Determinants of Economic Growth across States in India

Manoj Panda
Samraj Sahay

2020

IEG Working Paper No. 399

सत्यमेव परमो धर्मः

Determinants of Economic Growth across States in India

Manoj Panda and Samraj Sahay

E-mails: manoj@iegindia.org and samraj.sahay@gmail.com

Abstract

Economic performance has been widely different across states in India. This paper attempts to examine some possible determinants of growth across 17 major states in India during 2004-05 to 2016-17. While investment data at the state level are not available to examine its influence on growth at the state level, the growth literature over the years has focused on several other variables such as infrastructure, social sector expenditure, urbanisation, and financial inclusion for which state level data are available. We examine these possible determinants in our analysis in this paper using a fixed effect panel regression model. In this context, a well-recognised point is that social sector expenditure by the government has a bidirectional relationship with economic growth in the sense that it influences growth as well as it is influenced by growth. A two stage least square approach using instrument variables has been used to treat the endogeneity problem. Second, an infrastructure index has been constructed at the state level using principal component analysis to combine several infrastructure related variables.

The results indicate that infrastructure development, social sector expenditure, and financial inclusion have positive and significant effects on GSDP and per capita GSDP across states and seem to be important drivers of growth across states in India. Urbanisation by itself seems to be having a negative effect on growth, though it has a positive effect on per capita GSDP.

Determinants of Economic Growth across States in India

1. Introduction

The Indian economy witnessed a high growth rate of above 8% per year during 2004-2011. The growth rate fell to about 7% thereafter. On the whole, India has maintained a fairly reasonable growth rate in recent decades. But, performance of different states in the Indian federation has varied widely in terms of economic and social indicators. States with relatively higher initial income have generally performed better leading to rising inequality among them on various counts. Per capita income of low income states like Bihar and Uttar Pradesh, accounting for 25% of India's population, is only a third of high income states like Maharashtra, Haryana and Gujrat.

This paper attempts to examine the role played by some factors in explaining observed differences in growth performance by the states in India. Certain policies like monetary and trade policies which are not in the state jurisdiction in the Constitution and we do not consider them in this paper. State level analysis also encounters certain major data problems. For example, state-wise investment data are not available and, thus, extent of variations attributable to an important factor could not be analysed. Moreover, trade and monetary policies are beyond state jurisdiction in the Indian constitution. Nevertheless, the growth literature over the years has focused on several other variables such as infrastructure and social sector expenditure for which state level data are available. We examine these possible determinants in our analysis in this paper.

Section 2 provides a review of the empirical literature on possible determinants of growth. Section 3 gives a macro overview of the selected states. Section 4 describes the methodology, data and variables used to identify the determinants of growth at the state level. Section 5 discusses the regression results. Finally, section 6 draws some conclusion and indicates scope for further work.

2. Literature on Determinants of Growth

There are a number of studies which have identified determinants of economic growth within a nation or across nations. Using the Keynesian framework, the Harrod-Domar model had focused on savings and investment rate and incremental capital-output ratio. On the other hand, the Solow model analysed long term growth path of an economy considering a neoclassical

production function where output depends on capital and labour and technological change leads to productivity gain. We discuss the empirical literature in brief with reference to the determinants considered by us for examining inter-state growth in India. Specifically, we focus on infrastructure development, social sector expenditure, urbanisation, and financial inclusion

2.1 Infrastructure

The seminal work by Aschauer (1989) drew attention to the role of public infrastructure in economic growth and added public capital to the conventional production function. Infrastructure expenditure enhances the productivity of private capital, increases its rate of return and stimulates private investment. It marked the beginning of the empirical research on the role of infrastructure on economic growth. Since then a number of empirical studies have been carried out which point towards a positive effect of infrastructure on growth but with varying extent of the impact (Straub, 2008). The positive role of infrastructure has been analysed for South Asia as well as for India by Sahoo and Dash (2008 and 2009) and across Indian states by Nauriyal and Sahoo (2010)

2.2 Social sector expenditure

There are several studies which have analysed the relationship between government expenditure and economic growth. The variations in the findings of these studies have led to the development of different views with regard to their relationship. A good number of studies find that economic growth results in expansion of volume of expenditure by the Government. Using econometric time-series tools, studies have confirmed causality running from economic growth to public expenditure, thereby supporting the Wagner's law. It has been empirically demonstrated that the Wagner's law holds true for India (Srinivasan, 2013; Meedhi, 2014, Rastogi et al. 2019). On the other hand, there are also many studies that holds the Keynesian view that public expenditure may be treated as an exogenous policy variable and increase in public expenditure helps economic growth in the presence of unutilised resources. The causality in this case runs from public expenditure to growth (Dogan and Tang, 2006).

In recent decades, there has been another influential body of research related to the endogenous growth theory that considers human capital as a key driver of growth. This calls for investment in human capital stock through public expenditures on social sectors like education, health, social security and other welfare measures (Barro, 1991; Stokey, 1991; Pyo, 1995; Alper and Demiral, 2016). The role of investment on human capital in the growth process of the East Asian Tigers has been well documented.

In view of this debate, public expenditure, total or the social sector component, should be tested for the possible endogeneity in empirical exercises. In the context of Indian fiscal federalism, another point relevant for this study is that social sector expenditure mostly falls within the jurisdiction of the state governments in the constitutional division of responsibility between the Centre and the states in India and could have a special relevance for inter-state growth analysis.

2.3 Financial inclusion

The role of financial inclusion in growth of an economy has been recognized long back (Schumpeter, 1911). It was well demonstrated that financial services influence growth by enhancing accessibility of capital formation, providing encouragement for innovation and efficiency and promoting investment. There has been a growing volume of literature in the last two decades supporting the Schumpeterian view which includes both theoretical as well as empirical studies. Majority of the studies have provided evidence of positive effect of financial inclusion on growth in developed as well as developing countries (Chattopadhyay, 2011; Dixit and Ghosh, 2011; Sulong and Bakar, 2018). The positive effect is mainly mediated through enhanced accessibility of financial services and products like availability of credit at affordable cost.

2.4 Urbanization

While urbanisation is a natural correlate of growth, literature on urban economics show that relationship between them is driven by a complex set of mechanisms and is no way a straightforward one-way relationship (Turok and McGranahan, 2013; Chen et al., 2014). Several studies find a positive impact of urbanization on economic growth (Bertinelli and Black, 2004; Chen et al., 2014; Nguyen and Nguyen, 2018) and provide evidence that it impacts growth through different channels such as promotion of manufacturing activities entrepreneurship, skills and knowledge spillovers, remittances and technology and skill transfer.

However, the positive effect of urbanization on economic growth may not always hold. Turok and McGranahan (2013) argue that the benefits of urbanization is offset by issues which come as a cost of urbanization particularly in developing economies such as over congestion, overcrowding, inadequate infrastructure, stressed out urban ecosystem, high living cost, property prices and other negative outcome of unplanned expansion of cities. While there are some studies which have reported negative effect of urbanization (Alam et al. 2007; Shabu,

2010), others have reported an inverted U-shaped relationship between the two (Henderson, 2003).

Studies Related to India

While the determinants of growth at the national level in India has been widely studied, very few studies have attempted to empirically study the determinants of growth at the state level. Ahluwalia (2000) and Krishna (2004) examine inter-state growth performance in the context India's economic reform. Ahluwalia (2000) considers growth pattern of GSDP in states in terms of the conventional variables that determines growth like variable for level of investment, quality of human resource and growth in infrastructure. In the absence of state level investment data, the study uses investment expenditure data from CAPEX database compiled by the Centre for Monitoring the Indian Economy (CMIE) as proxy for investment. Krishna (2004) studies the issue of growth variability in Indian states and finds that agriculture influences growth as it has positive impact on industrial and service sector growth. It also establishes the importance of social infrastructure as major determinant of investment. The manufacturing sector was found to be a more consistent driver of growth as compared to agriculture at state-level by Sachs et al. (2002). The study further identifies urbanization as a likely key determinant of growth. Agriculture, infrastructure and human development were found to be important determinants of overall growth in the study conducted by Shand and Bhide (2000).

Infrastructure has been identified as the major reason for the disparity in the growth pattern across Indian states by Cain, Hasan, and Mitra (2012), Lall, Wang and Deichmann (2010) and Sachs (2009). At the district-level in India, Das, Ghate and Robertson (2015) identified infrastructure, mainly irrigation and electricity provision along with urbanization as the most important factors responsible for variation in growth. Sahoo and Das (2008; 2009) found a unidirectional causality running from infrastructure to per capita income at the national level. At the state-level, Dutt and Ravallion (1998) find higher growth rates in states with better infrastructure in addition to other factors. In their inter-state analysis of growth, Nauriyal and Sahoo (2010) found education, infrastructure and health as significant determinants.

Financial inclusion has played a major role in improvement of livelihood of farmers and rural enterprises along with generation of employment opportunity. It allows people to deposit their money in formal financial institutions which in turns has a multiplier effect on growth (Dev, 2006; Khan, 2012; Mehrotra et al. 2009).

3. An overview of Selected States

A total 17 states have been selected for the growth analysis. The period selected is 2004-05 to 2016-17. The GSDP data for this period includes 2004-05 base and 2011-12 base and, we take into account the change in base year by extending the 2004-05 series for the period 2012-13 to 2016-17 by using the growth rates from the 2011-12 series. The selected states account for 1% and above in the national GDP during the study period. Together they account for 90% in the national GDP and 96% of total population in India as per 2011 census.

Table 1 provides the average per capita income, GSDP growth rate and contributions of the selected states to national GDP and total population. Maharashtra occupies the top position with an average of Rs. 65500 per capita GSDP during 2004-2016. Bihar, on the other hand, is at the bottom with average per capita income of Rs. 14000 during the same period. The average level of living between these two states thus differs by a factor of 4.6:1.

Table 1: Per capita income, GSDP growth, contribution in GDP and population during 2004-05 to 2016-17

States [a]	Average Per capita income (Rs. at 2004-05 prices)	GSDP Growth Rate (%)	Share of GSDP in the National GDP (%)	Share in total Population of India in 2011 (%)
Maharashtra	65478	8.56	14.89	9.28
Haryana	64454	8.13	3.32	2.09
Gujarat	62616	9.19	7.34	4.99
Tamil Nadu	58789	8.72	7.96	5.96
Kerala	55114	7.10	3.93	2.76
Punjab	50772	6.49	3.1	2.29
Karnataka	45941	7.50	5.62	5.05
Andhra Pradesh [b]	44585	7.62	7.74	6.99
West Bengal	35304	6.70	6.54	7.54
Chhattisgarh	30982	7.27	1.62	2.11
Rajasthan	30844	7.30	4.29	5.66
Jharkhand	28617	7.63	1.8	2.72
Odisha	28151	5.40	2.55	3.47
Madhya Pradesh	25993	8.56	3.71	6.00
Assam	24600	6.05	1.57	2.58
Uttar Pradesh	19595	6.21	8.26	16.5
Bihar	13937	9.37	2.63	8.6

Source: Authors' calculation using data from Handbook of Statistics on Indian States – RBI

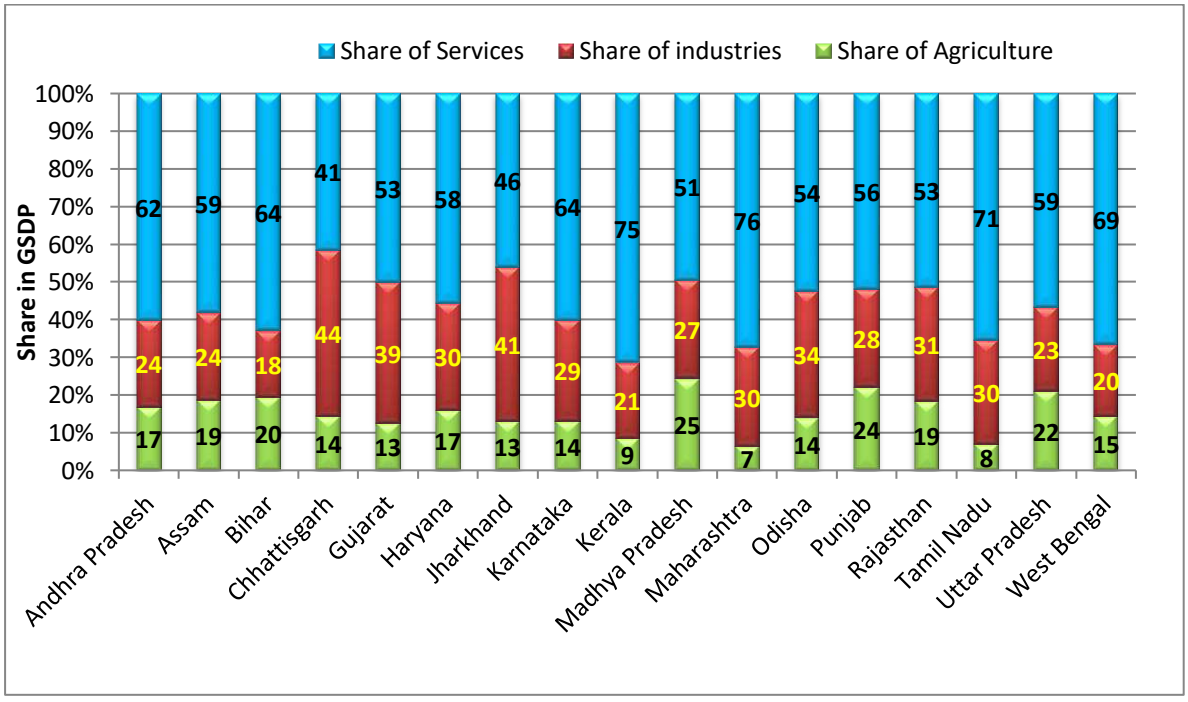
[a] States arranged in descending order of average per capita income

[b] Andhra Pradesh refers to the undivided state and includes both Andhra Pradesh and Telangana since 2014.

Maharashtra, Haryana, and Gujrat occupy the top 3 positions by level of average per capita income while Bihar, Assam and Uttar Pradesh happen to be at the bottom end during the study period. Generally speaking, the high income states have also relatively grown at a faster rate of 8-9% per annum, though some low income states like Bihar and Madhya Pradesh did perform as well in terms of growth. In fact, Bihar witnessed the highest growth rate during the selected period. Assam, Uttar Pradesh, Odisha from the low income category and West Bengal and Andhra Pradesh from the middle income categories experienced a relatively lower average growth rate of less than 7% per annum.

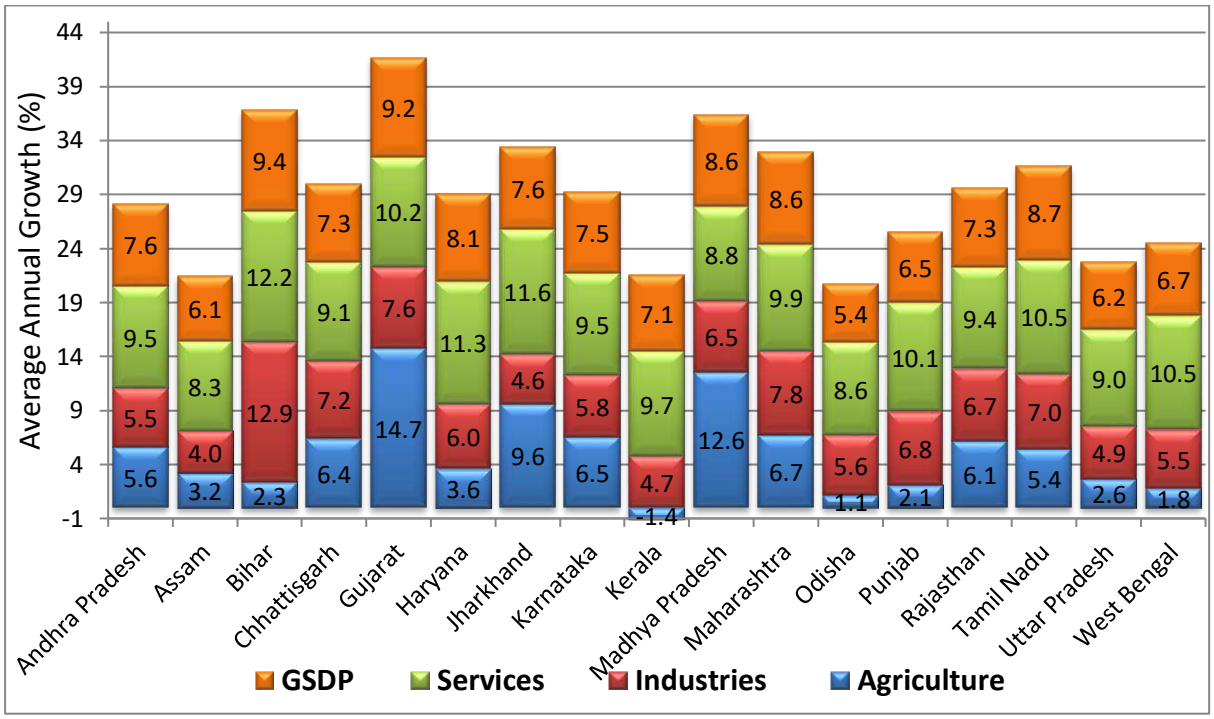
The average share of agriculture, industries and services sectors in GSDP of the selected states during the study period have been provided in Figure 1. Services turn out to be the major contributor to GSDP across the states followed by industries and agriculture. The richest state Maharashtra had the highest average share in services (75.8%), Chhattisgarh in the middle range on per capita income had the highest share in industry (43.8%), and Madhya Pradesh in agriculture (25.2%). While Chhattisgarh had the lowest share in services (41.2%), Bihar in industry (18.1%) and Maharashtra in agriculture (7.1%). The per capita income and the pattern of growth brings out the economic diversity across states in India.

Figure 1: Average share of Agriculture, Industries and Services in GSDP – (2004-05 to 2016-17)



Source: Authors' calculation using data from Handbook of Statistics on Indian States – RBI

Figure 2: State wise average annual growth rate in GSDP by major sectors (2004-05 to 2016-17)



Source: Source: Authors' calculation using data from Handbook of Statistics on Indian States – RBI

The state-wise growth rates of total GSDP and in 3 broad sectors are shown in Figure 2. It may be seen that the high growth during 2004-16 is driven by industry and services in Bihar, while it was driven by agriculture in Gujarat and Madhya Pradesh. Several states had service growth rate of above 10% a year. Bihar, Gujrat, Haryana, Jharkhand, Punjab, Tamil Nadu and West Bengal fall in this list. It seems Punjab and Haryana have saturated on agricultural growth and diversifying towards non-agriculture.

4. Methodology and Estimation

4.1 Empirical Model Specification

To identify the key determinants of economic growth (GSDP) at the state level, following functional form has been estimated –

GSDP = f (*Social sector expenditure, infrastructure, urbanization, financial inclusion*)

A fixed effect panel regression of the type given below using annual data for the period 2004-05 to 2016-17 for the selected variables for the selected states has been estimated.

$$Y_{it} = \alpha + \beta_{\text{sec}} X'_{it} + \sum_{i=1}^{17} \beta_{state} S + \varepsilon_{it} \qquad \text{(I)}$$

Here Y_{it} is the gross state domestic product (GSDP), for state in the year t. It is taken in log scale. x'_{it} is a vector of variables representing determinants considered:– infrastructure index; social sector expenditure as a percentage of GSDP; share of urban population and number of branches of commercial banks per one lakh population with the associated parameter β_{sec}, S is the state dummy and the estimated parameter β_{state}indicates state specific effects on growth in the respective states compared to the reference state. The state with the median income (West Bengal) is taken as reference state and dropped from the equation. The intercept term α represents the state specific effect of the reference state.

As an alternative specification to check robustness, we repeat the estimation of the above model with Per Capita GSDP as the dependent variable.

Endogeneity

As hypothesized in the literature discussed above, social expenditure has a bidirectional relationship with economic growth – social expenditure influences growth and growth also influences social expenditure by the government, the existence of possible endogeneity cannot be ruled out. As social sector expenditure is jointly determined with the dependent variable, OLS estimators would suffer from simultaneity bias. Hence a Durbin-Wu-Hausman(DWH) test[1] (augmented regression test) for endogeneity was performed as suggested by Davidson and MacKinnon (1993). The variable for *social sector expenditure as a percentage of GSDP* was regressed on the other explanatory variables of the model and the possible instruments (variables which are strongly related to the potential endogenous regressor but are uncorrelated with the error term). The residual derived from the regression was then used as a regressor in

[1]The DWH test compares the OLS estimator of the suspected endogenous regressor in the IV regression with that of 2SLS and helps deciding use of IV analysis as the estimators are less biased when the suspected endogenous regressor in the IV regression is actually endogenous (Davidson and MacKinnon, 1993).

Eq. (1). As the coefficient for the residual term was significantly different from zero, endogeneity of the regressor was confirmed. .

To treat endogeneity, a two stage least square using instrument variables (2SLS IV) approach is used for the estimation of Eq. (1). IV estimators are in fact special case of GMM estimators and are a preferred choice in case the error term is homoskedastic and small sample size (Baum, Schaffer and Stillman, 2003). The choice of IV method was based on heteroskedasticity test which confirmed homoskedasticity. Both underidentification test (LM test) of whether equation is identified or there is no correlation of the instruments with the error term and the excluded instruments are relevant and the Sargan-Hansen test for overidentification of the instruments or the validity of the instrument were carried out. Rejection of the null hypothesis for the underidentification (LM test) confirmed that the selected instruments are relevant (correlated with the endogenous regressor and uncorrelated with the error). Failure to reject the null hypothesis for the Sargan-Hansen test for overidentification confirmed that the instruments are valid or they are uncorrelated with the error and are correctly excluded from the estimated equation. Based on the results of the validity tests, first lag of the endogenous regressor *social sector expenditure as a percentage of GSDP*, infant mortality rate *imr* and the gross enrolment ratio in upper primary *ger_upper_primary*were used as instruments for *social sector expenditure as a percentage of GSDP*.

4.2 Data and Variables

4.2.1 Data sources

For this study, most of the data have been taken from Handbook of Statistics on Indian States published by the RBI. This includes data on the GSDP (constant price), per capita GSDP, social sector expenditure, infant mortality rate, share of urban population in total population, number of commercial bank branches and variables used for infrastructure index (see below)- per capita power availability, installed capacity of power, gross irrigated area, gross sown area, national highways and railway route length. The population data has been derived from the NSDP and per capita NSDP data taken from the above source. Whereas data on gross enrolment ratios were taken from NITI Aayog Database, telecom density per 100 persons and area of the states from Statistical Yearbook 2018, CSO, MoSPI, GoI and peak demand deficit from India Energy Portal, NITI Aayog.

4.2.2 Infrastructure index

Infrastructure refers to several variables and, hence, to avoid multicollinearity, studies generally prefer an infrastructure index to determine the effect on growth (Sahoo and Das, 2009; Mitra et al., 2011 at national level and Nauriyal and Sahoo (2010) at state level). An infrastructure index has been constructed by us using principal component analysis (PCA) to be used as regressor in our model. PCA is a multivariate technique where a new variable or component is created as a linear combination of the given set of variables which is unobserved or latent. The set of variables used to construct the index are: per capita power availability, installed capacity of power, peak power demand deficit, percentage of gross irrigated area to gross sown area, telecom density - access to telephone per 100 person, road density, and rail density. The variables for road density and rail density have been constructed using the data for length of total roads and rail network and total area of the sates as length of total roads per 1000 square kilometres and railway network per 1000 square kilometres respectively

Table 2: Eigenvalues and proportion of the variance explained by the extracted components after PCA

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	**2.3471**	**0.2159**	**0.3353**	**0.3353**
Comp2	**2.1311**	**0.9395**	**0.3044**	**0.6397**
Comp3	**1.1917**	**0.6137**	**0.1702**	**0.8100**
Comp4	0.5779	0.1833	0.0826	0.8925
Comp5	0.3946	0.1771	0.0564	0.9489
Comp6	0.2175	0.0774	0.0311	0.9800
Comp7	0.1401	.	0.0200	1.0000

Table 3: Factor loadings of the infrastructure variables

Variables	Comp1	Comp2	Comp3
Telecom density (*tele_density*)	0.4621		
Per capita power availability (*per_capita_power*)	0.6100		
Rail density (*rail_1000sqm*)		0.6184	
Road density (*nh_100sqkm*)		0.5674	
Percentage of gross irrigated to gross sown area (*percntg_irrigated*)		0.4702	
Installed capacity of power (*installed_power*)	0.5554		
Peak power demand deficit (*peak_demnd_deficit*)			0.7802

Note: Only factor loadings greater than 0.45 are presented above.

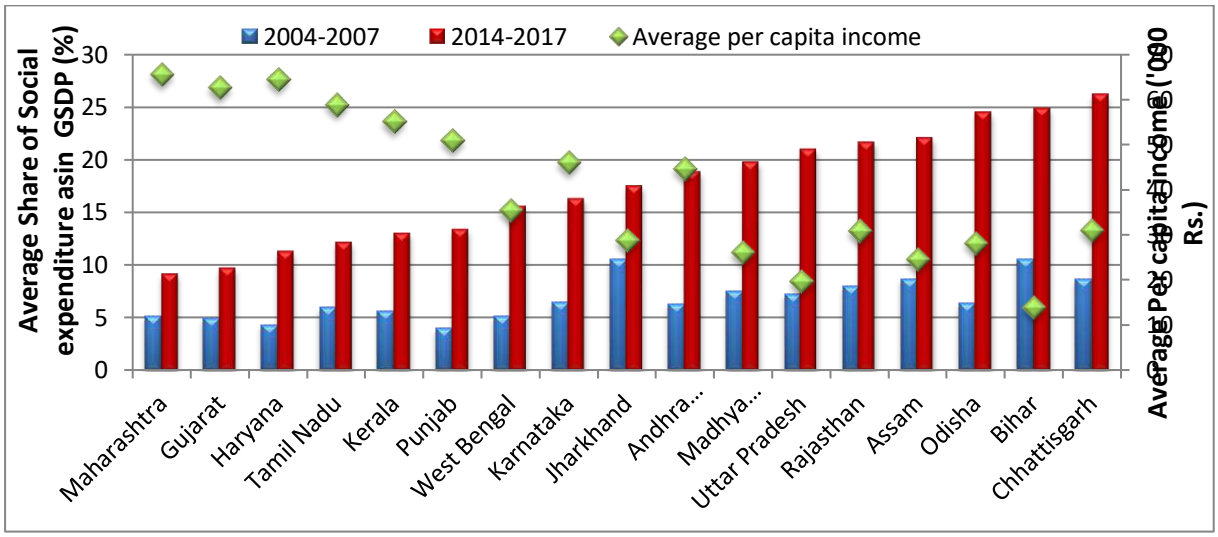
Using PCA, 3 components were extracted based on the eigenvalues which provide a measure of the variance of the underlying factors explained by the components (Table 2). Components with eigenvalues greater than 1 were retained as suggested by the Kaiser Criterion. Component 1 explained 33.53%, the maximum variation in the underlying factor, component 2 30.44% and component 3 another17.02%. The three components thus extracted were able to collectively explain 81% of variation. This was followed by determining the factor loadings or the correlation coefficients between the observed variables and the underlying factors (Table 3). The factor loadings were obtained on rotation using the Varimax criterion. The three components were then combined to construct a single infrastructure index. The factor loadings of variables thus obtained were used as weights of respective variables in constructing the infrastructure index.

4.2.3 Social sector expenditure

Most of the total social sector expenditure by states goes to three major services: (a) Education, Sports, Art and Culture, (b) medical, public health and family welfare, and (c) social security and welfare. Other social services which are included in the expenditure list are drinking water supply and sanitation, housing, urban development, welfare of labour, SCs, STs, OBCs and natural disaster and calamities (RBI, 2018). Social sector expenditure has increased substantially in all the states during the study period. Figure 3 shows the average share of social sector expenditure in GSDP of various states during the initial 3 years (2004-07) and final 3 years (2014-17) of the study period along with the average per capita income during the entire study period.

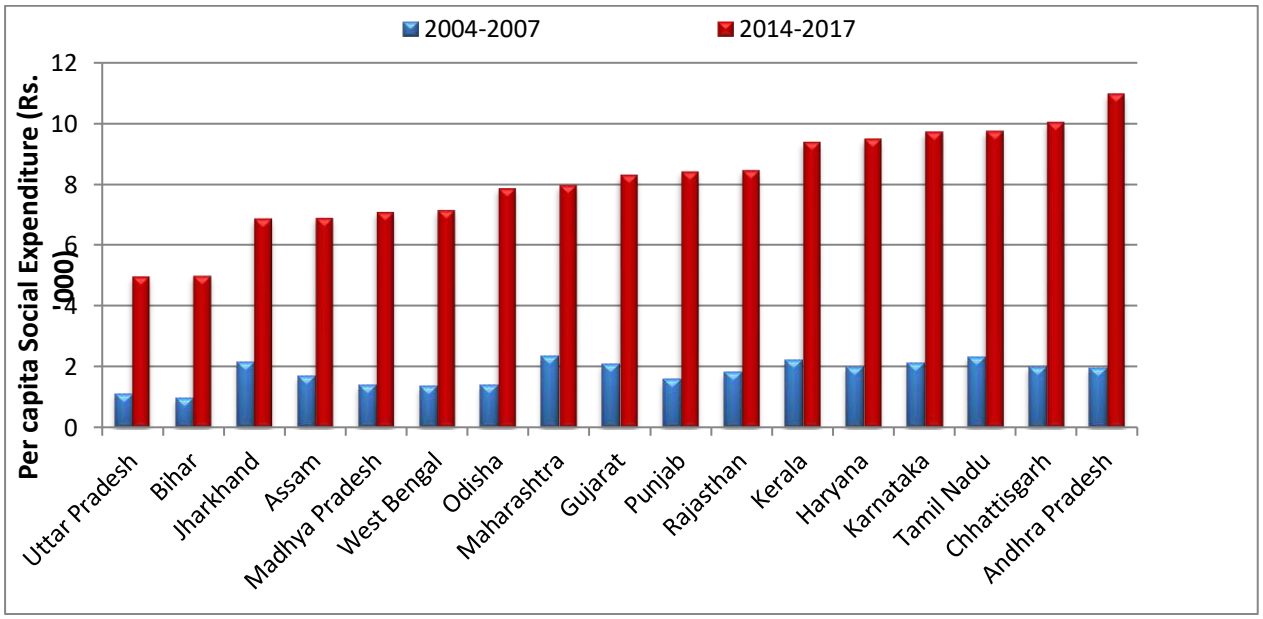
The average increase in share of social sector expenditure across the states between the two periods was 10.72%. The highest increase was observed in Odisha where the share increased from just 6.4% during 2004-07 to 24.6% during 2014-17. The increase was the lowest in Maharashtra, where it increased from 5.1% in the initial years to just 9.2% in the final years. As evident from Figure 3, share of social sector expenditure has remained low in the high income states as compared to middle and low income states during both the initial and final trienniums.

Figure 3: Average of share of social sector expenditure in GSDP during initial 3 years (2004-07) and last 3 years (2014-17) of study period.



Source: Authors' calculation
Note: The average per capita income refers to the whole of the study period.

Figure 4: Average of per capita social sector expenditure during initial 3 years (2004-07) and final 3 years (2014-17) of study period.



Source: Authors' calculation
Note: The average per capita income is the average for the whole study period

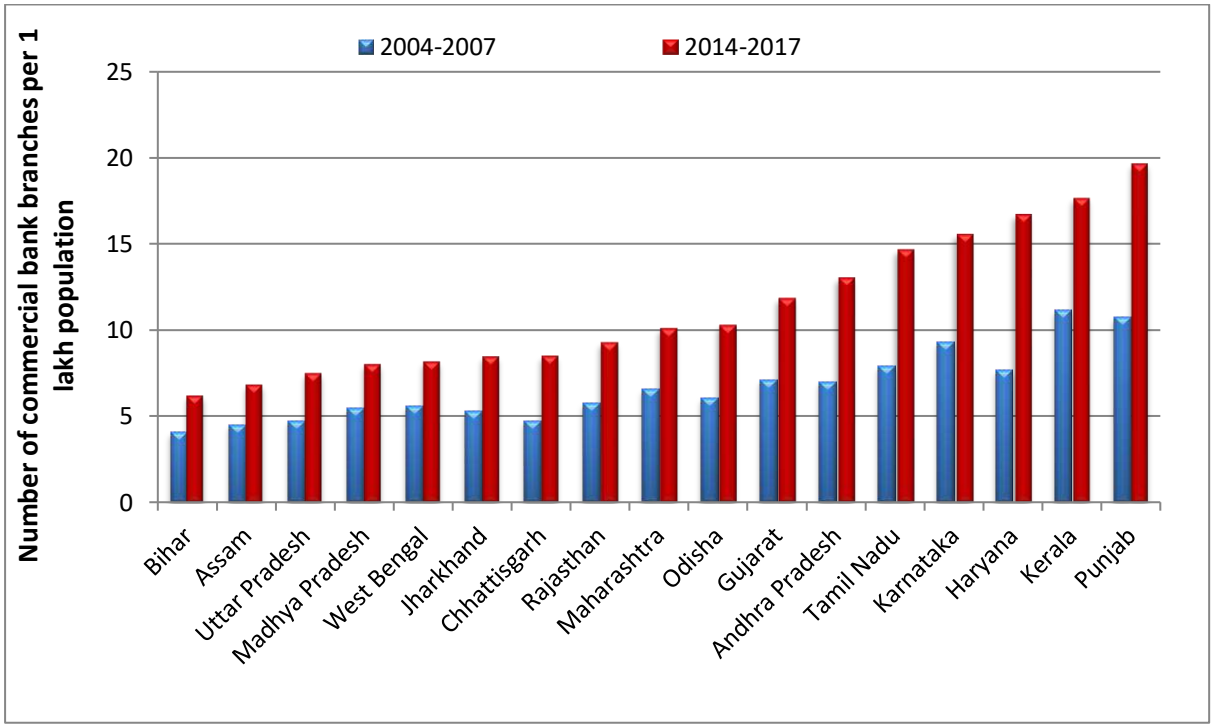
Even if share of social sector expenditure is low for high income states, their per capita expenditure level may not be low in absolute terms. This aspect is examined in Figure 4. As this figure reveals, the low income states lag behind the high income or middle income states on social sector on a per capita basis even after increasing the share in GSDP.

Financial inclusion

In the empirical studies different indicators for financial inclusion have been used to determine the effect on growth. The number of commercial bank branches normalised by population or area is the most commonly used indicator to determine the effect of financial inclusion on growth (Demirguc and Klapper, 2012; Subrahmanyam and Acharya, 2017; Sethi and Acharyaa, 2018). In this study number of commercial bank branches per one lakh population has been used as an indicator of financial inclusion.

During the study period there has been a considerable increase in number of bank branches in all the states but in the extent of increase varies across the states (Figure 5). The variations indicate that financial inclusion has gained importance at state level but it has not been uniform across the states. On an average the number of branches increased by 67.6% across the states. There has been 118.3% increase in numbers in Haryana between the two periods as compared to 46.8% in West Bengal. The increase in financial inclusion has been mainly observed in the high income countries.

Figure 5: Average number of bank branches per lakh population during 2004-07 and 2014-17.

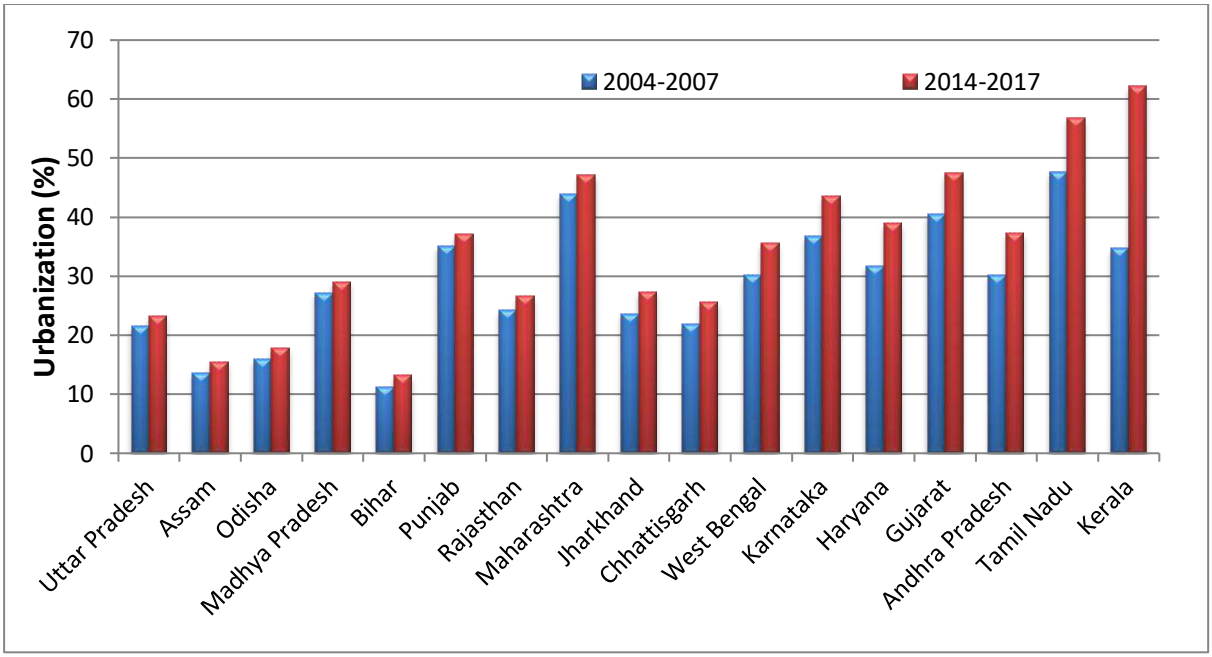


Source: Authors' calculation

Urbanization

In this study urbanization has been represented by share of urban population in the total population of the state. During the study period some of states experienced substantial urbanization. The average share of urban population across the states increased from 28.82% during 2004-07 to 34.37% during 2014-17. Figure 6 show the increase in urbanization between the initial and final trienniums. Kerala has the highest urbanisation rate with a rise from 34% to 62% followed by Tamil Nadu which saw an increase from 48% to 57%. The increase in urbanization remained less than 2 percentage points in the low income states like Uttar Pradesh, Assam, Odisha, Madhya Pradesh and Bihar.

Figure 6. Percentage point change in urbanization between initial (2004-07) and final (2014-17) years of study period.



Source: Authors' calculation

5. Regression Results

To determine the drivers of growth at the state level, two alternative equations of the model stated in Section 4.1 have been estimated. The dependent variable is GSDP in equation 1 and per capita GSDP in equation 2. Both GSDP and per capita GSDP are on the log scale. The estimated coefficients and standard errors for both the equations are given in Table 4.

Let us consider Equation 1 first. The results reveal the following:

- Social sector public expenditure has positive and significant impact on GSDP indicating that a rise in social sector expenditure as a percentage of GSDP results in an increase in GSDP. A 1% rise in social sector expenditure relative to GSDP has an average effect of 0.0261 on log of GSDP.
- Infrastructure index too has a significant positive impact on log of GSDP with a coefficient of 0.756.
- Another variable that has a positive effect is financial inclusion as measured by number of bank branches per lakh of population. Its coefficient is 0.0465.
- On the other hand, urbanisation rate has negative and significant impact on log of state GSDP with a coefficient of 0.0138.
- State dummies reveal a negative impact on the intercept term which corresponds to the reference state, i.e., West Bengal. All the state dummies are negative and significant except for 3 states, e.g., Gujarat, Maharashtra and Tamil Nadu. A negative coefficient implies state specific factors lower the intercept terms as compared to West Bengal and positive values raise it.

Next, we have tried to explore determinants of per capita GSDP rather than GSDP as such. The results given in the last two columns of Table 4 under the heading Equation 2 are very close to those described above except for urbanisation which has a positive effect on per capita GSDP.. The effects of infrastructure, social sector expenditure and financial inclusion seems to be robust on growth of state economy measured either by GSDP or per capita GSDP.

Overall, the results are consistent with the literature discussed in section 2 earlier. They reinforce the conclusions obtained at the cross-country level or at the national level by several authors. As we have discussed earlier, urbanisation need not always have a positive effect on growth. The only study to our knowledge for various states in India has been Nauriyal and Sahoo (2010) which does not reflect the experiences beyond 2006, the last year of their dataset. Moreover, they noted that infrastructure and health did not have a significant effect on growth in their study.

Table 4: Regression Results on Determinants of GSDP

	Equation 1: Dependent Variable = Log(GSDP)		Equation 2: Dependent Variable = Log(Per Capita GSDP)	
	Coefficient	**Std. Err.**	**Coefficient**	**Std. Err.**
Share of Social Expenditure in GSDP [A]	0.0261***	0.0030	0.0279***	0.0033
Infrastructure index	0.7560***	0.1088	0.6153***	0.0872
Urbanization	-0.0138***	0.0013	0.0142***	0.0009
Financial inclusion - Offices of commercial bank per lakh population	0.0465***	0.0071	0.0185***	0.0060
State Dummies				
Andhra Pradesh	-0.1768***	0.0510	0.0329	0.0321
Assam	-1.5598***	0.0586	-0.0656*	0.0396
Bihar	-1.1336***	0.0584	-0.7985***	0.0417
Chhattisgarh	-1.6712***	0.0501	-0.1479***	0.0344
Gujarat	0.0252***	0.0537	0.2169***	0.0353
Haryana	-0.9633	0.0571	0.3849***	0.0376
Jharkhand	-1.3965***	0.0481	-0.2098***	0.0334
Karnataka	-0.4050***	0.0492	-0.0359	0.0326
Kerala	-0.5519***	0.0580	0.1956***	0.0437
Madhya Pradesh	-0.6990***	0.0461	-0.3902***	0.0299
Maharashtra	0.8366***	0.0525	0.2921***	0.0342
Odisha	-1.3285***	0.0551	-0.0346	0.0358
Punjab	-1.2487***	0.0721	0.0843	0.0533
Rajasthan	-0.6983***	0.0476	-0.1750***	0.0305
Tamil Nadu	0.1276***	0.0460	0.0009	0.0292
Uttar Pradesh	-0.012	0.0483	-0.5374***	0.0313
Constant	16.9005***	0.0526	9.4273***	0.0366
Reference State [B]	West Bengal		West Bengal	
Under identification test [C] (Anderson canon. corr. LM statistic)	149.20***		104.96***	
Sargan-Hansen Test statistic [D, E] (over identification test of all instruments)	0.409		0.164	
Endogeneity Test [F] (Chi2 value)	15.502***		12.691***	

Note: '***', '**' and '*' indicates 1%, 5% and 10% level of significance respectively. [A] Social expenditure as share of GSDP is the endogenous regressor.

[B] Reference state with median income

[C] Rejection of the null for the under identification or excluded instruments is not correlated with the endogenous regressors confirms the relevance of the instruments.

[D]Failure to reject the null for the Sargan-Hansen test that the instruments are valid or uncorrelated to the error terms confirm that the instruments selected are valid instruments.

[E]Excluded instruments used in each of the model are first lag of the endogenous regressor and gross enrolment ratio in upper primary and infant mortality rate.

[F] Endogeneity test - Tests that endogenous regressor can be treated as exogenous. Rejection of the null confirms endogeneity.

6. Conclusions

Analysis of determinants of inter-state GSDP growth has been an under researched area in India. Given the economic diversity across states, our understanding of the drivers of growth across states needs to be improved for better policy decisions.The present study is an attempt to econometricallyexplore determinants of growth across 17 major states in India during the period 2004-5 to 2016-17 using a fixed effect panel regression model. Social sector expenditure, infrastructure, urbanisation and financial inclusion have been considered as determinants in this study. Social expenditure by the governmenthas a bidirectional relationship with economic growth, i.e. it influences growth as well as it is influenced by growth. To treat endogeneity issue, we have used a two stage least square approach using instrument variables. For considering a number of components of infrastructure, we have constructed an infrastructure indexusing principal component analysis.

The results indicate that infrastructure, social sector expenditure, and financial inclusion have positive effects on growth of both GSDP and per capita GSDP and seem to be important drivers of growth across states in India. Urbanisation by itself seems to be having a negative effect on growth once other factors are controlled, though it has a positive but non-significant effect on per capita GSDP. Both positive and negative effects of urbanisation on economic growth have been obtained in cross country studies too.

We would like to draw attention to a basic data problem. Inter-state growth analysis is severely constrained by absence of data on some crucial variables like investment. Attention must be given to estimate total capital expenditure data by the states on a comparable basis under the guidance of the national statistical system. When several state governments are adopting a competitive spirit for achieving higher growth rates, absence of basic data severely constrains design of their growth strategies.

We may note at the end that more research needs to be done on explaining state level growth in India. This is a fruitful future line of work to understand the diversity of the Indian development process from various perspectives by experimenting with alternative model specifications, new variables and institutional factors.

References

Ahluwalia, M. S. (2000). Economic performance of states in post-reforms period. Economic *and Political weekly*, 1637-164

Alam, S., Sultana, A., and Butt, M.S. (2010). Does social expenditures promote economic growth? A multivariate panel cointegration analysis for Asian countries. *European Journal of Social Sciences*, 14(1), 44-54.

Alper, F. O., and Demiral, M. (2016) Public Social Expenditures and Economic Growth: Evidence from Selected OECD Countries. *Research in World Economy* Vol. 7, No. 2, 44-51. http://dx.doi.org/10.5430/rwe.v7n2p44

Aschauer, D. A. (1989) Is public expenditure productive. *Journal of Monetary Economics*. 23:177- 200.

Barro, Robert J. (1991). Economic growth in a cross section of countries. Quarterly *Journal of Economics* 56, 407-43.

Baum, C. F., Schaffer, M. E., and Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *The Stata Journal*, 3(1), 1-31.

Bertinelli, L., and Black, D. (2004), "Urbanization and Growth", *Journal of Urban Economics*, Vol. 56. Pp. 80-96.

Cain, J., Hasan, R., and Mitra, D. (2012). Trade liberalization and poverty reduction: New evidence from Indian states. In J. Bhagwati, & A. Panagariya (Eds.), I*ndia's reforms: How they produced inclusive growth* (pp. 91–169). NY: Oxford University Press.

Cali, M., and Menon, C. (2009) Does Urbanisation Affect Rural Poverty? Evidence from Indian Districts. SERC Discussion Paper 14, Spatial Economics Research Centre, the UK.

Chattopadhyay, S. K. (2011) Financial Inclusion in India: A case-study of West Bengal. MPRA Paper No. 34269

Chen, Mingxing, Hua Zhang, Weidong Liu, and Wenzhong, Zhang (2014). The Global Pattern of Urbanization and Economic Growth: Evidence from the Last Three Decades. *PLOS ONE* 9(8): e103799

Das, S., Ghate, C., and Robertson, P. E. (2015) Remoteness, Urbanization, and India's Unbalanced Growth. *World Development*, Vol. 66, pp. 572–587.

Davidson R., and MacKinnon J.G. (1993). *Estimation and Inference in Econometrics*. Oxford University Press, New York, 1993.

Dev, S.M. (2006) Financial inclusion: Issues and challenges. *Economic and Political Weekly*, pp: 4310-4313.

Dixit R, and Ghosh M (2011) Financial inclusion for inclusive growth of India-A study of Indian states. *Int J Bus Manage Res* 3: 147-156.

Dogan, E., and Tang, T. C. (2006). Government expenditure and national income: Causality tests for five South East Asian countries. *International Business & Economics Research Journal* (IBER), 5(10).

Dutt, G., and Ravallion, M.. (1998).Why have some Indian states done better than others at reducing rural poverty. *Economica*, 65, 17–38.

Henderson V (2003) The urbanization process and economic growth: The so what question. *Journal of Economic Growth*, 8: 47–71.

Islam, A. M. (2001) Wagners Law Revisited: Cointegration and Exogeneity Tests for the USA, *Applied Economics Letter*, 8(8), 509-515

Khan, H. R. (2012) Financial Inclusion and Financial Stability: are they two sides of the same coin? Reserve Bank of India Monthly Bulletin, March.

Krishna, K. L. (2004) Patterns and determinants of economic growth in Indian states, Working Paper, No. 144, Indian Council for Research on International Economic Relations (ICRIER), New Delhi

Lall, S. V., Wang, H. G., and Deichmann, U. (2010). Infrastructure and city competitiveness in India. Technical Report, Working paper/World Institute for Development Economics Research

Medhi, K. (2014). An Empirical Investigation of the Causality between Government Expenditure and Economic Growth in India during 1974-2010. IOSR Journal Of Humanities And Social Science (IOSR-JHSS), Volume 19, Issue 7, Ver. IV, pp 53-58.

Nauriyal, D. K., and Sahoo, B. K. (2010). Economic growth across Indian states: role of education, infrastructure and health. Inter-regional Disparities in India, 61.

Nguyen, H. M., and Nguyen, L. D. (2018). The relationship between urbanization and economic growth: An empirical study on ASEAN countries. *International Journal of Social Economics*, 45(2), 316-339.

Pyo, H.K. (1995). A time-series test of the endogenous growth model with human capital. Retrieved from http: //www.nber.org/chapters/c8551.pdf

Rastogi, R., Chakravarty, S., and Pradhan, B. K., (2019) Wagner's Law for Low Income States in India. IEG Working Paper No. 383

Sachs, J. D., Bajpai, N., and Ramiah, A. (2002). Understanding regional economic growth in India. Asian Economic Papers, 1(3), 32-62

Sachs, J. D. (2009). South Asia story of development opportunities and risks. In E. Ghani, & A. Sadiq (Eds.), *Accelerating Growth and Job Creation in South Asia* (pp. 42–49). New Delhi: Oxford University Press.

Sahoo, P., and Das, R. (2008). Economic growth in South Asia: role of infrastructure. In: Institute of economic growth working paper no. 288. New Delhi, India: IEG.

Sahoo, P, and Dash, R. K. (2009). Infrastructure development and economic growth in India, *Journal of the Asia Pacific Economy*,14:4,351 — 365 DOI: 10.1080/13547860903169340

.Schumpeter, J.A. (1911). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle. Harvard University Press, Cambridge.

Shabu, T. (2010). The relationship between urbanization and economic development in developing countries. *International Journal of Economic Development Research and Investment*, 1(2), 30-36

Shand, R., and Bhide, S. (2000). Sources of Economic Growth: Regional Dimensions of Reforms. Economic and Political Weekly,October 14.

Srinivasan, P. (2013). Causality between Public Expenditure and Economic Growth: The Indian Case. *Int. Journal of Economics and Management* 7(2): 335 – 347

Straub, S. (2008). Infrastructure and Growth in Developing Countries: Recent Advances and Research Challenges. World Bank Policy Research Working Paper Series. No. 4460. Washington, DC: World Bank.

Stokey, Nancy L. (1991). Human capital, product quality and growth. *Quarterly Journal of Economics*, 106, 587-616.

Sulong Z, and Bakar, H.O. (2018). The Role of Financial Inclusion on Economic Growth: Theoretical and Empirical Literature Review Analysis. *J Bus Fin Affair* 7: 356. doi: 10.4172/2167-0234.1000356

Turok, I., and McGranahan, G. (2013) Urbanization and economic growth: the arguments and evidence for Africa and Asia. *Environment and Urbanization*, 25: 465–482.

Recent IEG Working Papers:

Devadevan, Manu and Naregal, Veena (2020). The Unification Movement in Karnataka: Twin Logics of Cultural and Economic Consolidation, Working Paper Sr. No.: 398

Boratti, Vijayakumar M. and Naregal, Veena (2020). Rethinking Linguistic Unification, Spanning Political Heterogeneity: Karnataka Ekikarana Across British India and 'Princely' Karnataka, Working Paper Sr. No.: 397

Pradhan, Basanta K., Chaudhuri, Chetana and Saluja, M.R. (2020). Constructing an Input-Output Table for Odisha for 2013-14, Working Paper Sr. No.: 396

Sharma, Suresh and Singh, Ankita (2020). Importance of Scholarship Scheme in Higher Education for Students from the Deprived Sections, Working Paper Sr. No.: 395

Chetty, V.K. and Pradhan, Basanta K. (2020). The Role of Income Distribution in Financing Human Capital Investment, Working Paper Sr. No.: 394

Dayal, Vikram and Murugesan, Anand (2020). Demystifying causal inference: ingredients of a recipe. , Working Paper Sr. No.: 393

Dash, Minati (2020). 'Our place in the future': an exploration of chalaki among young men dispossessed by a mining project, Working Paper Sr. No.: 392

IEG Working Paper No. 399

INSTITUTE OF ECONOMIC GROWTH

University Enclave, University of Delhi
(North Campus) Delhi 110007, India
Tel: 27667288/365/424
Email: system@iegindia.org