Assessment of the Quality of State Expenditures in India

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Abstract

Union government expenditure quality has been assessed in ample researches based on fiscal consolidation targets while losing sight of state finances which do the bulk of the general government spending. State budgets are generally studied collectively, ignoring the inequality in state historical development levels. Present study tries to prepare a composite development index for ranking of states using physical, social and financial indicators. Regression analysis of state fiscal parameters on development index studies the distribution of expenditure across revenue-capital, development-non-development and economic-social services. The study highlights the importance of social expenditure vis-à-vis the economic services for sustained growth .Excess of revenue expenditure over capital outlay in long run could hamper the development due to lack of asset creation. Additionally, study finds large variation in fiscal dynamics of states in pre financial crisis (2005-2008), recovery period (2009-2015) and late slowdown period (2016-2020). Thus, for instrumental assessment of heterogeneous state expenditures, study calculates the fiscal quality index as an indicator.

Keywords: Infrastructure, Revenue Expenditure, Capital Outlay, Fiscal Deficit, Golden Rule, Factor Analysis, Generalised Method of Moments, Impulse Response

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1 Introduction

The prime objective of any government is to create assets and provide utilities for the general public welfare. The larger the economy gets both population wise and in terms of income level, more is the scope for infrastructure development. Schools, hospitals, roads, highways, banks, post offices, power houses, etc. development is prioritized by the government as it enhances labour productivity , improves quality of living and supports demographic dividend. However, macroeconomic constraints and external economic shocks imposes limitations on expenditures, making it difficult to balance development and non-development expenditure. Social infrastructure competes with physical infrastructure in less developed states. This trade off generally persists in short term and leads to mismanagement in budgetary outlay.

Regional divergences in growth and human development across states has been well documented, which has prompted states to spend differently. More developed states would focus on improving health and education outcomes(which historically is less touched upon) while low per capita income states like Bihar, U.P, M.P, etc. focus on physical infrastructure to boost employment and create value generating avenues. However, legislations on fiscal prudence (FRBM,2003) further constraints the exchequer. This makes the issue of assessing expenditure quality more cumbersome as higher debt levels, more borrowings may seem to be a red alert, but backward states needs that space to converge towards more developed ones. As advanced states readily attract private investment (PPP projects), public expenditure actually crowds in private investment.

Distribution of expenditure within the developmental expenditure is another contested debate. Economic services expenditure (agriculture, energy, science, rural development) and social services (housing, medical, labour, social security) both form part of developmental expenditure , but former creates direct income and employment while latter sustains livelihood.

Optimal government expenditure to achieve sustainable growth path is difficult to arrive at when state's revenue generation capacity is limited. But as there is no global consensus on optimal expenditure pattern, a balanced budget would be one which does not trade-off between the long term objectives and short term exigencies and simultaneously adopt policies to suit domestic needs.

This makes us study the fiscal position of the government not just from the view whether states have achieved the threshold (set by fiscal rules) or not but through appropriate fiscal quality measure which accommodates whether the expanded balance sheets of states actually contribute to development of financial, physical and social infrastructure. Recognising the state specific effects, dynamic panel data analysis (System GMM) is conducted to derive the important fiscal parameters. Long term relationship between the variables is studied through co-integration analysis while impulse response function is used to analyse the impact on development index by shocks in government expenditure.

2 Literature Review

As per Wagner's law, as the size of economy increases, the government expenditure increases. The basic objective of any government expenditure in a developing country is to achieve maximum welfare. Expenditure incurred for physical and social infrastructure like schools, hospitals, technology, roads, highways, etc. not only create future avenues for welfare but generates multiplier effect in the economy. This effect is seen in terms of higher productivity and capital stock generation which is long term translates to growth (Romer, 1986; Diamond, 1989; Tanzi and Zee, 1997). Similar investments in transportation and communications also have rapid growth effects (Randolph, 1999). This has been proven across countries (South Africa, Chile, Kenya) using both panel and time series studies (Albala-Bertrand and Mamatzakis, 2001).

Enough empirical work has been done sector wise to differentiate how spending on types of social and economic infrastructure creates differential impact. Endogenous growth theory (Romer) has shown that significant labour contribution towards ideas development could propel an economy towards continuous growth path. As schools and teachers availability lays down the foundation for human capital from childhood, their contribution in overall development cannot be ignored (Krueger and Lindahl, 2001).

Similarly Phang (2003) has shown that positive effects of transportation infrastructure has been observed over longer time periods.

Apart from the physical and social infrastructure, the financial infrastructure is another pillar for economic growth (Gurley and Shaw, 1955; Angadi, 2003). Extension of bank branches, provision of postal services at doorstep and functional bank deposit accounts strengthens the financial intermediation system leading to better financial inclusion (Chakravarty and Pal, 2013). Access to formal credit provides safety nets against economic shocks and increase investment in human capital.

Expenditure on all these types of infrastructure is directly or indirectly growth promoting. Ample research and indexes have been developed to measure the extent of development across countries using these parameters, however their use for analysing the quality of state expenditures is less looked upon.

However, fiscal reforms at state level are very critical for state economic growth (Vadra, 2010). Since fiscal consolidation became a priority (mid 2000's onwards) , the expenditure onus shifted towards reduced capital expenditure as revenue expenditure budget (mainly committed share) is difficult to cut short. Capital expenditure increases the own revenue earning capacity of state in longer term while revenue expenditure achieves short term goals for governments. Fiscal literature has taken revenue to capital expenditure as a proxy to assess the quality of budgetary allocations and growth pattern as money moves from former to latter (Devarajan, 1996; Bhanumurthy, 2019). Similarly, cross country analysis in Asia-Africa has shown increasing share of capital investment improves the level of per capital income (Cabezon, 2015) through higher multiplier effect prolonger for over four years (Kumar and Jain, 2013; Bose and Bhanumurthy, 2019). These studies have shown the differential impact of revenue and capex but not the complimentary impact. For e.g., construction of schools is considered a capital expenditure but payment of salaries, administrative expenses, teacher trainings, etc. are revenue expenditure. Thus, it is not always that either one is superior, if capital expenditure lays the foundation, the revenue expenditure ensures the benefits of capital expenditure are reaped. Devarajan et.al (1996) shows this rare hypothesis (over 43 countries using 1970-1990 data) of capital expenditure negatively promoting growth with current expenditure positively associated.

Borrowing and debt servicing also forms an important part of fiscal consolidation. As state government's own revenue capacity dries up due to sluggish growth and inevitable macroeconomic shocks, states are bound to borrow from market or through union government window to service current payment and repay debt. However, the "Golden Rule" of fiscal policy states that borrowings should be used strictly for the capital expenditure and not for current. Keynesian view on deficits does not distinguish between alternate views of fiscal deficit and argue that in developing economies with excess capacity, deficits would boost demand which could lead to higher interest. But the impact of higher private investment and profitability margins would counter the negative impacts of higher interest rate. Thus, as per Keynesian view deficits could improve fiscal space for the governments. However, deficits in general negatively contributes to economic growth by reducing confidence on government. Similar negative relationship has been established using 30 countries panel data analysis (Niloy Bose, M Emranul Haque, and Denise R Osborn: 2003). India specific study was done by Rajan Kumar Mohanty (2012) using co-integration analysis and found that 1% increase in fiscal deficit would lead to 0.21% decline in GDP.

Expenditure quality of the state is also assessed from the level of debt which state has incurred over the years. Lack of timely debt servicing distorts future taxation (Barro, 1979) through Ricardian equivalence, increases inflationary spiral, constrain scope for counter cyclical policy and pressurize the government to borrow more for surrendering old debt leading to debt trap situation. Debt levels can be sustainable if interest rate growth differential is favourably negative (growth rate is higher than interest rates) and can lead to higher growth.

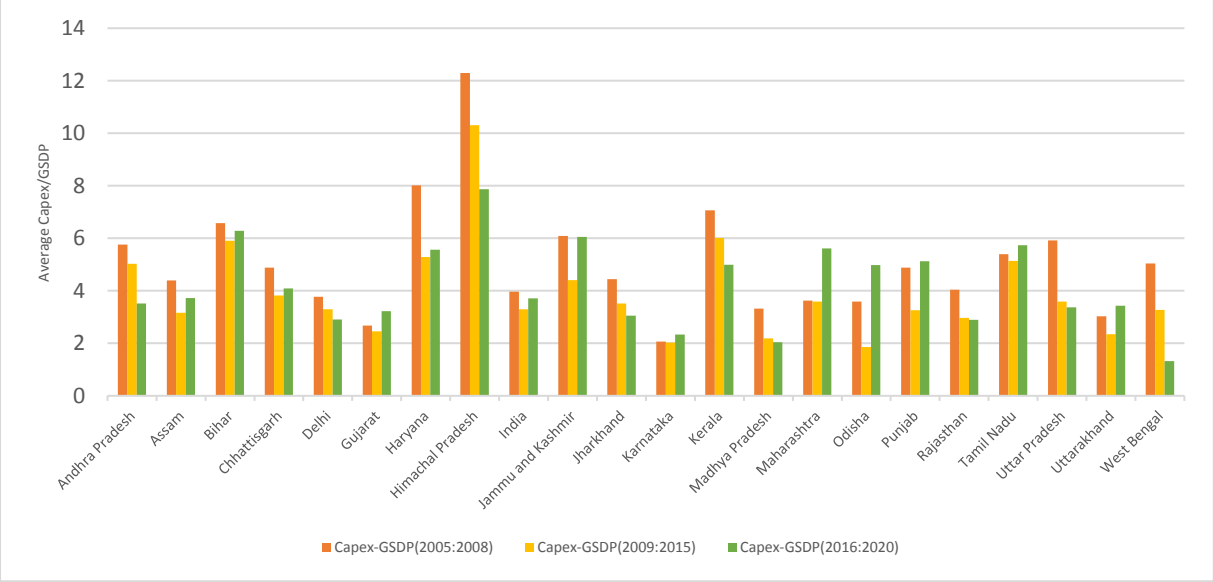
Some of the above fiscal parameters in addition to debt spread, state own tax revenue efficiency, interest rate sustainability have been used in multi indicator approach (Mohanty and Mishra, 2016; Dholakia, 2005) to derive composite fiscal performance index. Das and Baig (2014) used four indicators while Bhide and Panda (2002) used five indicators to evaluate the quality of union budget.

The conclusion from previous empirical work is that elevated fiscal ratios restraint the government to spend forward looking infrastructure and focus more on current dynamics. Important development indicators in health, education, transportation can remain sluggish as a result of this. In this study we try to develop an infrastructure index using social, physical and financial parameters and try to analyse the fiscal space of the state governments over the years which led to differential development status of states (based on index rankings). The significance of type of expenditures along with the guided fiscal thresholds are clubbed to arrive at fiscal quality index for states.

3 Historical State Expenditure

Trends in expenditure components have traversed a volatile journey from 2005-2019 spanning across multiple reforms and crisis. A brief discussion on the expenditure composition would throw some light on state priorities. For historical expenditure assessment, we divide the total time period in three frames (2005-2008: pre crisis FRBM era, 2009-2015: recovery period, 2016-2020: late slowdown). Gross Fiscal Deficit as a ratio of GSDP has increased on an average (for all states combined) from 2.33 in phase I to 2.79 in phase III which could have been due to relaxation in FRBM rules post crisis. Due to higher reliance on the central transfers (due to higher tax devolution under successive Finance Commissions), rationalisation of tax brackets under GST regime, state's own tax revenue has deteriorated. As a proportion of revenue receipts, own revenue has declined from 12.1% to 8.47% on average over the three phases. Capital expenditure as percentage of GSDP has remained below 4% on average from 2005-2019 while revenue expenditure increased from 12.33 % to 13.78%.

Figure 1Capital Expenditure across states

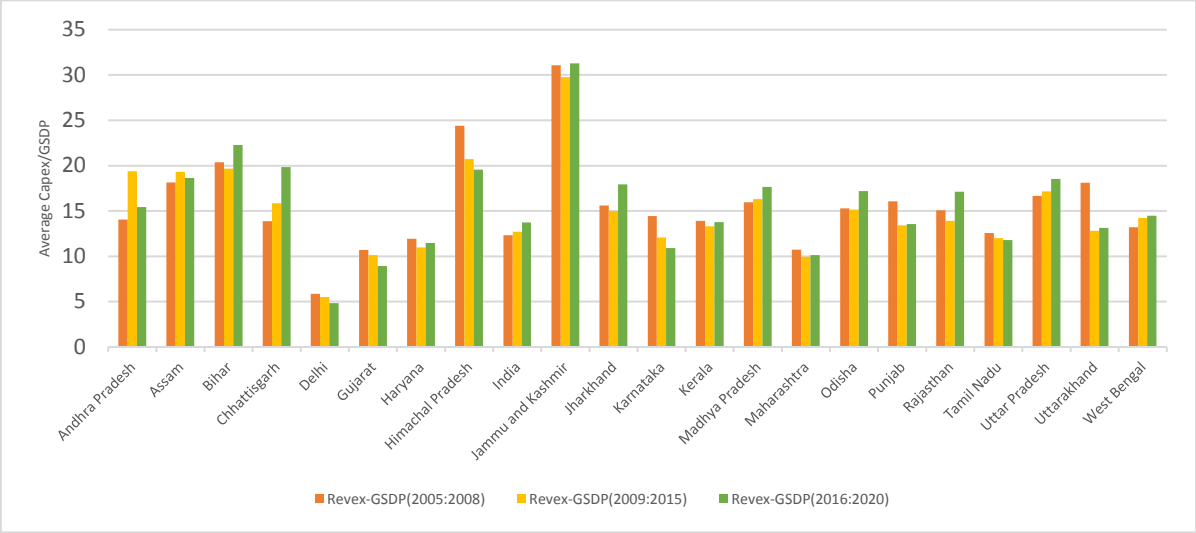


Source: Based on Author's calculation

Going through the state wise data, majority of states saw decline in capital expenditure to GSDP in slowdown phase compared to pre pandemic growth phase. This supports the literature of pro-cyclical capital expenditure. Less developed states/UT like Bihar, Jammu & Kashmir, Odisha, Uttarakhand, Chhattisgarh have significantly improved in capital investment compared to peer developed states (Delhi, Andhra, Kerala which saw a decline). The extent of state heterogeneity can also be seen as states like Himachal Pradesh spends with 8-12% while equally developed states like Karnataka and Gujarat having less than 4% which depicts the discretionary level of spending.

In terms of borrowings, divergence is seen from the golden rule principle as Capital Outlay to GSDP has declined from 1.07% to 0.85% over the phases.

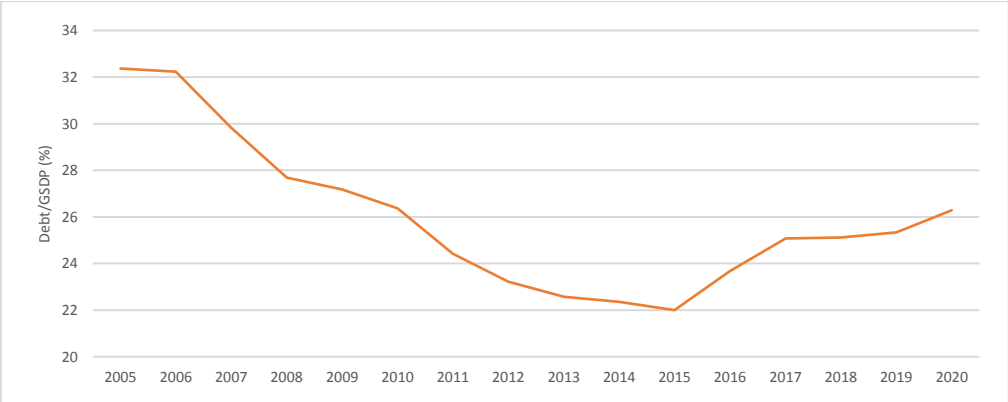
Figure 2: Revenue Expenditure across states



Source: Based on Author's calculation

Cutting the revenue expenditure has been a difficult task for state governments even during and post crisis as committed expenditure forms a major part. Even the most developed states like Maharashtra, Kerala, and Punjab have not improved upon the revenue expenditure consolidation. Jammu and Kashmir shows the spike due to higher administration costs pertaining to security issues. Some of the states also resorted to loan waivers (post back to back agricultural drought in 2014-15) which is represented in higher expenditure in third phase (Chhattisgarh, Rajasthan, U.P, T.N).

Figure 3: Combined States Debt



Source: Based on Author's calculation

Post the crisis period, states have consolidated debt to below 25% level , however post 2016 there has been a slight increasing trend which is in line with decreasing own revenue generation capacity of the states. But state wise average debt ratio varies from as high as 48.3% (average over 2005-2019) in Jammu & Kashmir to 13.7% in Delhi. Himachal Pradesh, Punjab, Kerala, Uttar Pradesh has followed the debt led growth path with more than 30% debt/gsdp ratio.

4 Methodology and Data

4.1 Factor Analysis for Composite Index

Factor Analysis is dimension reduction methodology which summarises the variance in explanatory variables into few factors based on the correlation structure. For each factor, the factor loadings represent the importance of variables; higher the factor loading means more is the contribution of particular explanatory variable in the factor. However, the factors are distinguished based on their explanatory powers which is represented by the Eigen values (calculated using covariance matrix). The general rule as prescribed by Kaiser (1974) is to take into account factors with Eigen values greater than 1 as they account for maximum variance. Scree plot test was carried for graphical representation of Eigen values with the threshold level of 1

The summation of the squares of the factor loadings against each explanatory variable give the total variance explained. Uniqueness is defined by

$$Uniqueness = 1 - \Sigma h^2$$

where $h^2 = \Sigma l^2$, l is the factor loading for particular factor. Uniqueness defines the unexplained part of the variable; lower the uniqueness better is the factor.

The un-rotated factors were rotated orthogonally to ensure the independent variables are uniquely distributed among the factors. The rotation does not change the factor loadings.

The state infrastructure variables considered for index calculation are distributed between financial, physical and social. However, as we are calculating a single composite index, weights for factors are taken in proportion to their Eigen values. Weighted factors sum would then provide a single index value for each state for each year.

It may be noted that adequate measures were taken to ensure that factor analysis was a justified methodology here. This study tested the evidence of correlation using Bartlett's test of sphericity with the null hypothesis that the correlation matrix is an identity matrix (no correlation). The statistic is based on a chi-squared transformation of the determinant of the correlation matrix. Further, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is used to indicate the degree to which data is suitable for common factor analysis. The higher values indicate greater suitability to be combined in a common factor but the value should not be less than 0.5 in order to proceed with the analysis.

4.2 Empirical Methodology

The study aims to understand the impact of state fiscal parameters on the development index (calculated using factor analysis) in order to analyse the quality of state expenditures.

A. POOLED OLS Model

Pooled OLS model is a simple linear regression model where the heterogeneity across the units (states) is ignored.

$$y_{it} = \alpha + \Sigma\beta_i x_{it} + \varepsilon_{it} + T_i$$

y_{it} Is the dependent variable, which is the development index in our case, i represents the ith state while t represents the time period. x_{it} Is set of independent variables. T_i Represent the time dummy.

B. Dynamic Panel Estimation

$$y_{it} = \alpha + \Sigma\beta_i x_{it} + z_i + \varepsilon_{it}$$

y_{it} is the dependent variable ,which is the development index in our case, i represents the ith state while t represents the time period. x_{it} is set of independent variables . T_i is the time dummy and z_i represents the unit specific characteristics.

The major advantage of using panel data for estimation is that is controls for the unobserved explanatory variable. This encounters for the unit specific heterogeneity ignoring which could lead to biased results.

Fixed effects (FE) assume that individual group/time have different intercept in the regression equation, while random effects hypothesize individual group/time have different disturbance. FE is based on the assumption that $Cov(x_i, \varepsilon_i) \neq 0$ while RE takes this covariance as zero.

In order to test for the best model between Pooled OLS, fixed and random effect certain tests were carried out. Breusch-Pagan Lagrange Multiplier (LM) test is a chi square test which considers the null hypothesis of pooled ols model being a good fit against the alternative of random effect being a good model. While Hausman test is used to compare between fixed and random effect. The null hypothesis of Hausman test is that random effect is better model.

C. GMM Estimation Technique

"Generalized method of moments is applied more often to unobserved effects models when the explanatory variables are not strictly exogenous even after controlling for an unobserved effect. As in cross-section and time series cases, there is usually a convenient estimator that is consistent quite generally, but possibly inefficient relative to GMM. For example, for studying the effects of prison population on crime rates, Levitt (1996) uses pooled two-stage least squares on a panel data set of states, after removing state fixed effects by differencing adjacent years. If the errors in the first-differenced equation are homoscedastic and serially uncorrelated, the pooled two-stage least squares estimator is efficient. If not, a GMM estimator can improve upon two-stage least squares .GMM is well suited for obtaining efficient estimators that account for the serial correlation; see, for example, Arellano and Bond (1991)".

$$Y_{it} = \emptyset Y_{it-1} + \beta X'_{it} + \gamma_i + \epsilon_{it} \text{.....(1) First Equation of GMM}$$

$$\Delta Y_{it} = \Delta Y_{it-1} + \beta \Delta X'_{it} + \Delta\epsilon_{it} \text{..... (2)Differenced Equation of GMM}$$

Unobserved fixed effects no longer enter the equation as they are by assumption constant between periods. Also, the first differenced lagged dependent variable is instrumented with its past levels [as the model follows autoregressive path] and now changes in the dependent variable are assumed to be represented by equation 2. Another advantage of GMM estimation is no assumption for distribution of error term.

As we have path dependence in the model, we use System GMM ahead of Difference GMM (Roodman, 2006). Former would take instruments in the form of level lag v/s instruments taken by difference GMM (just differenced lags). So System GMMM is a two-step procedure using both equation 1 and 2

However to remove the problem of endogeneity GMM estimation takes lags prior to t-1 as the instrument variable because these lags are assumed to be not correlated with error term of periods ahead. So the two conditions are satisfied

i) Instrument is correlated with the regressor , $[cov(y_{it-1}, y_{it-2}) \neq 0]$
ii) Instrument is uncorrelated with error, $[cov(\epsilon_{it}, y_{it-2}) = 0]$

Also the model assumes that error terms over time are uncorrelated, for which the AR test is carried out. To check whether the dependent variable lags are correctly taken as instruments, Hansen test is carried out.

4.3 Data Source and Variable Definition

The analysis is based on 16 years period covering 2005-2020 over 21 states of India. There are two sets of variables, one for the index calculation while other for the panel analysis.

Infrastructure variables

Table 1 : Parameters for Development Index

Variable*	Definition	Period of Study	Sources
Physical Infrastructure			
Road density (sq. km)	The ratio of the State's total road length to land area	2005 to 2020	RBI
Rail density (sq. km)	The ratio of the State's total rail network to the State's land area	2005 to 2020	RBI
Telecom Density	Telephone (fixed-line plus mobile) connections per 100 people	2005 to 2020	RBI
Per Capita Installed power capacity (KW)	Installed power generation capacity per person	2005 to 2020	RBI
Social Infrastructure			
School Density	School per 1000 population	2005 to 2020	EPWRF
Teachers	School teachers per 1000 population	2005 to 2020	EPWRF
Hospital Beds	Hospital Beds per 1000 population	2005 to 2020	EPWRF
Doctors	Doctors registered with the State Medical Councils/Medical Council of India per 1000 population	2005 to 2020	EPWRF
Financial Infrastructure			
Bank Accounts	Bank Accounts per 1000 people	2005 to 2020	RBI
Bank Branches	Bank Branches per million people	2005 to 2020	RBI
Post office	Post office per million people	2005 to 2020	Department of Post

*The ideology to take these variables into consideration is taken from "Govinda R Timilsina, P.Sahoo, Ranjan Kumar Dash (2022); why do Indian States Differ in Their Infrastructure Development? Research Working Paper Series .10086. World Bank"

Empirical research has shown that expenditure towards creation of durable assets like schools, transportation, communication, hospitals etc. has higher multiplier effect by augmenting productivity of factors of production as well as boosting economic growth.

Infrastructure development is one of the major source of development of any economy. Prakash (1977) has shown that there were disparities in the states of India in terms of infrastructure and the regions with stronger infrastructural base the potential to grow more rapidly as compared to others. Better physical Infra in terms of roadways, railways, energy reduce the cost of doing business and promotes investment in economy.

Investment in social infrastructure in terms of creating hospitals , schools , deployment of qualified teachers improve the standards of living in the economy, which enhances the chances of capitalising on the demographic dividend.

Improvement in financial inclusion increases the spending and saving capacity of individuals, leading to increased aggregate demand in the economy. As the financial institutions accessibility increases, the credit markets become more robust in the economy. This releases pressure on the government to spend on infrastructure as private sector comes forward to fill the gap.

Interlinkages in the different types of infrastructure and their impact on economic growth is well established but as the infrastructure development is capital intensive activity with long gestation period , state governments have generally considered expenditure in infrastructure as residual.

Changes in the developmental variables over the years is represented in the Appendix.

Fiscal Parameters

Fiscal variables such as state government expenditure (capital, capital outlay and revenue) has been sourced from Handbook of Statistics on the Indian Economy (RBI). For estimation of quality of expenditure, revenue to capital outlay (RECO) variable is created instead of Revenue to Capital expenditure. Capital outlay expenditure has been used because as suggested in Jain & Kumar (2013), “it constitutes only the investment expenditure and excludes debt repayments, etc. by the state governments”. Goswami (2021) has showed RECO in the range of 4-5 is growth promoting while higher ratio (like in 1990’s reached close to 11) reduces the scope of capital outlay. Therefore, squared term of RECO is included to check if higher levels of RECO impact the development index negatively

Fiscal space for the governments is constrained by the levels of debt incurred over the years along with the current fiscal deficit. Debt to GSDP ratio (DEBT_GSDP) and Gross Fiscal Deficit to GSDP ratio (GFD_GSDP) are two major indicators which control the exchequer’s spending. Post 2000 when the debt levels for government reached the peak, FRBM legislation was bought to control for GFD and RD. Controlling for deficit generally translates to spending in favour of revenue expenditure by cutting down on capital expenditure. This directly impacts the creation of durable assets leading to downfall in development index. However, borrowing is not always harmful if “golden rule” of expenditure is adhered to which says borrowings should be strictly directed towards capital expenditure.

This can be studied by another variable like Revenue Deficit to Gross Fiscal Deficit (RD_GFD) which indicates the proportion of borrowed resources spend on current expenditure rather than investment. Government of India (2017) report showed 32% RD_GFD as appropriate ratio which drives states closer to the “golden rule” of borrowing. The variable is an important part of government’s forward looking medium term fiscal policy framework.

Development expenditure(DEV) consists of: (i) social services, which includes expenditure on education, health, water supply and sanitation, housing, urban development, and welfare of backward communities, and (ii) economic services, which includes expenditure on agriculture and allied activities, rural development, irrigation, energy, and transportation infrastructure. While Non Development (Non Dev) expenditure consists of committed expenditure like administration, salaries, pensions, etc. The ratio of two parameters indicate the focus of government budgets towards creating new assets.

Economic expenditure like on irrigation, energy, transportation develops infrastructure over long term however social expenditure like on water, sanitation, education develops human capital which enhances the accessibility of the economic infrastructure. Therefore ignoring social infra spending over economic infra spending could lead to increased inequality and biased development within the states. The ratio of two variables is represented by ECOSOC.

Descriptive statistics of the fiscal variables

Table 2 Descriptive Statistics of Fiscal Parameters

Variable	**Mean**	**Std. Dev**	**Min**	**Max**
GFDGSDP	2.81	1.77	-1.73	12.37
DEVNONDEV	2.26	0.74	0.80	4.44
ECOSOC	4.26	5.49	0.41	73.12
DEBTGSDP	29.49	11.73	0.43	68.46
RECO	7.25	4.51	2.20	31.25
RDGFD	503.44	8618.98	-2379.59	157662.8
RECO_SQ	72.96	120.28	4.84	977.11

The above table represents the extent of variation between the states. Fiscal deficit for some state in a particular year is as high as 12.37% while it is in surplus for some states. Development Expenditure is generally >1 for all states (except for in some particular year), which represents that index value variation may not arise because of this fiscal ratio. Some states excessively focus on economic expenditure as maximum value is 73 but because mean is around 4.26, it could be assumed that max value may come from an outlier state. Average debt level for states is close to 30% (fiscal target by Finance Commission), which is due to debt led growth by states. As GFD vary extensively across states and so is the deficit, the ratio RD-GFD is quite difficult to interpret.

So, apart from the basic development indicators (physical, financial and social) which vary across states, fiscal variables are equally heterogeneous which contributes significantly to the level of development across states and time.

5 Results

5.1 Factor Analysis Results

Factor analysis results on the independent variables is represented for the year 2019-2020.

```
Factor analysis/correlation                    Number of obs    =         22
    Method: principal-component factors        Retained factors =          3
    Rotation: orthogonal varimax (Kaiser off)  Number of params =         30

    --------------------------------------------------------------------------
        Factor   |   Variance   Difference    Proportion   Cumulative
    -------------+------------------------------------------------------------
       Factor1   |    4.12796     1.06743       0.3753       0.3753
       Factor2   |    3.06053     1.44029       0.2782       0.6535
       Factor3   |    1.62025           .       0.1473       0.8008
    --------------------------------------------------------------------------
    LR test: independent vs. saturated:  chi2(55) =  238.46 Prob>chi2 = 0.0000

Rotated factor loadings (pattern matrix) and unique variances
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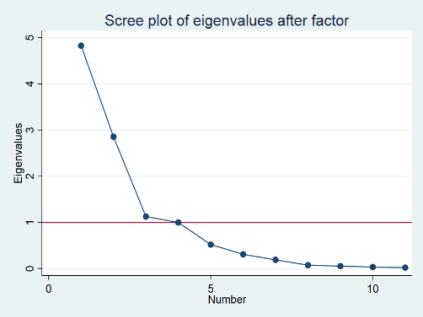


The above results indicate the reduction of independent variables significantly into 3 factors (represented by Eigen values >1). The factor loading for the estimation are presented below in the table.

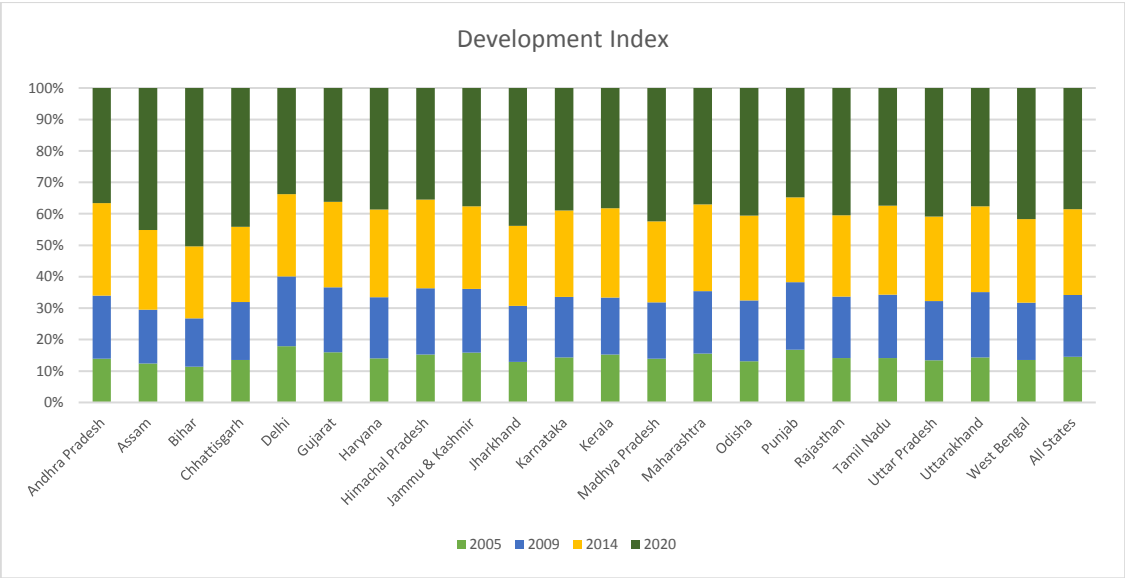
Table 3 Factor loadings for year 2020

Variable	Factor1	Factor2	Factor3	Uniqueness
Bank Accounts	0.8455	0.4438	0.1096	0.0761
Hospital Beds	0.7904	-0.0733	-0.0548	0.3669
Bank Branches	0.8819	0.0269	0.3114	0.1245
Doctors	0.7142	0.0935	-0.4203	0.3045
Post Offices	0.4122	-0.7868	0.2605	0.1432
Power Per Capita	0.7047	0.0699	0.2085	0.4551
Rail Density	0.2351	0.9125	-0.0602	0.1085
Road Density	0.3430	0.8361	0.0334	0.1822
Schools	-0.2010	-0.6722	0.6249	0.1173
Teachers	0.2468	-0.0791	0.9076	0.1091
Tele Density	0.7482	0.4848	0.0359	0.2038

Without rotation, first factor represents 37.5% of the variation, second factor represents 27.8% of the variation while third factor accounts for 14.7% of variation. Later these factor loadings were used for the index calculation.

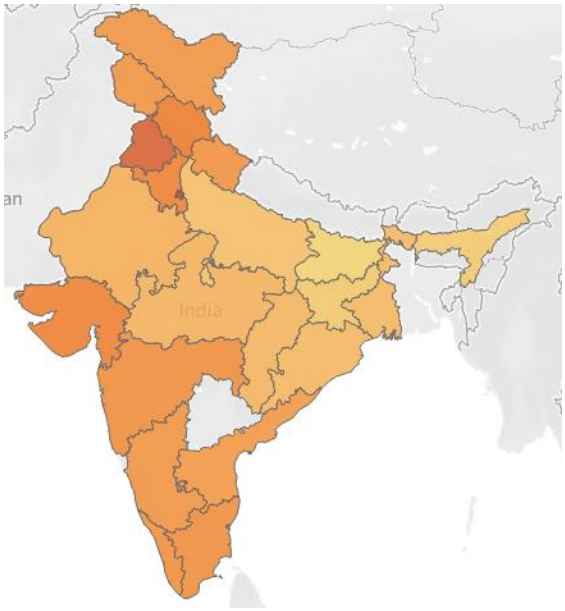
The factors are combined using the weighted Eigen values with maximum weight given to first factor which contains maximum number of variables. The gives Composite Index (as three types of infrastructure variables are combined into one index) for every state for year 2019-20. Similar analysis is being carried out for each year (2005-2020). Ranking of the states are given in the Appendix.

Figure 4: Cumulative State Development Index value from 2005-2020

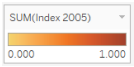


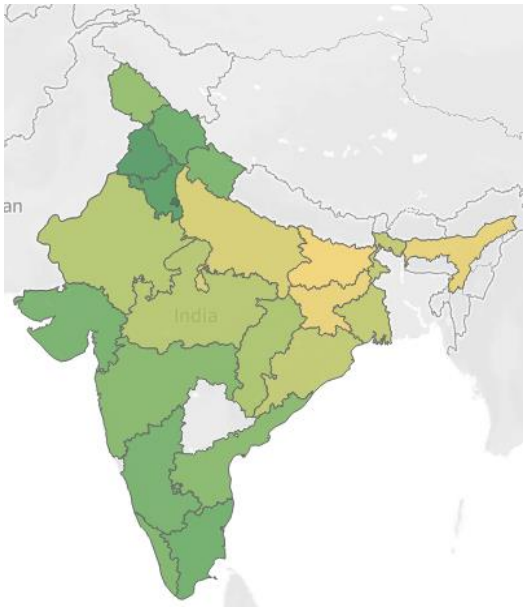
The above graphs shows the Index values for the states over the years. It shows that less developed states like Bihar, Jharkhand, Assam, Chhattisgarh, etc. have grown faster in recent years compared to more developed States/UT like Delhi, Gujarat, Himachal, Kerala, etc. This has been supported my major growth theories which predict convergence between states in terms of development levels. Though in nominal terms, the creation of infrastructure in less developed states is still quite lagging behind.

Figure 5: Development Index change in states over the time period

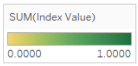


Development Index: 2005





Development Index: 2020

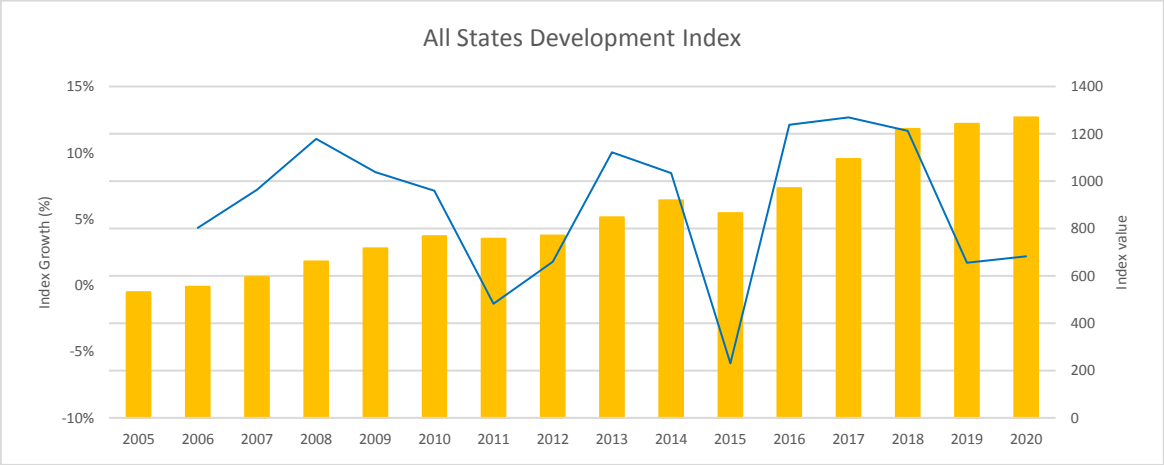


Source: Based on Author's calculation

The above graph depict that if we compare the overall development status of the states using index values of 2020 and 2005, it's the developed states like Karnataka, Tamil Nadu , Haryana which have made the most advancement. However, less developed states like Odisha, M.P, Chhattisgarh has made significant improvement. Reasons for which will be analysed later in the paper.

We also get an insight that development is generally concentrated in clusters. South India states like Kerala, T.N, Karnataka, Maharashtra share similar level of states while in north Himachal Pradesh, Punjab, Haryana, Uttarakhand developed equally.

Figure 6: Growth in Infrastructure development



Development Index for all the 21 States/UTs is plotted on right hand side while the growth rate in index value is plotted on left hand side. The growth rate in Index value shows upward trend in time period 2005-2008 led by capital intensive growth phase of Indian economy. Post 2008, due to GFC and due to twin balance sheet problem, the infrastructure growth slowed down. With regulatory forbearance window by RBI (for easier credit) and investment growth (34% in 2011), infrastructure growth picked up (with a lag). However, in recent years the growth has moderated as states shifted focus towards curbing expenditure.

5.2 Dynamic Panel Estimation Results

Pooled OLS Model results in Table 4 represents the combined OLS model ignoring the state specific heterogeneity.

Table 4 : Pooled OLS Results

Source	SS	df	MS			
				Number of obs	=	330
				F(8, 321)	=	1410.38
Model	100680037	8	12585004.6	Prob > F	=	0.0000
Residual	2864333.77	321	8923.15817	R-squared	=	0.9723
				Adj R-squared	=	0.9716
Total	103544371	329	314724.531	Root MSE	=	94.462

DEVELOPMENTINDEX	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DEVELOPMENTINDEX						
L1.	1.005383	.0106635	94.28	0.000	.9844035	1.026362
GFDGSDP	11.60593	3.72329	3.12	0.002	4.280799	18.93106
RDGFD	.0003968	.0006027	0.66	0.511	-.000789	.0015826
DEVNONDEV	11.02617	10.8883	1.01	0.312	-10.39527	32.4476
RECO	7.813288	4.31295	1.81	0.071	-.6719302	16.29851
ECOSOC	-.7477056	1.421811	-0.53	0.599	-3.544951	2.049539
DEBTGSDP	-.9110999	.740345	-1.23	0.219	-2.367641	.5454413
RECO_sq	-.306562	.1554218	-1.97	0.049	-.6123361	-.000788
_cons	4.302483	54.0554	0.08	0.937	-102.0451	110.6501

The results show that Development to Non-Development expenditure ratio does not impact the development index while Revenue Expenditure to Capital Outlay only linearly impacts the development index and that too at 10% level. As FRBM guidelines required states to reduce the fiscal deficit and contain the debt levels, major brunt has fallen on capital expenditure. However Goswami (2021) has shown that beyond a threshold (4-5), suppressing capital outlay against revenue expenditure would lead to lower development. Thus, we expect the squared term of RECO to be significant in the model.

Majority of the variation in the dependent variable is explained by the lag of the dependent variable which is highly significant, however the model suffers from the problem of endogeneity and autocorrelation as the error term will be correlated with the lagged dependent term. This gives biased and inconsistent results.

To solve the problem of endogeneity we make the use of two step GMM model which takes the difference of the independent variables as instrumental variable along with the lag of dependent variable.

Table 5: GMM Estimation Results

Dependent Development Index	Model (1)	Model (2)	Model (3)
Independent Variables	**Coefficient**	**Coefficient**	**Coefficient**
Development Index (t-1)	0.9580** (46.34)	0.9623** (50.11)	0.9689** (54.25)
GFDGSDP (%)	15.683** (2.43)	17.196** (2.64)	11.457** (2.10)
DEVNONDEV	21.670 (1.02)	-	35.913** (3.05)

ECOSOC	-1.955* (-1.77)	-1.994* (-1.66)	-1.771* (-1.79)
DEBTGSDP (%)	-1.578 (-0.96)	-2.472** (-2.22)	-
RECO	10.717* (1.87)	7.338* (1.74)	13.143* (2.90)
RDGFD (%)	0.0005** (3.34)	0.0005** (3.5)	0.0005** (3.7)
RECO_SQ	-0.382** (-2.25)	-0.310** (-2.2)	-0.456** (-3.17)
Constant	29	114*	-62.24

*Notes: ** and * denote significance at 5 and 10 % levels. Figures in the brackets are z statistics*

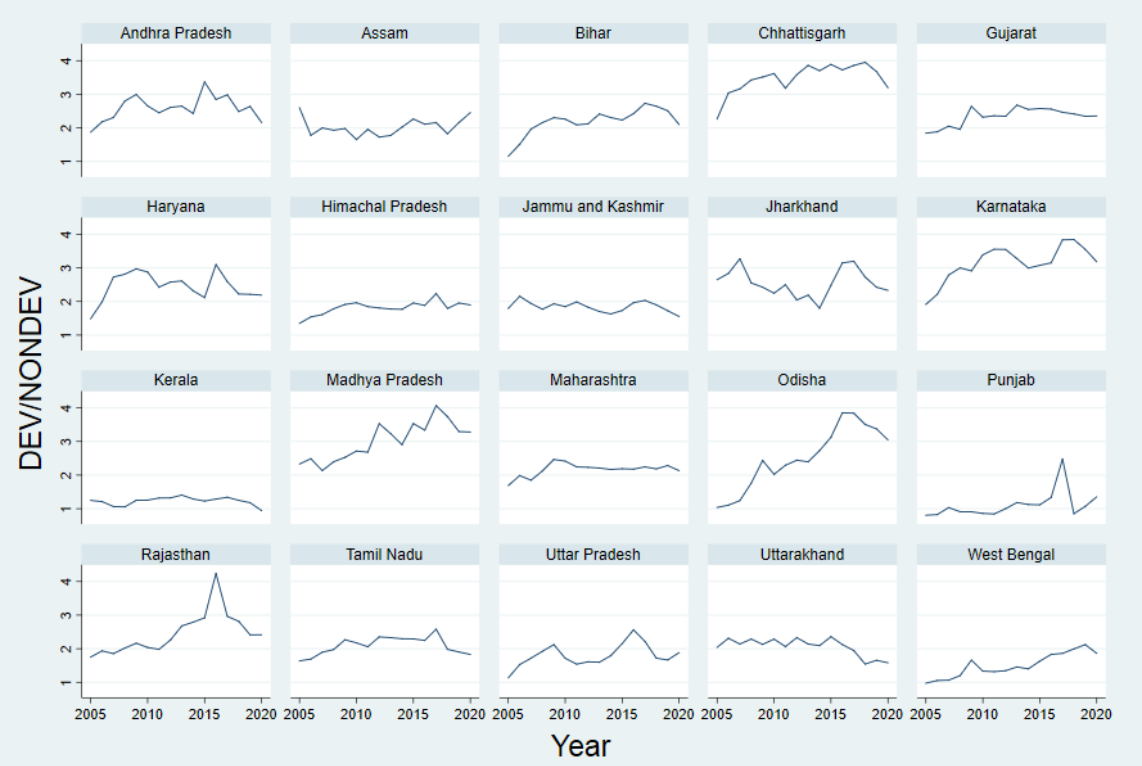
The GMM model controls for heterogeneity as well as endogeneity. First lag of the development index is positively significant with coefficient value close to 1. This shows that on an average for states there is not very incremental difference year on year. Also it signifies that once a state has sizeable infrastructure development, people would demand even better socio-economic facilities, which compels the state to spend judiciously.

The RECO variable is positively significant in all the three models stating that expenditure on activities like administration, pensions, maintenance, salaries, etc. is also important to sustain the assets created due to capital expenditure. Revenue expenditure also comprise of expenditure on rural development, power, transport etc. which support income and business activities. Also, Capital outlay reaps benefit in long term but current expenditure is necessary to ensure social security. Second order coefficient of RECO is negatively significant which consolidates our point that beyond a level, favouring revenue expenditure over capital is not sustainable for development.

GFDGSDP is significant and its high value indicate the possibility of "golden rule" convergence where the states borrow to spend on capital creation. However, if states are not able to retire the debt over the years, it could lead to drawing down in the private savings thus negatively impacting the infrastructure development.

DEBTGSDP ratio is negative in the model but not significant in model 1. A possible explanation is that some states even with higher debt levels can sustain growth (due to negative interest rate growth differential), so higher debt is not always bad. Also, states which receive lower transfer from union, based on Finance Commission formula are bound to borrow at higher market rates. Developed states have also seen decline in own revenue capacity over the years due to decline in capital expenditure spending (which has longer multiplier impact) which makes them move towards borrowings. This is supported by the fact that DEVNONDEV expenditure ratio is positive but not significant in model 1. This shows that when expenditure is diverted towards developmental activities, debt of states is not binding on the infrastructure quality. In model 3 DEVNONDEV variable is positive and significant when we do not involve debt in analysis. This confirms the impact of developmental expenditure on growth. However, the negative significance of debt and absence of DEVNONDEV variable in model 2 confirms that in general debt may negatively impact the exchequer's investment path.

Figure 7Developmental to Non Developmental Expenditure for States



For states like Bihar, M.P, Odisha, Chhattisgarh, W.B, and Karnataka there is an increasing trend in the DEVNONDEV ratio signifying the focus of less developed states to improve the revenue generation capacity. Andhra Pradesh however, has slowed (as panel shows decline) on growth post 2014 due to bifurcation. Developed states like Maharashtra, H.P, and Kerala have seen moderation or even decline.

Expenditure on energy, communication, transport, agriculture, industry comes under the development expenditure while on public health, education, nutrition, labour welfare, etc. come under social expenditure. The balance between Economic and Social Expenditure differs from state to state based on level of development and demography

These expenditures directly contribute to physical and human capital. Intuitively, the ECOSOC variable should be positive as economic expenditure is more value and employment generating while social expenditure is more support oriented. But with high levels of poverty and weak health indicators, social expenditure is equally important for Indian states (National Health Policy, 2017; XV Finance Commission).

RDGFD significance shows that when borrowings are diverted towards revenue expenditure, it promotes growth. This takes away from the Golden Rule principle. But the coefficient value of 0.005 is very small and will not contribute much to the change in infrastructure index.

Diagnostic Check for GMM:

To check whether the GMM results are robust and intuitive, we perform the Arellano Bond test for serial autocorrelation as well as Hansen Test to test for instrument validity.

```
Arellano-Bond test for AR(1) in first differences: z =  -3.04  Pr > z =  0.002
Arellano-Bond test for AR(2) in first differences: z =   1.83  Pr > z =  0.067

Hansen test of overid. restrictions: chi2(14)   =  20.11  Prob > chi2 =  0.127
  (Robust, but weakened by many instruments.)
```

We can reject the null hypothesis of no autocorrelation as the p value is less than 5 % significance level while the serial correlation problem is not present at the second order as p value is greater than 0.05. The Hansen test hypothesis is not rejected which means that we can accept the null that instruments are valid. However, the number of instruments are on the higher side.

Using the above variables and lagged dependent variable, we also run the fixed effect model. The coefficient of lagged dependent variable is 0.9601 while the coefficient sign and significance is similar. As the difference between coefficient value of lagged index variable in GMM and fixed effects is very low (0.95 v/s 0.96), the use of system GMM estimate is appropriate.

So, from GMM we can conclude that index value is certainly impacted by the fiscal condition of the state along with the index value is period t-1.

5.3 VECM results

Before going to the Vector Error Correction Model, co-integration test has to be carried out to find the existence of long term relationship between dependent and independent variables (used in panel regression). We have already studied the relationship using GMM method which assumes dependent variable to be endogenous, this additional analysis will contribute to the study by decomposing impact of exogenous shocks.

Also we scale down the index variable using the standard equation

X* = (X-Min(X))/(Max(X)- Min(X))

Co-integration test:

Table 6 : Co-integration test results

```
Kao test for cointegration
--------------------------

Ho: No cointegration                        Number of panels      =     22
Ha: All panels are cointegrated             Number of periods     =     14

Cointegrating vector: Same
Panel means:          Included              Kernel:           Bartlett
Time trend:           Not included          Lags:             1.50 (Newey-West)
AR parameter:         Same                  Augmented lags:   1
---------------------------------------------------------------------------
                                            Statistic         p-value
---------------------------------------------------------------------------
 Modified Dickey-Fuller t                     4.1262           0.0000
 Dickey-Fuller t                              6.4680           0.0000
 Augmented Dickey-Fuller t                    7.7079           0.0000
 Unadjusted modified Dickey-Fuller t          2.5263           0.0058
 Unadjusted Dickey-Fuller t                   3.5364           0.0002
---------------------------------------------------------------------------
```

As the p values for the dickey fuller tests is less than 0.05(5% significance level), we reject the null hypothesis of no co-integration and conclude that long term relationship exist between the variables.

VECM model decomposes the impact into short run (VAR) and long run through error correction term (ECT). It considers the dependent variable to be endogenous. For the study, all the variables taken into consideration are first difference stationary. Growth rate of GSDP is another variable which is taken as development is dependent on growth in long term. Standard equation for VECM is represented as

$$\Delta y_t = \sigma + \Sigma_{i=1}^{k-1}\gamma_i \Delta y_{t-i} + \Sigma_{j=1}^{k-1}\delta_j \Delta x_{t-j} + \Sigma_{m=1}^{k-1}\vartheta_m \Delta R_{t-m} + \lambda ECT_{t-1} + \mu_t$$

Where y is the dependent and x is the list of independent variable. ECT is the error correction term.

$$ECT_{t-1} = Y_{t-1} - \eta_j X_{t-1} - \vartheta_m R_{t-1}$$

From results we get,

$$ECT_{t-1} = [1.00 DevIndex_{t-1} - 3.33\ GFDGSDP_{t-1} + 0.34\ DebtGSDP_{t-1} + 0.099 DevNonDev_{t-1} - 0.155\ EcoSoc_{t-1} + 0.23 RECO - 0.0001 RDGFD_{t-1} - 1.24$$

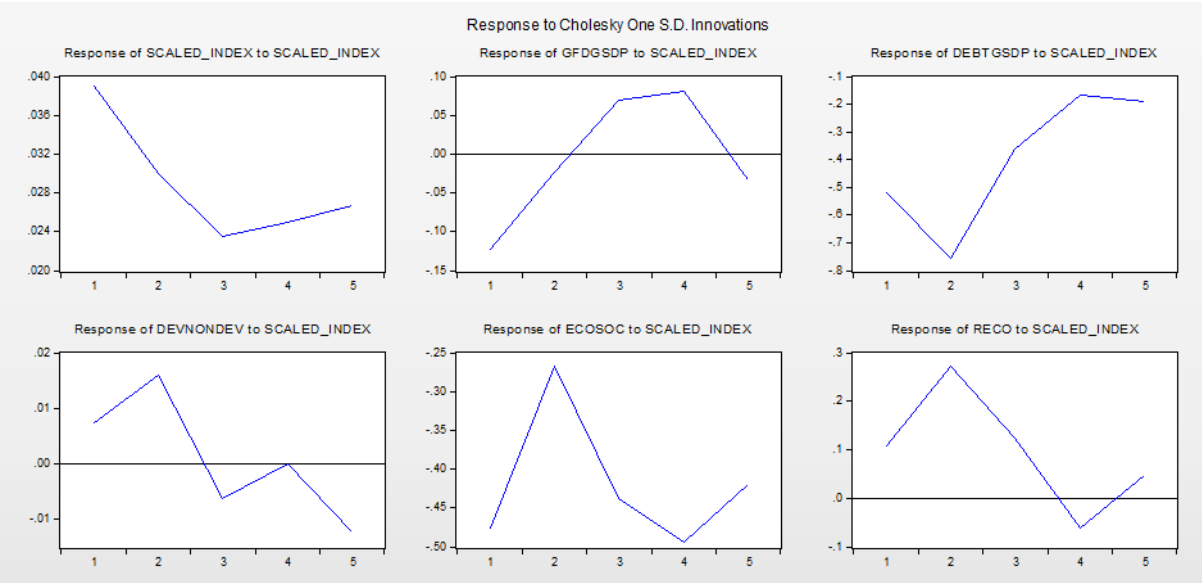
The long term error correction term has negative coefficient (λ) in the VECM equation which is -0.000168. The negative sign of the coefficient shows that any long term shock in the index value will be corrected and the equilibrium level will be restored. However, the speed of adjustment is very low signifying the positive effect of development. Increase in development (positive shock) is beneficial for the economy and thus reversion to equilibrium signifies that states do trade-off between development and other committed expenditure. So if in one year they spend very heavily on infrastructure they will eventually reduce the expenditure in coming periods (as happened with some developed states which reduced spending over time).

The signs of the coefficients in the error correction term are read inversely. Coefficient of Gross fiscal deficit is negative showing that, even with higher fiscal deficit, states can spend on development purposes. This is possible if states follow the golden rule of expenditure. Also states with historical low development indicators need more fiscal space to spend on asset creation. However, in long term higher debt to gsdp ratio negatively impacts the index. Higher debt leads to increased expenditure (non-developmental) on interest payments through higher rate of interest. This reduces the available level of resources with the states. Coefficient value of the debt variable also reduces compared to short run dynamics stating smoothening of fiscal impact. In long term, excessive spending on development may not lead to infrastructure improvement for all states. As growth generally tapers off after continuous growth phase (convergence theory), role of even non development expenditure in terms of pensions, administration, fiscal services becomes important. Investment in economic activities will lead to creation of employment opportunities which in turn will support domestic growth.

Thus, we see that over the long run, the expenditure distribution may need manoeuvring depending on the then development status of the state.

Impulse Response Function:

Figure 8 : Impulse Response Graphs



Impulse Response Function measures the effects of a shock to an endogenous variable on itself or other endogenous variable in the model.

The second graph in the above panel shows the initial shock in gross fiscal deficit negatively impacts the index value as states in very short term react to higher deficit by curbing development expenditure. Also as union government incentivise the states to curb deficit in order to get more grants and transfers (conditional), states generally move towards expenditure rationalisation. But as borrowings are channelized towards capital spending and balance sheets of smaller states improve, the deficits are accommodates and index improves.

Impact of the exogenous shock in debt levels eases out over the time period as the rate of growth of economy rises above the interest rates in the economy, leading to sustainable growth.

Development Expenditure directly contributes to the improved infrastructure in terms of better banking facilities, telecommunication, roads and highways along with better social outcomes. Improved power availability supports business activities and construction sector which is significant contributor to physical infrastructure. But over the periods to sustain infrastructure, governance needs to be improved. It is done through better district administration, interest payment to retire short term debt over long term debt and timely public works dissemination.

A standard deviation shock in economic expenditure benefits the least developed states like Bihar, Odisha, and M.P (relatively only as shock is negative). But over the periods as requirement of health and education takes centre stage, welfare oriented social services should become the state priority. Thus development in infrastructure in later time periods is driven more by social spending as people start demanding advanced services like higher education, vocational training, super specialised hospitals, etc.

FISCAL INDEX

After arriving at the major fiscal factors which impact the infrastructure index in any state, a comprehensive index is prepared using simple average method to rank states. Fiscal deficit variable enters the GMM (contributes to infra development) with a positive sign, however continuous increase in deficit will taper the growth in long run. Similar is the case with RECO as RECO_SQ term is negative, there needs to be an adequate threshold for RECO. Using the FRBM guidelines and RBI (Fiscal Framework and Quality of Expenditure in India) 3% is taken as threshold for GFD and 5 for RECO.

All the five variables are scaled using the simple scaling method

Improvement Index =(X-Min(X))/(Max(X)-Min(X))

Deprivation Index = (Max(X)-X)/ (Max(X)-Min(X))

As some variables like ECOSOC impact the development index negatively, deprivation index is used for them which means that higher the index value for these variables, lower will be the overall fiscal index.

To calculate the fiscal index using transformed variables, simple average method is used. Higher the index better is the fiscal quality.

Table 7Variables for Fiscal Index calculation

Variable	Transformation	Type of Sub-Indices Used	Reason
GFDGSDP	GFDGSDP-3	DEPRIVATION INDEX	Though significance from GMM is with positive sign, higher levels of GFD above threshold impact the borrowing powers of state , so much higher values impact negatively
ECOSOC	ECOSOC	DEPRIVATION INDEX	Significance from GMM estimation is with negative sign
RECO	RECO-5	DEPRIVATION INDEX	As squared term of RECO is negative, increasing revenue expenditure over capital is taken an sign of weak fiscal performance
DEBTGSDP	DEBTGSDP-20	DEPRIVATION INDEX	Significance from GMM estimation is with negative sign while Finance Commission recommended 20% as debt to gsdp target for states
DEVNONDEV	DEVNONDEV	IMRPOVEMENT INDEX	Significance from GMM estimation is with positive sign

FISCAL INDEX = 0.2xGSDP+0.2xECOSOC*+0.2xRECO*+0.2xDEBTGSDP*+0.2xDEVNONDEV**

**Represents the transformed variables (scaled using either deprivation or improvement index)*

Rankings of the States and values are provided in the Appendix.

Figure 9: Fiscal Index for States

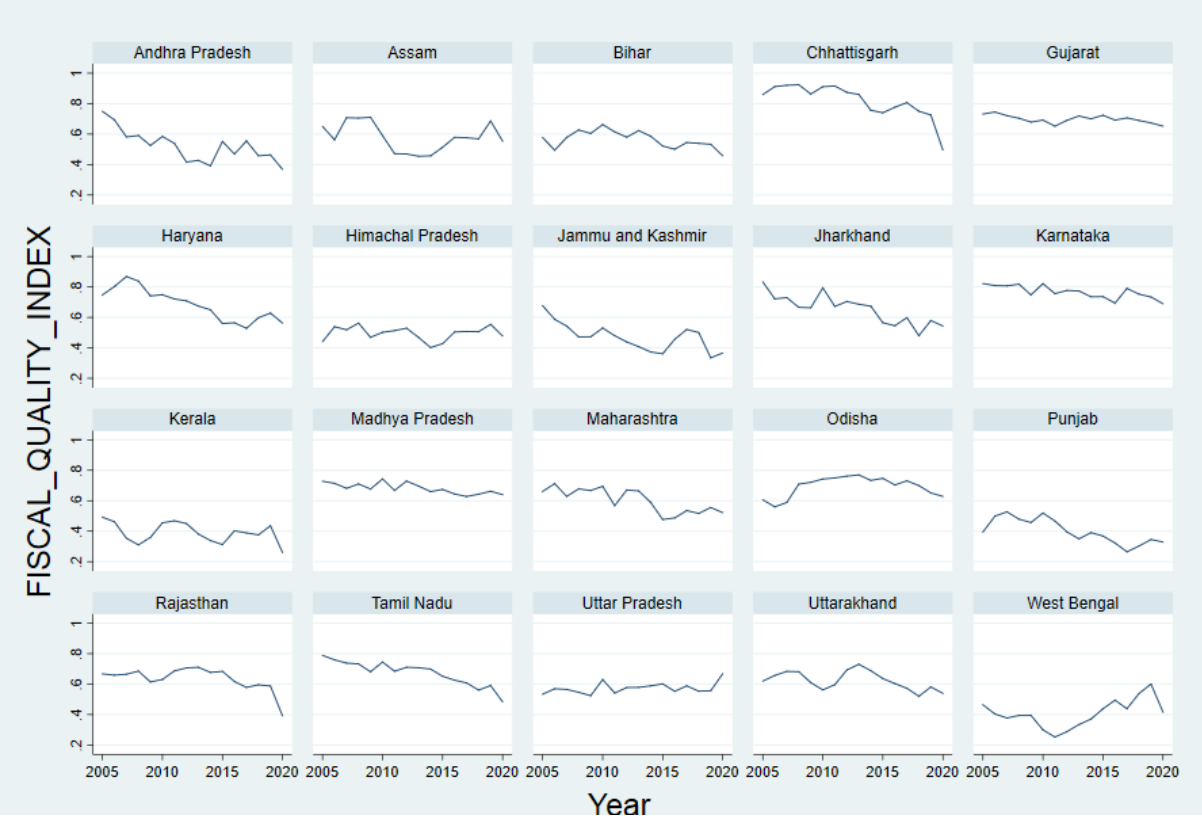
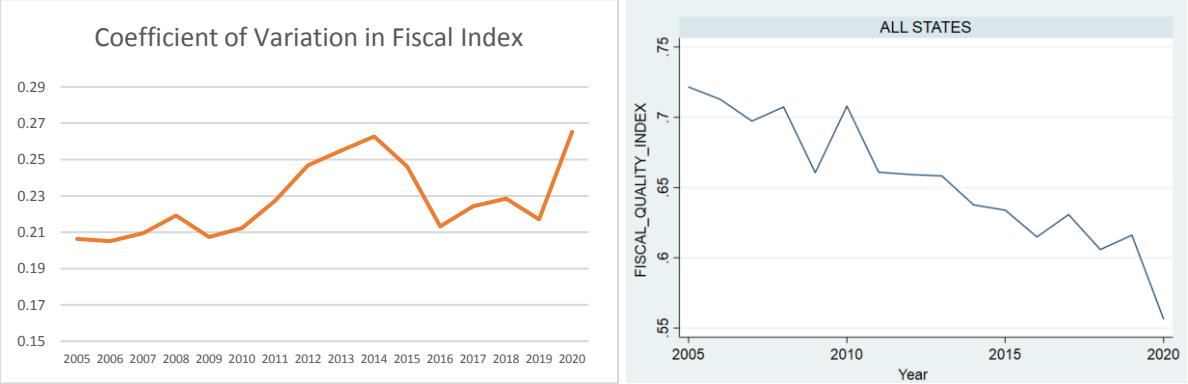


Figure 9 shows going in the slowdown phase (2018-20) where the overall infrastructure development score reduced for all states, even the fiscal quality took a hit. Specially baring few states, majority saw decline in fiscal health nearing 2020. M.P, Rajasthan, Chhattisgarh, Bihar, and Odisha has been resilient in fiscal quality post 2015 period. This goes in line with the improvement in their development index values (Figure 4). However, improvement in fiscal capacity is driven by different factors for different state. For e.g. in case of Chhattisgarh it is the RECO management and increased developmental expenditure while in case of Odisha it is the focus on social expenditure along with focus on developmental expenditure. In case of Gujarat, prudent deficit targeting and higher social expenditure allocation has kept its scoring high.

Looking at the developed states like Uttarakhand, Maharashtra, Haryana, and Tamil Nadu fiscal quality has not improved significantly in last decade. H.P has prudently controlled the debt and fiscal deficit however balance between types of expenditure is not met. For majority of time period fiscal quality of Assam has score more than 0.6 because of the significant improvement in social expenditure.

Some developed states like Punjab, Haryana, Kerala has consistently declined in fiscal quality which is also seen in the lower marginal improvements in their infrastructure index values. Due to their better historical fiscal performance, they achieved rapid infra growth which has kept the first two states consistently in the top four ranks across the development index. Only Himachal Pradesh seems to be an anomaly as its fiscal quality has remained non-volatile and still it remains in top 3 position in infra index rank. One possible reason could be its above average fiscal performance (scoring consistently above 0.4 in fiscal index).

Figure 10 Fiscal Index for all States Combined



Coefficient of variation shows two major dips at 2009 (due to fiscal crisis), 2015(Agricultural drought leading to loan waivers, UDAY scheme) and 2019(an increase in revenue receipts of 0.45 per cent of GDP in the form of own taxes and 0.03 per cent under grants was completely offset by a decline in tax devolution and own non-tax revenue by 0.42 and 0.06 per cent). Fiscal quality improved till 2008 crisis stuck, as economic growth facilitated fiscal sustainability. However, RECO also declined during that period. Post 2010 the recovery was volatile as some states improved drastically (Figure 11).

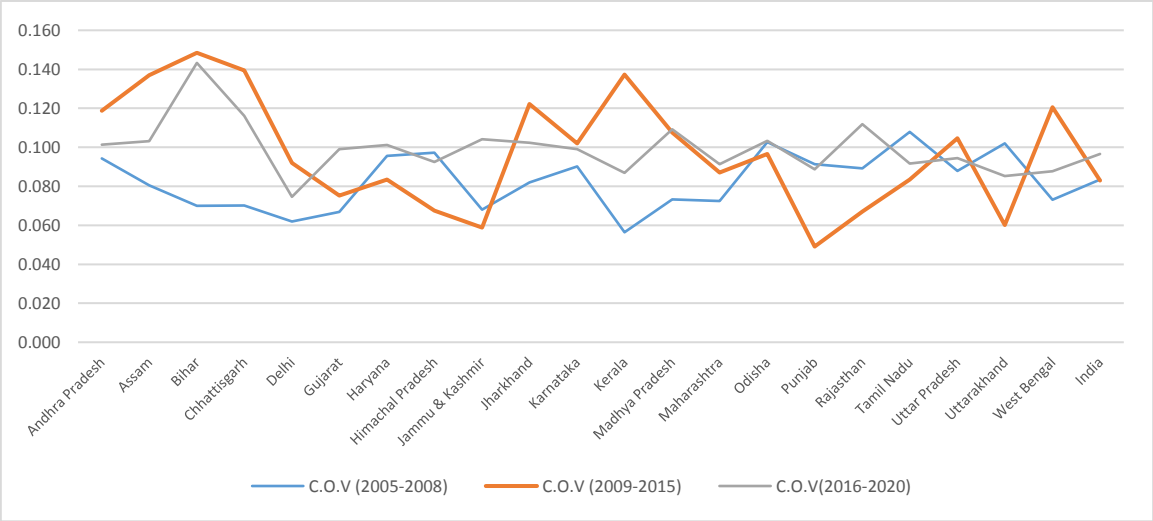
Non-development expenditure rose sharply during 2017-18 in a break from the past leading to decline in fiscal index. On the other hand, development expenditure suffered erosion indicating that the quality of expenditure was compromised by a combination of higher revenue expenditure and lower capital expenditure. Slowdown in fiscal quality since 2016 was due to reduced average GSDP growth of all states to 10% in 2016-2020 v/s 16% in 2009-2015 period. Also the high deficit levels of states has deteriorated fiscal quality.

The graph in second panel (combined fiscal quality of all states) shows that the kind of fiscal consolidation along with growth prospects which India achieved before 2008 has still not been replicated.

Differential Development in States? What can be the other impacting factors?

Apart from the factors considered in GMM estimation, there can be other fiscal indicators which constraints or supports spending ability of government

Figure 11: Coefficient of Variation in Development Index over three phases



The pace of infrastructure development varied across states and across the phases (2005-2008, 2009-2015, 2016-2020) .The coefficient of variation shows significant jump between phase and two for less developed states like Assam (0.08 to 0.137) Bihar (0.07 to 0.148) , Chhattisgarh (0.07 to 0.139) , Madhya Pradesh (0.073 to 0.108) whereas developed States /UT's either saw moderation or slight increase with Gujarat(0.067 to 0.075), Karnataka (0.09 to 0.1), Tamil Nadu (0.108 to 0.083) , Punjab (0.091 to 0.049), Haryana (0.096 to 0.083). When we look at combined impact on all states coefficient remains same (0.083 to 0.084). While in the third phase the development has been moderate with stable coefficient of variation across states. One of the possible reason for moderation can be the loan waiver schemes by state governments which had sizeable fiscal cost. RBI (State Finance Report, 2019-20) has estimated 0.1-2% of GSDP allocation to farm loan waivers. As loan waivers have 3-4 years of persistent effect, focus shifted away from capital outlay. This represents the case why studying state heterogeneity dwells into differential development levels than studying collective all India level development.

Table 8: State's own revenue as percentage of GSDP

State	2005-2008	2009-2015	2016-20
Bihar	4.808	5.912	6.611
Chhattisgarh	9.618	9.721	9.463
Gujarat	7.994	7.860	6.535
Jharkhand	6.512	7.285	8.007
Maharashtra	8.507	7.674	7.409
Haryana	11.025	7.808	7.179

The above table shows that developed states which had higher own revenue in period 1 has declined over the periods. Haryana's own revenue capacity decline by almost 400 point while 150 points for Gujarat. Bihar on the other hand improved revenue capacity by 200 points which is indicated by figure (XX) where marginal improvement in index for Bihar is more than developed states.

Table 9: Grants from Centre as percentage of GSDP

State	2005-2008	2009-2015	2016-2020
Bihar	4.297	4.534	5.177
Chhattisgarh	2.157	2.965	3.993
Gujarat	1.059	0.950	1.128
Haryana	0.826	1.027	1.050
Jharkhand	2.476	3.245	3.621
Madhya Pradesh	2.536	3.125	3.682
Maharashtra	0.977	1.103	1.042

Another reason for higher marginal improvement in less developed states is the fiscal support provided by the union government through the finance commission transfers. Recent finance commissions has suggested flexible grants, which has helped less developed states to get more union grants. Generally these grants are invested for social and physical infrastructure which relieves pressure on state exchequer.

6 Conclusion

The study so far has discussed the development performance of states over physical, financial and social variables. As different states inherited different socio-cultural factors, and contribute differently to the collective growth objective of nation, variation in growth rates is very natural. However underestimation of average growth in least developed states may lead to false policy inputs. Thus, marginal improvement in development index can be considered a better indicator to check if states have adequately spend.

Development inequality is concentrated more in middle latitude for India along with eastern side which is even lesser developed. Thus rather than north south divide it's the middle India states which suffers the most despite occupying resource rich regions. Also the idea of transfer of benefit from developed to less developed regions cannot be strongly established as BIMARU states (Bihar, UP, MP) continue to be least developed despite bordering highly developed states. For the full period of consideration, there are 9 states which remain below the all India average in terms of index value.

Optimum budget allocation and balanced budgets have been studied time and over, but the same methodologies does not apply to state level which has heterogeneous fiscal capacities. A 30% debt to GSDP ratio of Bihar is not same as 32% ratio for developed state Kerala. Some states like Chhattisgarh, Jammu & Kashmir, and Odisha has grown slowly and need fiscal space to develop. Elongation of debt maturity profile would provide this additional cushion to the states.

In accordance with a priori expectations, capital outlay expenditure multipliers are significantly higher than revenue expenditure multiplier potentially owing to long lasting impact of infrastructure development and complementary private investment and consumption cycles associated with it. However, as states develop, their expenditure priority changes.

Fiscal index in the study signifies the divergence between developed and developing states in terms of their contribution towards infrastructure development. The index incorporates positive effect of better development spending while simultaneously constraining deficit and debt levels. Post 2015 states like M.P, Odisha, Chhattisgarh, Bihar has improved fiscal quality while some developed states like Maharashtra, Kerala and Haryana has stagnated.

The study prescribes for concrete policies to attract investment in states which are lagging behind in infrastructure. States which have significant development levels have more bargaining power which enable them to borrow from the market at lower interest rates. Initial development in the states is led by physical infrastructure which gets inclined to financial infrastructure as disposable income of people increases. Improved standards of living leads to higher demand for social infrastructure. Thus, infrastructure requirements of the economy is a kind of flow concept which requires continuous spending over the years.

Revenue generation is the pivot for sustainable debt management and acting as circuit breaker against debt spirals. Technology based taxation reforms and rationalization of populist schemes would plug the leakages in state balance sheets.

There can be many other unobserved state specific cultural, political, geographical factors which may define the development path of the states. Beyond the budget allocations, exogenous variables like inflation, money supply, manufacturing and service shares, literacy levels, etc. may also support the growth structure. Thus, inclusion of other macroeconomic variables for deriving more holistic explanations can be future scope for this study.

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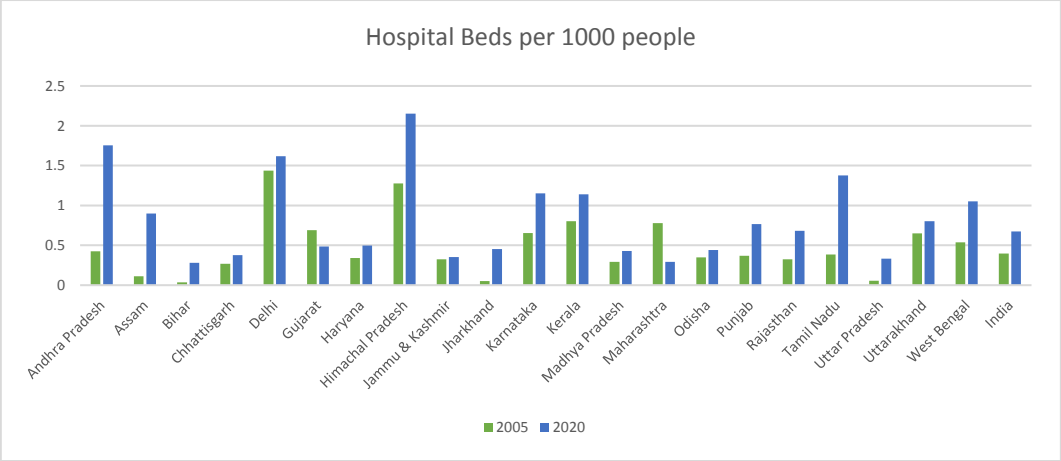
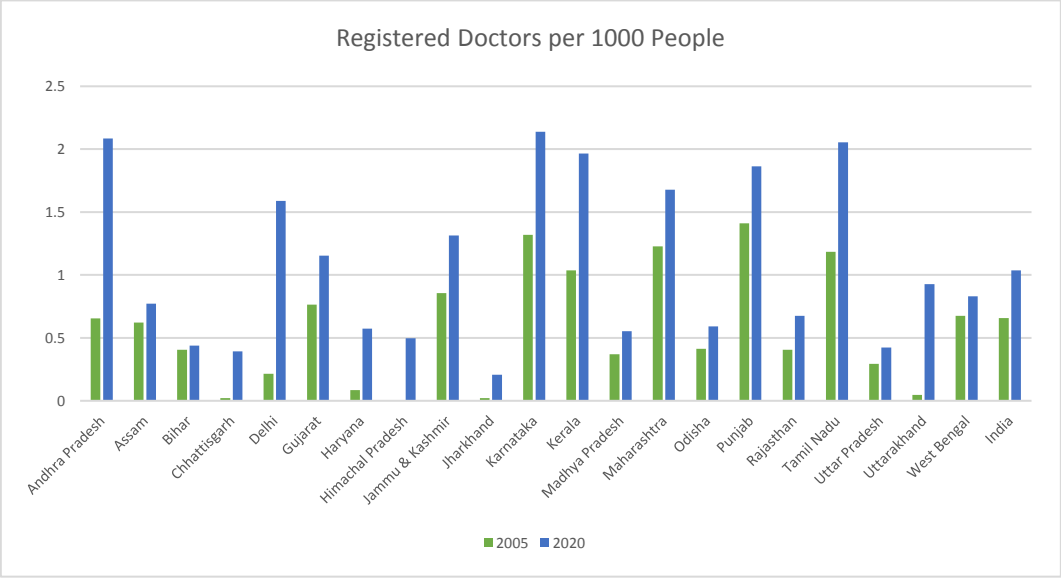
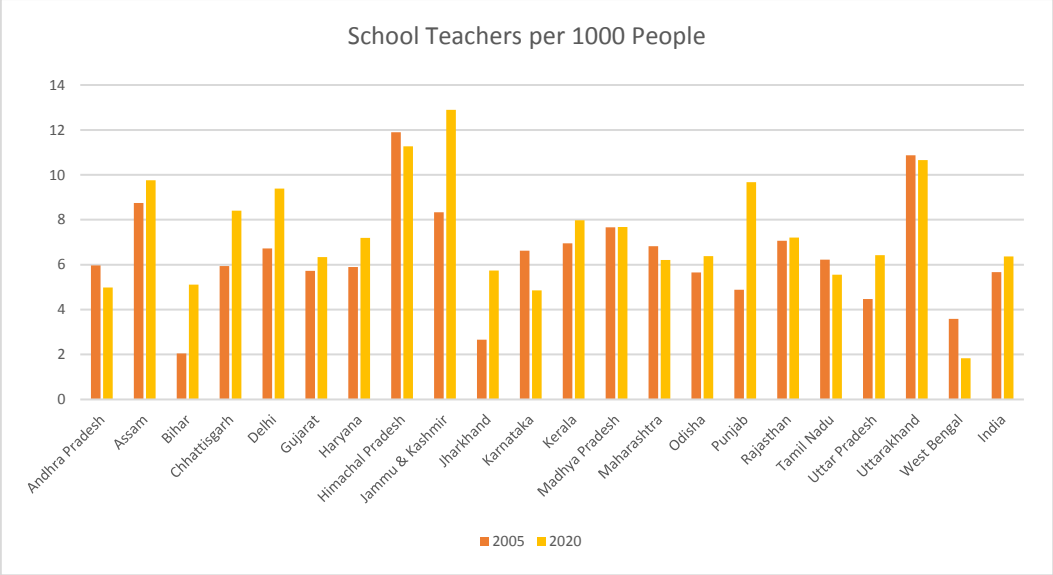
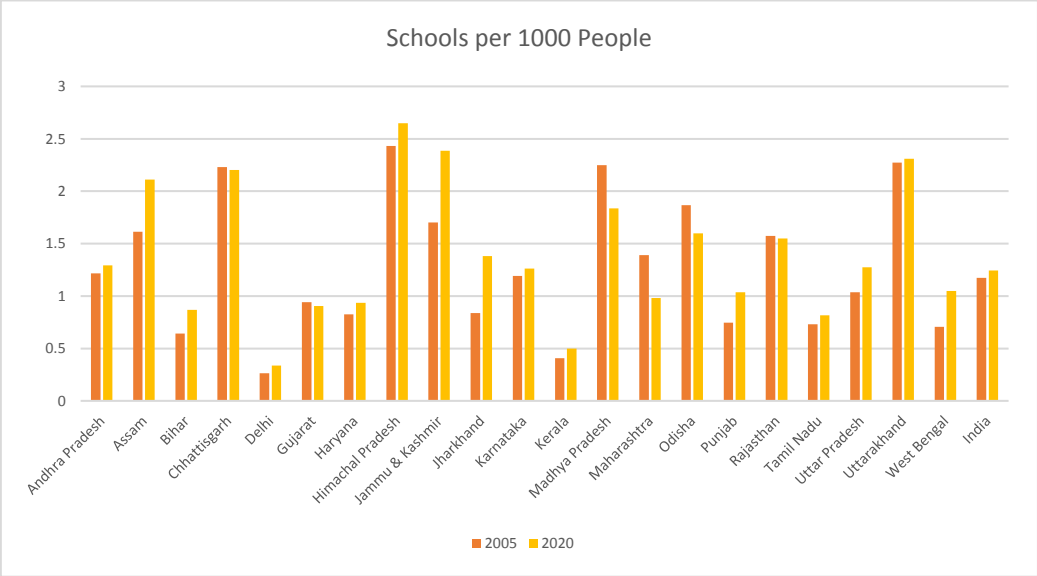
APPENDIX

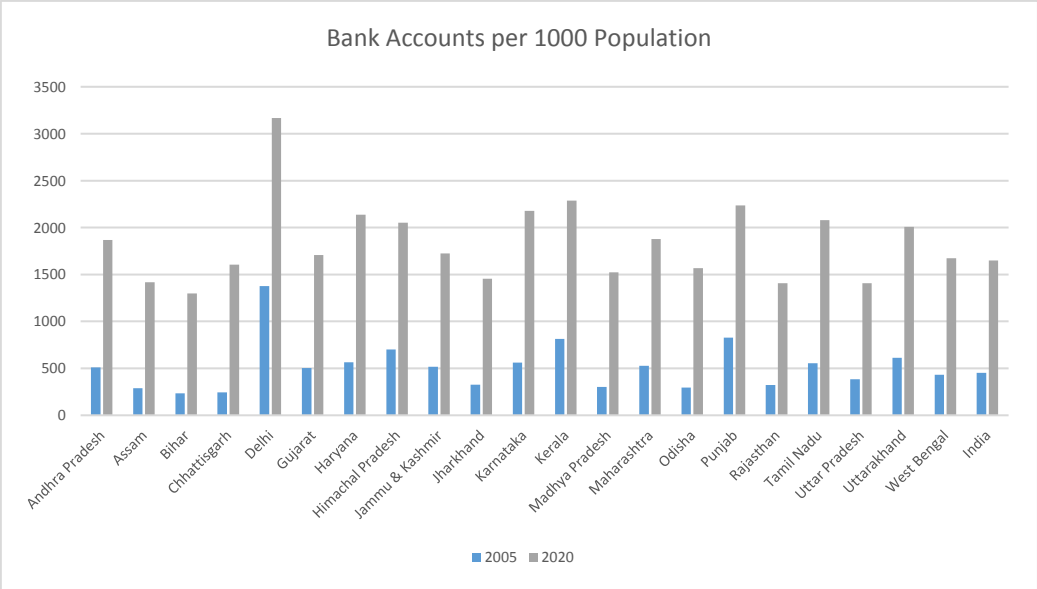
Descriptive Comparison of Index variables:

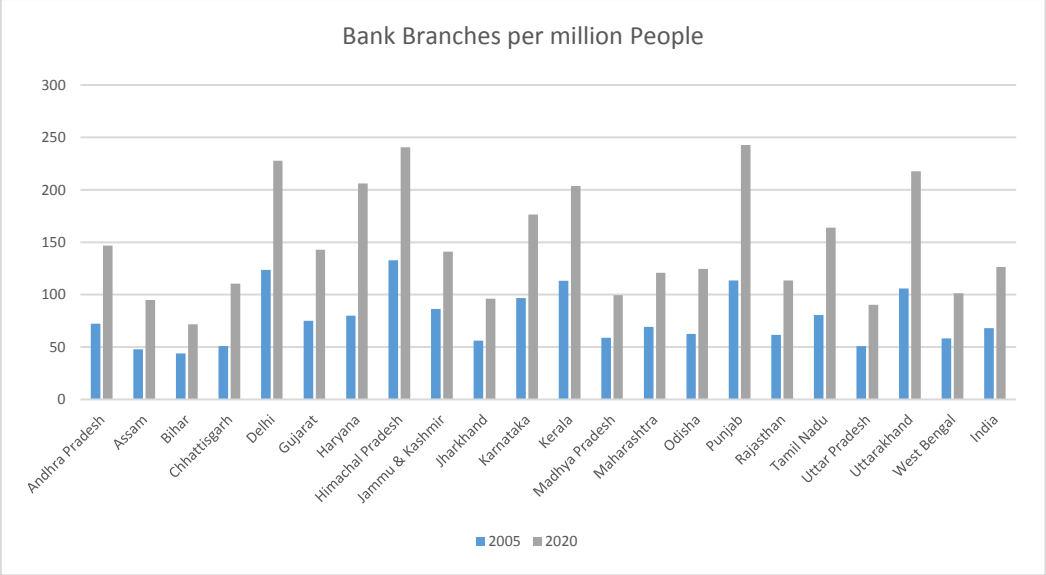


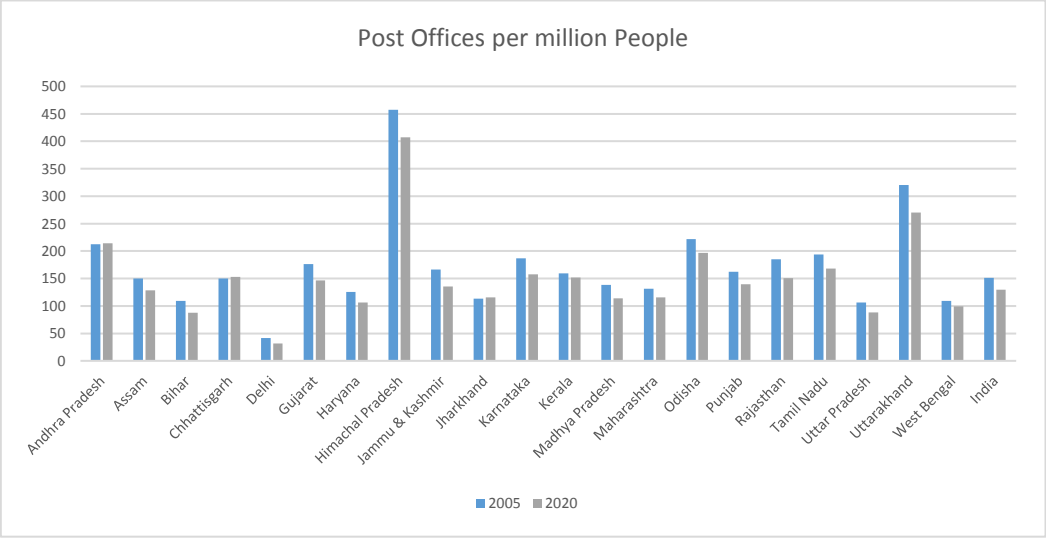


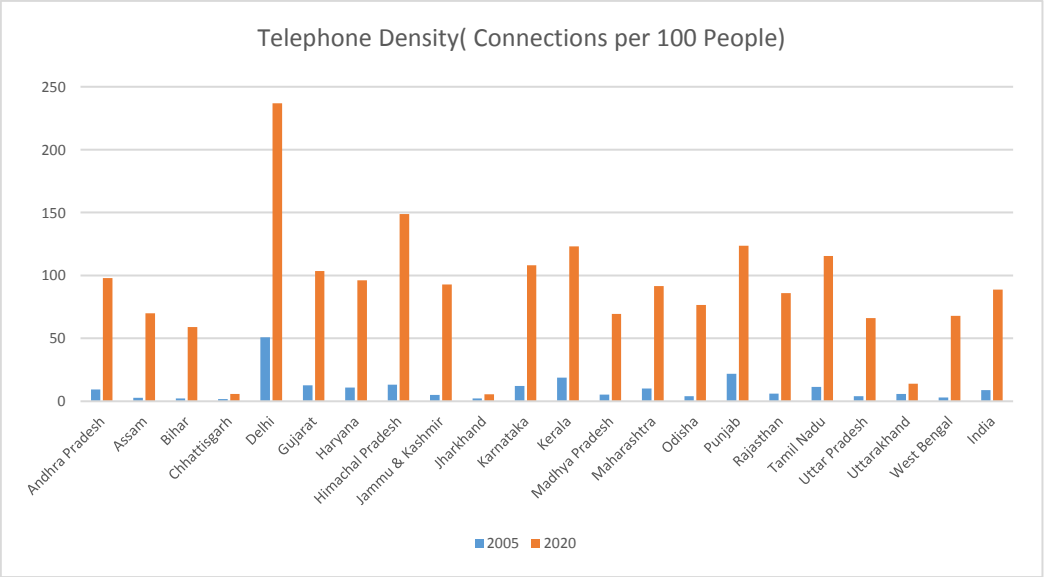

School Teachers per 1000 People
14
12
10
8
6
4
2
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020

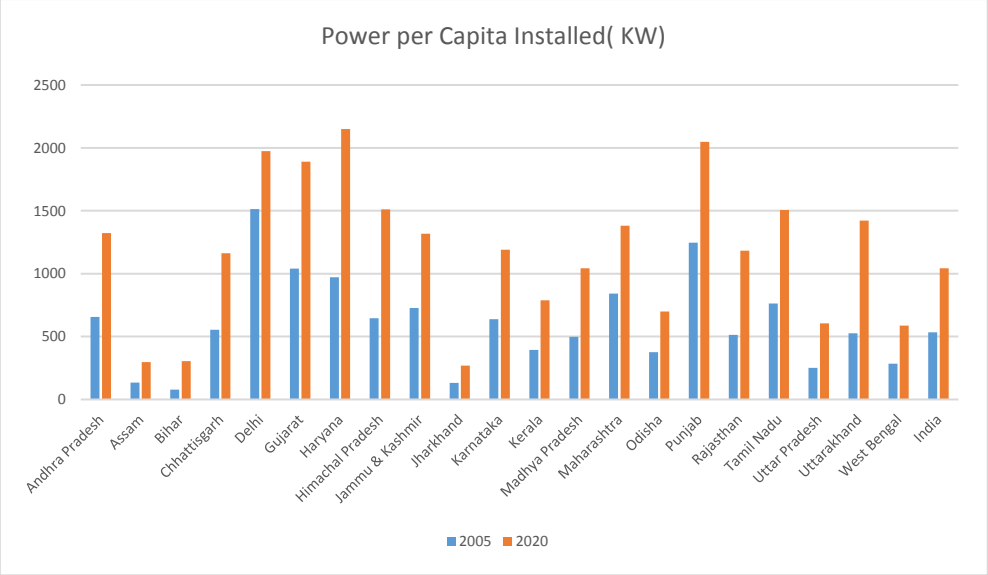

Schools per 1000 People
3
2.5
2
1.5
1
0.5
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020

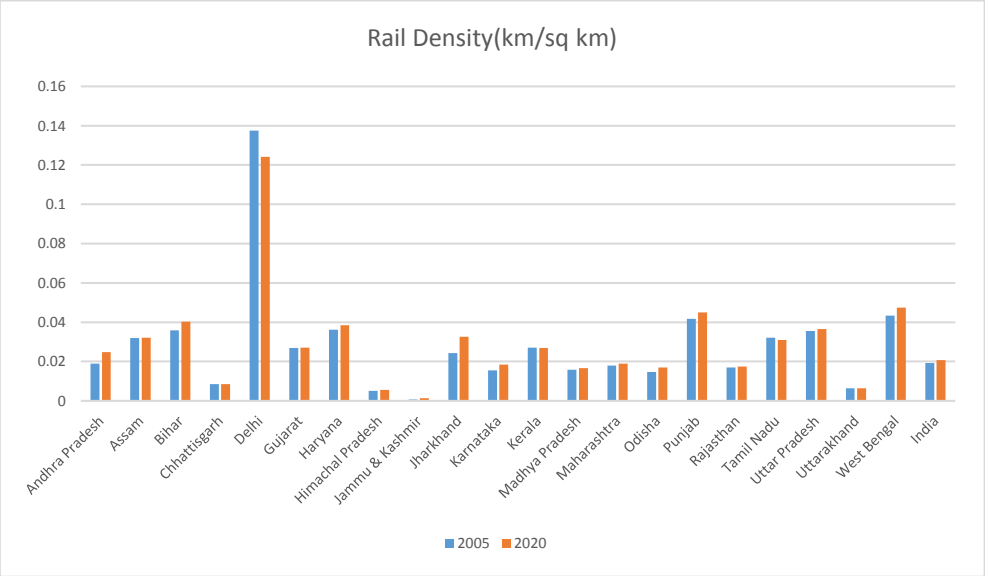

Bank Accounts per 1000 Population
3500
3000
2500
2000
1500
1000
500
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020

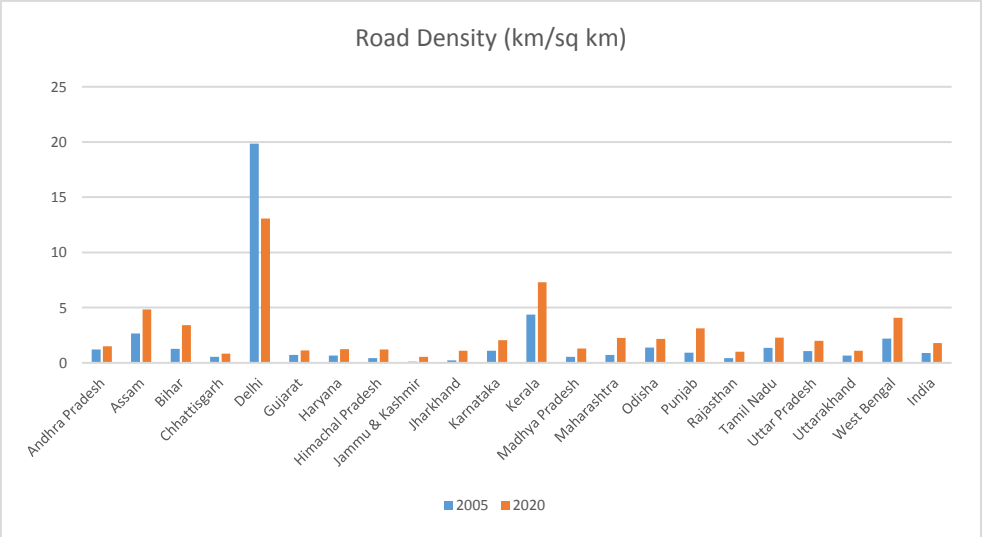

Bank Branches per million People
300
250
200
150
100
50
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020


Post Offices per million People
500
450
400
350
300
250
200
150
100
50
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020


Telephone Density(Connections per 100 People)
250
200
150
100
50
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020


Power per Capita Installed(KW)
2500
2000
1500
1000
500
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020


Rail Density(km/sq km)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020


Road Density (km/sq km)
25
20
15
10
5
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2020

Development Index Ranking:

Rank	2005	2006	2007	2008	2009	2010	2011	2012
1	Delhi	Delhi	Delhi	Delhi	Delhi	Delhi	Delhi	Delhi
2	Punjab	Punjab	Punjab	Punjab	Punjab	Punjab	Punjab	Punjab
3	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Haryana	Himachal Pradesh	Himachal Pradesh
4	Gujarat	Haryana	Haryana	Haryana	Haryana	Himachal Pradesh	Haryana	Haryana
5	Haryana	Gujarat	Gujarat	Gujarat	Gujarat	Tamil Nadu	Tamil Nadu	Tamil Nadu
6	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu	Gujarat	Gujarat	Uttarakhand
7	Maharashtra	Maharashtra	Karnataka	Uttarakhand	Uttarakhand	Uttarakhand	Uttarakhand	Gujarat
8	Kerala	Uttarakhand	Maharashtra	Maharashtra	Andhra Pradesh	Andhra Pradesh	Andhra Pradesh	Andhra Pradesh
9	Uttarakhand	Jammu & Kashmir	Uttarakhand	Karnataka	Maharashtra	Jammu & Kashmir	Maharashtra	Karnataka
10	Jammu & Kashmir	Karnataka	Kerala	Andhra Pradesh	Karnataka	Karnataka	Karnataka	Maharashtra
11	Karnataka	Kerala	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Maharashtra	Jammu & Kashmir	Kerala
12	Andhra Pradesh	Andhra Pradesh	Andhra Pradesh	Kerala	Kerala	Kerala	Kerala	Jammu & Kashmir
13	India*	India*	India*	India*	India*	India*	India*	India*
14	Rajasthan	Rajasthan	Rajasthan	Rajasthan	Rajasthan	Rajasthan	Rajasthan	Rajasthan
15	Madhya Pradesh	Madhya Pradesh	Chhattisgarh	Madhya Pradesh	Odisha	Odisha	Odisha	Odisha
16	Chhattisgarh	Chhattisgarh	Madhya Pradesh	Odisha	Chhattisgarh	Madhya Pradesh	Madhya Pradesh	Madhya Pradesh
17	West Bengal	Odisha	Odisha	Chhattisgarh	Madhya Pradesh	West Bengal	West Bengal	West Bengal
18	Odisha	West Bengal	West Bengal	West Bengal	West Bengal	Uttar Pradesh	Uttar Pradesh	Chhattisgarh
19	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Chhattisgarh	Chhattisgarh	Uttar Pradesh
20	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Assam
21	Assam	Assam	Assam	Assam	Assam	Assam	Assam	Jharkhand
22	Bihar	Bihar	Bihar	Bihar	Bihar	Bihar	Bihar	Bihar

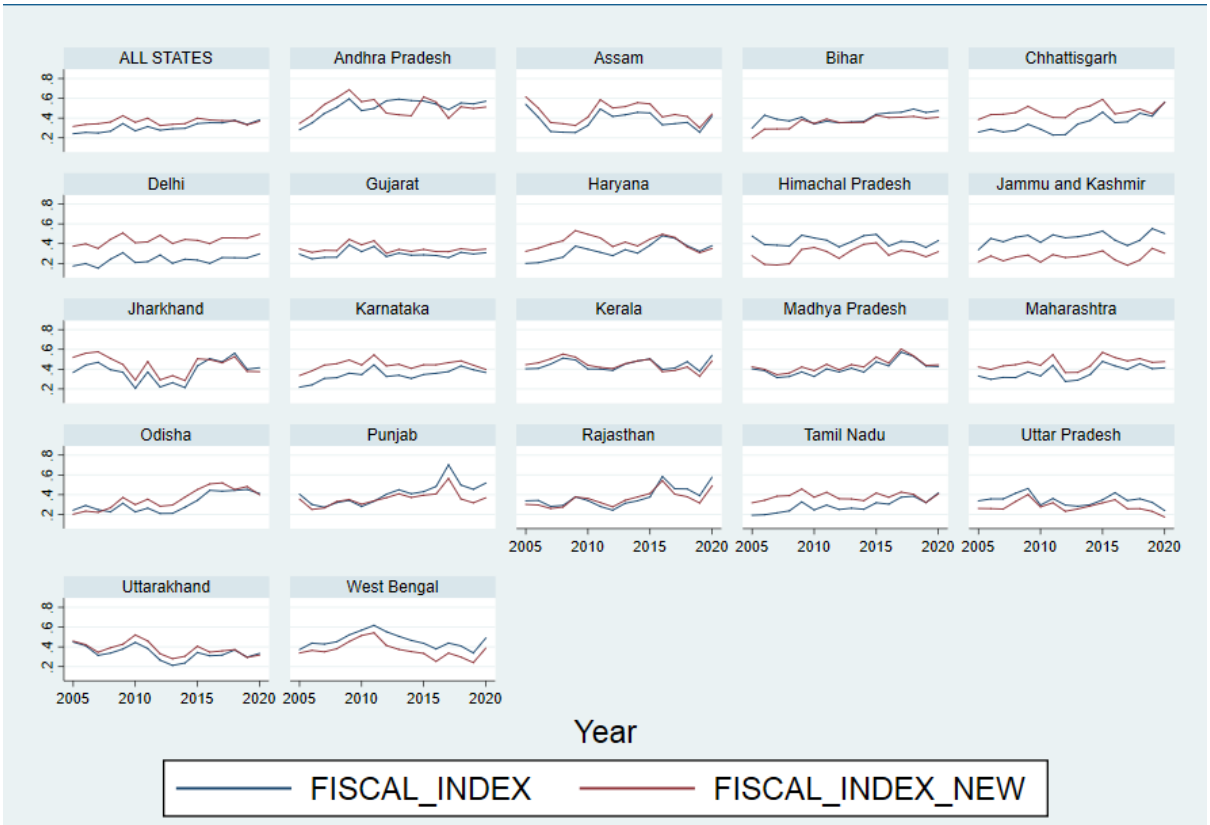
2013	2014	2015	2016	2017	2018	2019	2020
Delhi	Delhi	Delhi	Delhi	Delhi	Delhi	Delhi	Delhi
Punjab	Punjab	Punjab	Punjab	Punjab	Punjab	Punjab	Punjab
Himachal Pradesh	Haryana	Haryana	Haryana	Haryana	Haryana	Haryana	Haryana
Haryana	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh
Gujarat	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu	Tamil Nadu
Tamil Nadu	Gujarat	Andhra Pradesh	Uttarakhand	Gujarat	Gujarat	Gujarat	Karnataka
Uttarakhand	Andhra Pradesh	Gujarat	Gujarat	Uttarakhand	Uttarakhand	Karnataka	Gujarat
Karnataka	Kerala	Karnataka	Karnataka	Karnataka	Karnataka	Uttarakhand	Uttarakhand
Andhra Pradesh	Uttarakhand	Uttarakhand	Kerala	Andhra Pradesh	Andhra Pradesh	Kerala	Kerala
Maharashtra	Karnataka	Kerala	Andhra Pradesh	Maharashtra	Maharashtra	Andhra Pradesh	Maharashtra
Kerala	Maharashtra	Maharashtra	Maharashtra	Kerala	Kerala	Maharashtra	Andhra Pradesh
Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir	Jammu & Kashmir
India*	India*	India*	India*	India*	India*	India*	India*
Odisha	Rajasthan	Rajasthan	Chhattisgarh	Chhattisgarh	Chhattisgarh	Chhattisgarh	Chhattisgarh
Rajasthan	Odisha	Chhattisgarh	Rajasthan	Madhya Pradesh	Madhya Pradesh	Madhya Pradesh	Rajasthan
West Bengal	Madhya Pradesh	Odisha	Madhya Pradesh	Rajasthan	Rajasthan	Rajasthan	Madhya Pradesh
Madhya Pradesh	West Bengal	Madhya Pradesh	West Bengal	West Bengal	West Bengal	Odisha	Odisha
Chhattisgarh	Chhattisgarh	West Bengal	Odisha	Odisha	Odisha	West Bengal	West Bengal
Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh
Jharkhand	Jharkhand	Assam	Assam	Assam	Assam	Assam	Assam
Assam	Assam	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Jharkhand	Jharkhand
Bihar	Bihar	Bihar	Bihar	Bihar	Bihar	Bihar	Bihar

*India here represents all states together

FISCAL INDEX Rankings

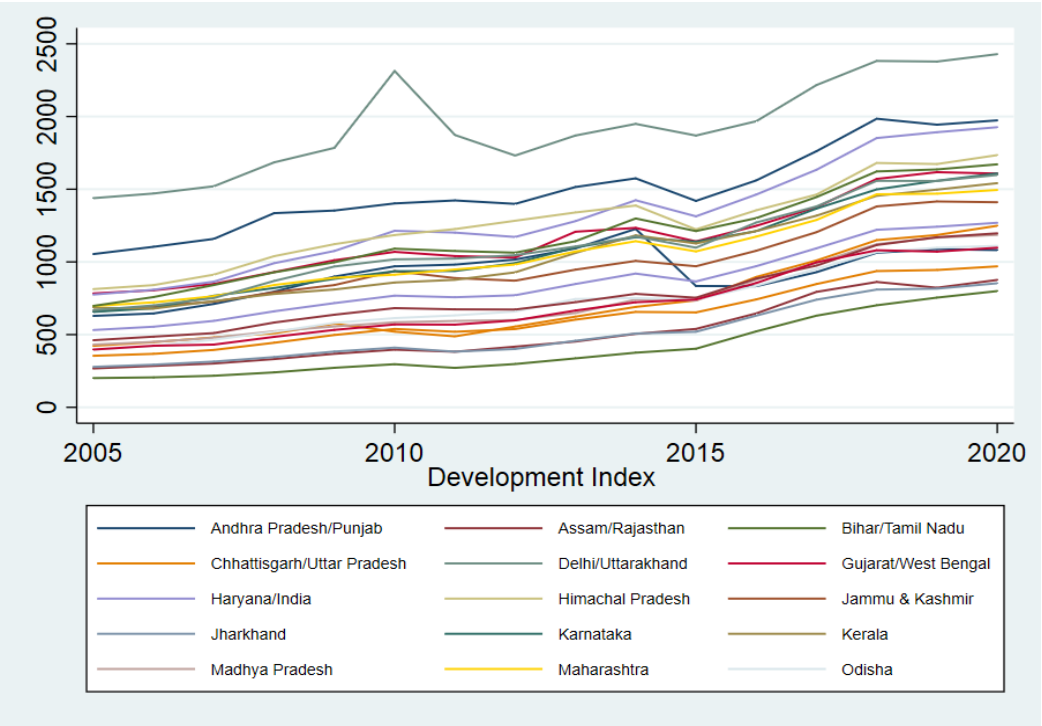
STATE/UT	FISCAL_QUALITY _INDEX_2005	STATE/UT	FISCAL_QUALIT Y_INDEX_2005	STATE/UT	FISCAL_QUALITY _INDEX_2005	STATE/UT	FISCAL_QUALITY _INDEX_2005
Delhi	0.938	Chhattisgarh	0.912	Delhi	0.908	Delhi	0.904
Chhattisgarh	0.859	Delhi	0.894	Odisha	0.747	Karnataka	0.690
Jharkhand	0.833	Karnataka	0.822	Chhattisgarh	0.740	Uttar Pradesh	0.668
Karnataka	0.823	Jharkhand	0.794	Karnataka	0.737	Gujarat	0.653
Tamil Nadu	0.788	Haryana	0.749	Gujarat	0.724	Madhya Pradesh	0.640
Andhra Pradesh	0.750	Tamil Nadu	0.744	Rajasthan	0.683	Odisha	0.628
Haryana	0.748	Madhya Pradesh	0.743	Madhya Pradesh	0.674	Haryana	0.563
Gujarat	0.732	Odisha	0.743	Tamil Nadu	0.651	ALL STATES	0.556
Madhya Pradesh	0.728	ALL STATES	0.708	Uttarakhand	0.636	Assam	0.554
ALL STATES	0.722	Maharashtra	0.695	ALL STATES	0.634	Jharkhand	0.544
Jammu and Kashmir	0.677	Gujarat	0.692	Uttar Pradesh	0.601	Uttarakhand	0.539
Rajasthan	0.667	Bihar	0.663	Jharkhand	0.565	Maharashtra	0.522
Maharashtra	0.661	Rajasthan	0.630	Haryana	0.561	Chhattisgarh	0.496
Assam	0.651	Uttar Pradesh	0.630	Andhra Pradesh	0.552	Tamil Nadu	0.483
Uttarakhand	0.619	Assam	0.590	Bihar	0.522	Himachal Pradesh	0.478
Odisha	0.606	Andhra Pradesh	0.585	Assam	0.513	Bihar	0.458
Bihar	0.578	Uttarakhand	0.562	Maharashtra	0.477	West Bengal	0.416
Uttar Pradesh	0.533	Jammu and Kashmir	0.531	West Bengal	0.438	Rajasthan	0.391
Kerala	0.492	Punjab	0.519	Himachal Pradesh	0.428	Andhra Pradesh	0.369
West Bengal	0.464	Himachal Pradesh	0.502	Punjab	0.369	Jammu and Kashmir	0.367
Himachal Pradesh	0.441	Kerala	0.455	Jammu and Kashmir	0.362	Punjab	0.329
Punjab	0.394701	West Bengal	0.299	Kerala	0.313	Kerala	0.261

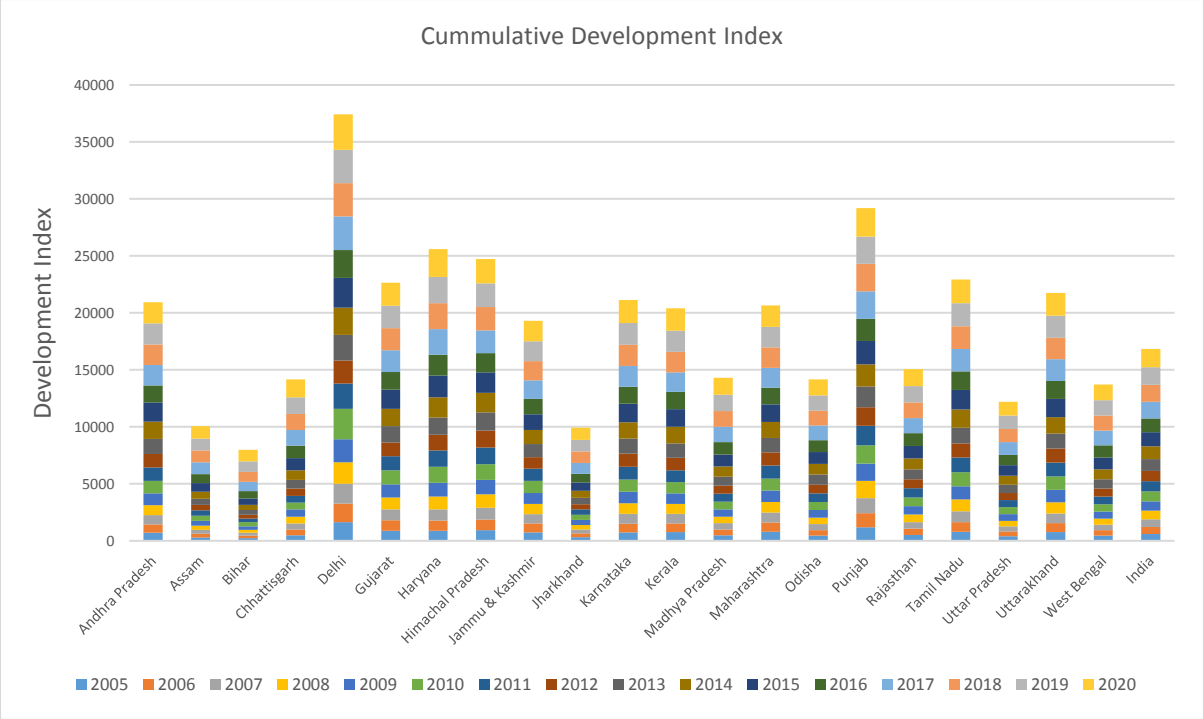
*ALL STATES represent combined all states/UT's



Red line(New Index) is where threshold on Debt level (20-DEBTGSDP) is imposed while in blue line there is no threshold(-DEBTGSDP).

Development Index Graph:




Cummulative Development Index
Development Index
40000
35000
30000
25000
20000
15000
10000
5000
0
Andhra Pradesh
Assam
Bihar
Chhattisgarh
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Odisha
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand
West Bengal
India
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020