that vary over time. Generally it is assumed that something within each cross sectional unit may impact or bias the independent variables and we need to control for this. Moreover the time –invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. When working with panel data models the first step is to test whether the data series can be estimated through a panel data model or through a pooled OLS. Therefore, Baltagi (2008) considers that the question is “To pool or not to pool the data?” A simple probability test has the null hypothesis the OLS model and the alternative hypothesis the FE model.

The next step would be to decide whether a FE model or a RE model is more appropriate for the data series. The decision between the two models can be made based on different tests, economic reasons and/or information criteria. Baltagi suggests all of these methods; hence one can estimate both models and choose between them according to the information criteria and/or based on economic arguments. In our study we have used Hausman’s specification test for selecting which model is better Fixed or Random effect model.

For the fixed effects model the most used estimator is called the “within estimator”. It performs OLS on the mean-differenced data. Because all the observations of the mean-difference of a time-invariant variable are zero, using a time-invariant variable is not recommended. Because the fixed effects have been eliminated (through mean-differencing), OLS leads to consistent estimates of the coefficients. A great advantage of panel data is the fact that consistent estimation is possible even with endogenous regressors, provided that x_{it} is correlated only with the time-invariant component of the error, α_i , and not with the time varying component of the error

For the random-effects model, the α_i from (1) is incorporated into the error term and assumed uncorrelated with the explanatory variables. Considering this assumption we have the model (2) as a random effect model specification:

$$y_{it} = x'_{it} * \beta + \varepsilon_{it} \text{-----}(2)$$

Because the α_i is incorporated in ε_{it} in each time period, we might say that we have to deal with autocorrelation of the error. Therefore the general least square method is used for the estimation of a RE model. An advantage of the RE model is that it allows to use explanatory variables that are constant over time; a great disadvantage is that if the FE model would be more appropriate those estimates would be inconsistent.

After controlling for the effects, the default standard errors assume that the error μ_{it} is independent and identically distributed (Cameron, Trivedi, 2009). Also, the model is estimated assuming the homoskedasticity of the residuals. When heteroscedasticity is present the standard errors of the estimates will be biased and one should compute robust standard errors correcting for the possible presence of heteroscedasticity. The most common deviation from homoskedastic errors in the context of panel data is likely to be error variances specific to the cross-sectional unit. When the error process is homoskedastic within cross-sectional units, but its variance differs across units we have the so called group wise heteroscedasticity. Another problem is the serial correlation of the idiosyncratic error term, but Wooldridge proposed a very simple test for checking the autocorrelation of the residuals.

In order to overcome these problems, we should estimate the regression model using robust standard errors. Some authors have provided a number of tests in order to identify the problems encountered (Drukker, 2003, Baum, 2001, Green, 2000). All these techniques are applied in this study.

3. Findings and Discussions

4.1. Findings from graphical plots of the variables

region wise graphical plot of per capita net state domestic product shows that north eastern region has lowest $\ln pcnsdp$ and the highest position takes southern region. This is true for all the three years (1997, 2007, and 2017) shown in the chart. The 2nd position takes the northern region. Central and Western region of India shows more or less similar pattern of per capita net state domestic product. Eastern region takes the last but one position in this context. Chart 2 shows region wise commercial bank's credit in India. This chart also reflects that bank's credit is lowest in North-eastern region. In other regions log of bank's credit are more or less similar volume. Though Southern and Western region show slightly more volume of bank credit obtained compared to other regions of India. Chart 3 and 4 show region wise capital outlay and social sector spending in India respectively. North eastern region takes the lowest place as usual in terms of both the variables. One interest point is that in 1997 central region's position was last compared to other five regions in terms of capital outlay, but it recovers very quickly such that in next successive time periods that is 2007 and 2017, significant differences are not observed through bar diagrammatic expression compared to other regions (except North eastern region) of India.

3.2. Findings from Panel regression analysis:

Table- 3 shows descriptive statistics, which clearly reflects that the highest variation is in the log of industry credit variable, whereas log of capital outlay shows lowest variation. The variation or standard deviation of per capita net state domestic product and agriculture credit is also high among the regions. Though the variation is comparatively low for log of social sector spending variation. Table-4 shows the results of pooled regression, which clearly reflects that the estimated value of total credit and social sector spending is positive and significant. Since the pooled regression does not consider the heterogeneity of the data set among the cross section units, hence we should not rely on pooled regression for panel data analysis. Table 5 shows the results of fixed effect model, which clearly shows all the independent variables are positively and significantly affect per capita net state domestic product. Similar results obtain in case of random effect model shown in table- 6. Table- 7

shows Hausman's specification test results. Hence these results show that random effect model is better than fixed effect model. In case of any heterogeneity exists in the error series of the random effect model, we have re-estimated the random effect model with robust standard error. The estimated results are shown in table 8. Hence from table 8 it is clear that bank credit plays an important role for stimulating per capita net state domestic product. Similarly capital outlay variable is also positively and significantly affecting per capita net state domestic product, however, social sector spending is not significant in this context.

4. 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 (Mohanty & Patyra, 2016.). Despite the growing literatures that examined the relationship between financial developments (through the expansion of bank credit) and growth of any economy, there is scarceness in the empirical studies that examine the influence of bank credit on economic performance or per capita net state domestic product at scrotal level of any country. Therefore this study came to examine the relationship between per capita net state domestic product, and bank credit, capital outlay, social sector spending at different regions of India for the period that span from 1997 to 2017. We have followed the RBI guideline for regional classifications. We have applied fixed effect model and random effect model and also Housman specification test in this study. This study finds that expansion of bank credit significantly affecting the per capita net state domestic product, capital outlay also positively and significantly affecting the per capita net state domestic product.

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Appendix:

Chart 1 Region wise graphical plot of variables (log form) of India

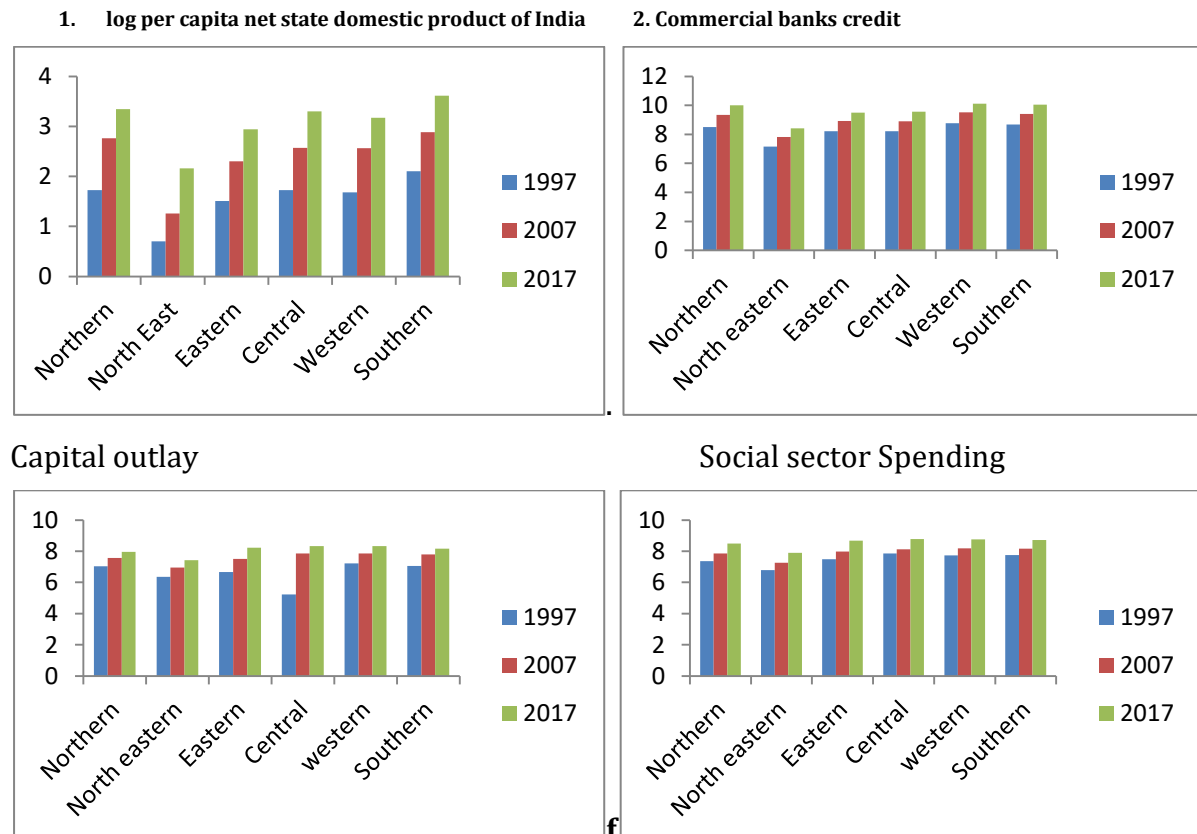


Table- 3 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lpcnsdp	126	2.322	.729	.602	3.612
lagcredit	126	8.322	.729	6.602	9.612
linduscredit	126	8.815	.749	6.954	10.049
lssspend	126	7.989	.479	6.784	8.782
lcapioutlay	126	7.377	.72	5.075	8.445
ltotcredit	126	8.955	.735	7.114	10.104

Table-4 results of pooled regression

lpcnsdp	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
ltotcredit	.6	.059	10.16	0	.483 .717	***
lcapioutlay	.018	.036	0.51	.61	-.053 .089	
lssspend	.56	.089	6.32	0	.384 .735	***
Constant	-7.657	.313	-24.45	0	-8.277 -7.037	***
Mean dependent var		2.322	SD dependent var		0.729	
R-squared		0.933	Number of obs		126.000	
F-test		563.377	Prob > F		0.000	
Akaike crit. (AIC)		-55.181	Bayesian crit. (BIC)		-43.836	

*** $p < .01$, ** $p < .05$, * $p < .1$

Table -5 Results of Fixed Effect Model

lpcnsdp	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
ltotcredit	.89	.062	14.29	0	.767 1.014	***
lcapioutlay	.036	.016	2.20	.03	.004 .068	**
lssspend	.261	.078	3.34	.001	.106 .415	***
Constant	-7.994	.169	-	0	-8.329 -7.66	***
Mean dependent var		2.322	SD dependent var		0.729	
R-squared		0.982	Number of obs		126.000	
F-test		2070.244	Prob > F		0.000	
Akaike crit. (AIC)		-303.030	Bayesian crit. (BIC)		-291.685	

*** $p < .01$, ** $p < .05$, * $p < .1$

Table-6 Results of Random Effect Model

lpcnsdp	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
ltotcredit	.877	.061	14.33	0	.757 .996	***
lcapioutlay	.036	.016	2.25	.025	.005 .068	**
lssspend	.276	.077	3.59	0	.125 .426	***
Constant	-7.997	.191	-	0	-8.372 -7.622	***
Mean dependent var		2.322	SD dependent var		0.729	
Overall r-squared		0.926	Number of obs		126.000	
Chi-square		6235.496	Prob > chi2		0.000	
R-squared within		0.982	R-squared between		0.889	

*** $p < .01$, ** $p < .05$, * $p < .1$

Table-7 Hausman (1978) specification test

	Coef.
Chi-square test value	3.026
P-value	.388

Table- 8 Estimation of Random effect model with robust standard error

lpcnsdp	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ltotcredit	.877	.204	4.29	0	.477	1.276	***
lcapioutlay	.036	.014	2.59	.01	.009	.064	***
lssspend	.276	.299	0.92	.357	-.311	.862	
Constant	-7.997	.582	-13.74	0	-9.138	-6.857	***
Mean dependent var		2.322	SD dependent var			0.729	
Overall r-squared		0.926	Number of obs			126.000	
Chi-square		7518.369	Prob > chi2			0.000	
R-squared within		0.982	R-squared between			0.889	

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