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Designing Transfers Policy With Normatively Determined Revenues And Expenditures Of State Governments In India

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Abstract

This study addresses an important policy issue of designing equalisation transfers from the union government of India to the states. It empirically measures the own revenue efficiency and potential of General Category and Special Category States using the frontier approach for panel data. It also analyses the effect of transfers on states' own revenue and its components. Results indicate a strong crowding-out effect of transfers in General Category States and a strong crowding-in effect in Special Category States. Amounts of additional transfers required to provide equal level of public services for all 29 States in four alternative scenarios range between ₹1072 billion and ₹15,948 billion. The range is based on alternate benchmarks of fiscal capacities and expenditure needs. We hope that these results will be useful to policymakers and other stakeholders to design appropriate fiscal transfer strategies such that all citizens can avail a standard level of public services in India.

Keywords: Fiscal equalisation, expenditure needs, fiscal capacity, Indian states

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1. Introduction

In federal nations, an asymmetry exists in assigning resources and spending responsibilities between the union government and the sub-national (or state) governments which leads to vertical and horizontal fiscal imbalances (Oates. 1999). As the sub-national or regional governments may have different fiscal capacities or abilities to raise revenues, the rich ones are in general better-off to finance public service provision. The sub-national governments may also differ in the expenditure needs. Even states with equal fiscal capacity may have cost differences in providing a standard bundle of public services due to differences in needs, price levels, demographic profiles, climatic conditions, incidence of poverty, unemployment etc. This hampers their ability to provide a comparable minimum standard of public services to ensure equity and efficiency in governance.

Intergovernmental transfers are important policy instruments to address such issues in federal nations. The proponents of equalisation transfers (Buchanan, 1950; Boadway, 1980; Boadway and Flatters, 1991) argue that by permitting equal fiscal treatment of identical jurisdictions in a federation, such transfers can promote "equity". By discouraging fiscally induced migration and enabling the states to provide certain minimum comparable standards of public services, the transfers can reduce barriers to factor mobility, thereby enhance the economic "efficiency" (Shah, 1994).[1] Thus, the equalisation transfers are consistent with both normative considerations of equity and efficiency (Munoz, Radics and Bone, 2016).

However, the median voter theorem argues that the transfers would crowd out local revenues as sub-national governments would pass them to local residents as reductions in local taxes and fees (Broadford and Oates, 1971). Thus, they would likely exert disincentive effects on states tax/revenue efforts. Further, distributing the transfers as lower taxes would crowd out local spending (Scott, 1952).

Countries like Australia, Canada, Germany, and Switzerland have developed their own models of equalisation with different implications for equity, incentives, and distribution (Bahl, Martinez and Sjoquist, 1992; Blair, 1992; Boadway, 2004; Ladd and Yinger, 1994; and Ridge, 1992). Among them, the Canadian and the Australian systems are two well-established models of equalisation: the former focuses on the fiscal capacity equalisation while the latter focuses on both fiscal capacity and expenditure equalisation. However, in both models, there is no reference to the efficiency consideration (Rangarajan and Srivastava, 2004).

In India, the Constitution (1950) assigned separate tax powers and expenditure responsibilities to the union and state governments. This led to vertical and horizontal imbalances. The Finance Commission (FC) of India was constitutionally assigned the task of determining transfers to all states, including larger or General Category States (GCS) and small or Special Category States (SCS) in the form of tax devolution (shared taxes) and statutory grants. This was done mainly using the "gap filling approach" where the assessment of tax revenues of the states is determined based on the past performance. There is hardly any reference to efficiency in raising revenues. The Ninth FC attempted to use the "Representative Tax System" (RTS) to some extent. The problem with the RTS is that it derives the revenue capacity which is closer to the average rather than maximum or potential fiscal capacity.

The FC transfers have been supplemented by Planning Commission grants (till 2014) and grants under various Centrally Sponsored Schemes (CSS) since 1950. The central transfers have played an important role in the state Governments' budgets. During 2011-12 to 2018-19, the share of Central transfers in the total revenue receipts of (29) Indian states ranged between 38.3% (2013-14) and 47.1% (2016-17).[2] Majority of the transfers were unconditional and a small portion of them was conditional/specific.[3] There are sharp differences in the level of federal transfers to states in different years. For instance, among the Indian states, Haryana had the lowest per capita transfers of ₹5434 in 2018-19 and Arunachal Pradesh had the highest per capita transfers of ₹90,124. Wide temporal and spatial disparities exist in other fiscal indicators also. In 2018-19, Bihar had the lowest per capita own revenues of ₹2824 and the lowest per capita revenue expenditures of ₹10,515. Goa had the highest per capita own revenues of ₹40,532 and Sikkim had the highest per capita revenue expenditures of ₹79,197.

In this context, the following important questions emerge: (i) Does the existing transfers policy have incentive or disincentive effect on state governments' own revenues in India? (ii) Do the incentive or disincentive effect of transfers on own revenues happen in GCS and/or in SGS? (iii) Is there a need for the robust design of the fiscal transfers so that the goal of horizontal fiscal equalization can be achieved? (iv) Do we need different equalisation principles needed for GCS and SCS? and (v) whether additional resources required to achieve the equalisation in India? This study attempts to answer these policy issues pertaining to the determination of fiscal transfers in India using the data for 29 Indian states during 2005-06 to 2018-19 and attempts to provide a normative approach to determine the potential own revenues based on the stochastic frontier approach for panel data and revenue expenditure of the states. Specifically, it empirically determines the additional transfers required to provide the benchmark level of public services (measured by benchmark per capita expenditure) considering full or average revenue potential of state governments.

The main contributions of this study are as follows. Firstly, although enormous studies emerged on the merits and standards of equalisation for various countries, studies on how to practically equalise the fiscal capacity and spending needs are scarce (Maarten and Lewis, 2011). This study contributes to this sparsely researched area. Secondly, studies designing equalisation transfers in the developing countries context are very rare. One such is Munaz et al., (2016), which estimates for 10 Latin American Countries the effects of transfer systems to identify which transfers equalize in greater or lower degree the own revenues of sub-national governments. Saraf and Srivastava (2009) apply the Canadian approach in calculating the fiscal capacity equalisation and Australian approach in calculating expenditure need based equalisation only for education and health in India. The present study is the first one designing the equalisation transfers based on normatively determined revenue capacity and revenue expenditure of GCS and SCS. Thirdly, it also empirically examines states in which transfers have incentive or disincentive or no effect on own revenues. These state specific results might be useful for policymakers to design appropriate strategies to achieve a horizontal balance. Finally, while this study provides policy suggestions based on the Indian experience, these may be relevant for similar federal nations.

This study proceeds as follows. Section 2 briefly reviews the literature on the study topic. Section 3 explains the empirical model, the data and the estimation technique employed. While the Section 4 presents and discusses the empirical results, the final Section 5 provides the policy conclusions of the study.

2. Brief Review of Literature

Tiebout (1956), Musgrave (1959) and Oates (1972) developed the "First Generation Theory" (FGT), which views equalisation transfers as a necessary tool to prevent relatively richer jurisdictions attracting more investments at the expense of poorer ones. The Second-Generation Theory (SGT), which emerged recently, strongly argues for own revenue powers of sub-national governments. It stresses the importance of horizontal competition between sub-national governments for economic efficiency and a refrainment of federal government from intervening in sub-national taxing and expenditure decisions. It further views that the Centre's fiscal intervention is distortionary and creates incentive compatibility problems by inducing sub-national spending, amassing unsustainable deficits, and perpetuating states' dependence on the Centre for support.

Despite these contrary views, there is a large volume of literature on transfers addressing horizontal fiscal inequalities. Buchanan (1950, 1952), Boadway (1980) and Boadway and Flatters (1991) have proposed equalization transfers. In theory, such transfers from the federal government can discourage fiscally induced migration and ensure that every sub-national government becomes capable of providing standard level of public services at standard tax rates. However, Scott (1952) and Courchene (1978) argue that the equalisation transfers may induce inefficiency in the regional allocation of resources, because they discourage outmigration of labour to high income jurisdictions where it would be more productive.

Other opponents like Shah (1988) argue that in the presence of full capitalisation, there may not be any efficiency and equity basis for fiscal equalisation transfers, because people in jurisdictions with fiscal surpluses pay relatively more for private services and less for public services, and vice versa for jurisdictions with fiscal deficiencies. Since net benefits are capitalised into property values, a capital gain or loss on account of the local public sector is realised at the time of a property sale. As a result, Tiebout's prescription that a system of local governments would ensure optimal levels of local public services is not guaranteed. Despite these limitations, as the equalisation transfers provide a rationale to estimate the expenditure needs and fiscal capacity as accurately as possible, many procedures have emerged in the literature (Munaz et al., 2016).

Measuring Fiscal Capacity: Fiscal capacity is the ability of union governments and subnational governments to raise revenues from their own resource bases. There are various methods to measure the fiscal capacity of a sub-national government. The simplest one uses the current or past year's revenue collections. But this raises many issues: (i) while potential ability to raise revenue is not directly affected by tax rates, the actual revenue is affected by fiscal effort and tax payers compliance (ii) use of current revenue may provide an incentive for the regional governments to impose low tax or make less effort in order to get higher compensation; (iii) use of past collection may have time inconsistency because regional governments expect that current increases in revenue obtained by rates or collection effort would reduce future transfers (Vaillancourt and Bird, 2005). Another method to measure fiscal capacity is to use macroeconomic indicator like GDP at regional levels, but this may not be a good indicator because it indicates maximum capacity. In general, governments attempt to collect significantly lower than GDP.

The third one is the representative revenue system (RRS), which measures the amount of revenue that could be raised by a regional government if it uses the standard tax bases and rates. It basically uses the regression method and considers the average revenue effort. The accuracy of RRS depends on the availability of data. For instance, Canada considers the fiscal capacity of a province as a measure of its ability to raise revenues from more than 30 revenue categories including personal income tax, corporate income tax, sales taxes, property tax, etc. The revenue potential for each province is computed using data on the size of respective tax bases and the average level of tax effort (i.e., average effective tax rates). Canada provides transfers to a province if its fiscal capacity is below a threshold or 'standard'. The major limitation of the RRS is that it provides the estimates of average revenue capacity and not the maximum/potential capacity.

The frontier approach suggests how to measure the potential revenues of regions. Broadly, there are two frontier approaches available: the data envelopment approach (DEA) and the stochastic frontier approach (SFA). The DEA method, developed by Farrell (1957) considers that the actual revenue (output), R is less than the potential revenue, $R^*(=f(X))$, i.e., $R \leq R^*$, where R^* is a deterministic quantity and X is a vector of determinants of revenues including the revenue base. The revenue gap is given by: $u=R^*-R$ and due to non-linear relationship, the actual revenue can be written as: $R= f(.)e^{-u}$. The SFA approach for cross section data, developed independently by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977), considers that the potential output is not deterministic but stochastic, due to random factors and so the actual revenue can be rewritten due to the random factors as: $R = f(.)e^{-u} e^{v} = f(.) e^{\varepsilon}$, where v is regular stochastic error term and ε is the composite error term (=v-u). The frontier revenue function is estimated using the maximum likely estimation (MLE) method assuming that the one side u (i.e., inefficiency) term follows either half normal or truncated normal or exponential or gamma distribution. Jondrow et al., (1982) suggest a procedure to compute the individual specific efficiency of sample units.

Schmidt and Sickles (1984) introduced the panel data version of SFA. This approach assumes that efficiency is time-invariant. Assuming the Cobb-Douglas functional form (and lower cases indicate the logarithmic values), the fixed effects model of revenue is specified as: $r_{it} = \alpha + x_{it}' \beta + v_{it} - u_i$, where u_i to be independently and identically distributed (i.i.d) with mean μ and variance σ^2_u and x is a vector of determinants of revenues. Letting $\alpha_i = \alpha - u_i$ the equation becomes: $r_{it} = \alpha_i + x_{it}' \beta + v_{it}$. The α_i is an individual (region) specific effect and can be estimated using either the fixed effects (FE) method or random effects (RE) method. In FE method, α^* [=max (α_i)] is the performance of the Most Efficient Region and the relative efficiency of i^{th} region can be measured as: $u_i = \alpha^* - \alpha_i$. Then, own revenue efficiency is computed as: $ORE_i = \exp(-u_i)$. In RE method, the individual effect is obtained as: $\alpha_i = (1/T)\, \Sigma\varepsilon_{it}$; i=1, 2,...,N and one can get α^* and $u_i = \alpha^* - \alpha_i$ and ORE as in FE method. Alternatively, one can use MLE method to estimate the equation $r_{it} = \alpha + x_{it}' \beta + v_{it} - u_i$, where u is assumed to follow either half normal or truncated normal distribution. Later Cornwell et al. (1990), Kumbhakar (1990) and Battese and Coelli (1992) extended this to time varying efficiency models. A few studies use the SFA to measure revenue or tax or fiscal efficiency.[4]

Spending Needs: There are four alternative approaches available in the literature to measure the spending needs of sub-national governments. The first, the simplest approach, is to use historical expenditure patterns (Boex and Martinez-Vazquez, 2004). In this is approach, there is no guarantee that past expenditures accurately reflect the present spending needs. Further, because of changing spending norms and priorities, past expenditures on particular services may not reflect current policy objectives (Vaillancourt and Bird, 2007). The second approach assumes that all regions have identical spending needs and so each is allocated the same amount. While it is simple to apply, it leads to a significant gap in per capita resource availability.

A third method regresses the actual spending on need indicators and other determinants of regional expenditures. The coefficients of the need indicators are used to build an allocation formula while keeping the effect of non-need expenditure determinants as constant (Ladd, 1994). However, this approach requires the data on appropriate regional characteristics that influence regional spending. Further, it is applicable only when actual expenditures are good indicator of spending needs. Another method is the representative expenditure system (RES) method. This measures a sub-national government's per capita spending need as the sum of its workload for each category of service weighted by average spending on each unit of service, divided by population. Thus, this provides an estimate of how much a jurisdiction would spend per capita given an average service level, its workload and the cost of providing services. However, this approach requires necessary data on various categories of expenditures, workload etc. (Maarten and Lewis, 2011).

Equalisation Transfers Systems Across Nations: Interestingly, many countries have designed their own equalisation methods. For instance, the Australian model considers both revenue and expenditures. It prepares the 'standard budget' for each service based on all-state average of expenditures as well as revenues so that the system reflects average efficiency (and not maximum possible efficiency). The Germany and Switzerland consider expenditure needs in fiscal equalisation. In Germany, nation-wise average tax revenue is used as the proxy for expenditure of each sub-national government. In Switzerland, the calculation of expenditure needs of cantons considers population density, mountain zones, productive area etc.

The Canadian system uses an elaborate (tax-by-tax) representative tax system (RTS) approach, where each tax or revenue source is considered individually and the average or representative tax effort is applied to the difference between the standard revenue base and the actual base (Bird and Smart, 2002). Denmark and Sweden explicitly design transfers based on the assumption that an average national local tax rate is applied. This creates an incentive to levy at least average taxes because those regions that levy above average taxes are not penalised while those that levy below are not rewarded. See Ma (1997), Vaillancourt and Bird (2007) and Hansjörg and Claire (2008) for the main features of fiscal equalisation schemes in selective countries.

Empirical Studies: Most empirical literature considers both income and transfers as two important economic factors determining local revenues. They treat income as a proxy for revenue base. They include transfers to test the hypothesis that transfers/grants from upper tier Governments crowd out revenues from local taxes, utilising the conceptual foundation given by the median-voter model. For instances, Zhuravskaya (2000) establishes a crowding out effect in Russia, Mogues and Benin (2012) in Ghana and Baretti et al., (2002) in Germany. However, Dahlberg, Mork, Rattese and Agren (2007) do not find a crowding out effect of transfers on local tax rates or on local tax revenues after econometrically addressing the potential endogeneity of transfers. Studies such as Skidmore (1999) show a positive (crowding-in) effect of transfers on local revenues.[5]

A few studies have emerged on the topic that are related to India. For instances, Sarma (1991), Naganathan and Sivagnanam (2000), Panda (2009), Dash and Raja (2013) show a negative effect of transfers on states own revenues/tax revenues. But these studies analyse only the average effect of transfers on own/tax revenues and not state specific effect. Further, they bypass the issue of tax effort. While Paincastelli (2001) and Purohit (2006) estimate the tax capacity/effort using income or RTS or aggregate regression approach, they do not use tax effort to design transfers. Jha (1999) uses the Battese and Coelli (1992) panel frontier approach to measure the tax efficiency of 15 major Indian states from 1980-81 to 1992-93. Sandhya, Goyal and Pal (2016) use the SFA for panel data and measure the tax capacity of 14 major Indian states from 1991-92 to 2010-11. But they also do not use fiscal capacity to derive the transfers.

3. Empirical Model, Data and Estimation

This study employs a framework closer to the Australian Transfer Mechanism. This involves four steps: (i) specify and estimate the stochastic own revenue (and own tax/own non-tax) equation(s); (ii) estimate the fiscal/revenue capacity for each state utilising the estimated model and standard benchmark; (iii) estimate the revenue expenditure needs, state-wise, using the per capita revenue expenditures and its standard bench mark; and (iv) determining the equalisation transfers for each state utilising the normatively determined fiscal capacity and expenditure needs. The empirical methodology to determine the equalisation transfers to Indian states is explained as:

Let the current transfers system is designed to cover only the revenue gap (not the total gap). Therefore, the per capita transfers to the state i in a given year 0 is T_0, which is the difference between the per capita cost of providing public services (C_0) and its per capita own revenues (R_0) in that year. That is, $T_0 = C_0 - R_0$. The task is to determine additional transfers required for state i to provide the benchmark level of public services (C_1) given its T_0, C_0, and R_0.[6] The efficiency aspect can be ensured by considering full (i.e., average of top 3 states) or (all state) average revenue potential of state (R_1). Therefore, $T_1 = C_1 – R_1$. The percentage change in per capita transfers, $(T_1\text{-}T_0) / T_0$ (denoted by lower case letter) is: [7]

$$t = c\frac{C_0}{T_0} - r\frac{R_0}{T_0}. \tag{1}$$

where c is the percentage change in per capita revenue expenditure and r is the percentage change in own revenues. To compute r, the estimate of benchmark, efficient revenue performance is required. This can be done utilising the frontier production function models, which identify the agents (such as states) which operate on the frontier as "efficient" and others operate below the frontier as "inefficient". The efficient agents essentially generate maximum possible output (=revenue) from the given set of inputs while others generate revenues that are less than their potential levels of revenues. The ratio between the actual and potential revenue is the measure of (revenue) efficiency.

We specify a simple production function corresponding to the per capita own revenue of i^{th} state in time period t, (R_{it}) as: [8]

$$R_{it} = f(X_{it}; \beta) \exp(v_{it} - u_i); \qquad i=1,2,..,n; \qquad t=1,2,..,T; \qquad (2)$$

where f (.) is the frontier (revenue) function, X_{it} is a vector of resource bases (inputs) and β is a vector of parameters. u_i ($u_i \geq 0$) is a one-sided (non-negative) residual term, representing the revenue (in) efficiency of the state and differs across states. v_{it} is the regular random error term. Assuming the Cobb-Douglas functional form (and * indicates the logarithmic values), the equation (2) can be written as:

$$R_{it}^{*} = \alpha + X_{it}^{*'} \beta + v_{it} - u_i \qquad (3)$$

Letting $\alpha_i = \alpha - u_i$ the equation (3) is rewritten as:

$$R_{it}^{*} = \alpha_i + X_{it}^{*'} \beta + v_{it} \qquad (4)$$

It fits exactly the usual framework in panel data literature with a firm effect but not time effect. The α_i is a state specific effect and can be estimated using the fixed effects (FE) method.[9] The performance of a state can be examined relative to the level achieved by the Most Efficient State (MES). If the N estimated intercepts are: $\hat{\alpha}_1$, $\hat{\alpha}_2$, ……, $\hat{\alpha}_N$, then $\hat{\alpha}_i^{*}$ [=max ($\hat{\alpha}_i$)] is the own revenue performance of the MES. Then, the relative efficiency of i^{th} state will be: $\hat{u}_i = \hat{\alpha}_i^{*} - \hat{\alpha}_i$. This ensures that all $\hat{u}_i \geq 0$. A high value of $\hat{u}_i$ implies that state i is very inefficient relative to the MES. The state specific estimates of efficiency are given by:

$$\text{Own Revenue Efficiency, } A_i = \exp(-\hat{u}_i); \qquad i=1,2,\ldots,N \qquad (5)$$

Thus, in the FE model, at least one state in the sample is assumed to be 100% efficient and the efficiency values of others are measured relative to the MES. One can also treat the individual effect in equation (3) as random by assuming that they are uncorrelated with the regressors. Therefore, the efficiency term is added with the regular noise term and the random effects (RE) method can be used to estimate the equation (3).[10] The Hausman's statistics can help choose the relevant method of estimation for a given data set.

According to the equation (5), for MES, the own revenue efficiency is 1. For others, it is less than 1. To derive transfers, the benchmark own revenue (R_1) could be either potential own revenue performance (i.e., average of top 3) or all state average revenue performance. Let the benchmark be A*. Then the percentage change in R_i, $r_i = (A^{*} - A_i)/A_i$. Following past studies, we specify the following stochastic frontier own revenue function for panel data:

$$\text{Ln } R_{it} = \alpha_i + \gamma_1 \text{ Ln } T_{it} + \beta_1 \text{ Ln } GSDP_{it} + \beta_2 \text{ Ln } NP_{it} + \beta_3 \text{ Ln } UR_{it} + \beta_4 \text{ Ln } LIT_{it} + \beta_5 \text{ Ln } PC_{it} + \beta_6 \text{ TREND} + v_{it} \qquad (6)$$

where R_{it} is the annual real per capita own revenue (or tax or non-tax revenue in alternate specifications) of the ith state in year t; T_{it} is real per capita Central fiscal transfers, $GSDP_{it}$ (=gross state domestic product) is real per capita income, NP_{it} is the non-primary sector share in total GSDP, UR_{it} is the urban ratio, LIT_{it} is the literacy rate, and PC_{it} is per capita power consumption. All are in log form. TREND is year trend. v_{it} is the stochastic error term.

The per capita transfers is used as a separate independent variable in the equation (6). This means that in order to determine future transfers, the impact of past transfers must be taken into account. That is, transfers become dependent on transfers themselves and it requires an endogenous treatment of transfers. To resolve the endogeneity issue, the following procedure is used. The total derivative of the equation (6) is:

$$d \ln R = d\,\alpha + \gamma_1\, d \,\mathrm{Ln}\, T + \beta_1\, d \ln GSDP + \beta_2\, d \ln NP + \beta_3\, d \ln UR + \beta_4\, d \ln LIT + \beta_5\, d \ln PC \quad (7)$$

Using lower case letter to denote the percentage change in respective variable, the above equation can be written as:

$$r = a + \gamma_1\, t + \beta_1\, gsdp + \beta_2\, np + \beta_3\, ur + \beta_4\, lit + \beta_5\, pc \quad (8)$$

Substituting (8) in (1) and solving for t, we get:

$$t = \frac{c.\frac{C_0}{T_0} - \frac{R_0}{T_0}\left(a + \beta_1 gsdp + \beta_2 np + \beta_3 ur + \beta_4 lit + \beta_5 pc\right)}{1 + \frac{R_0}{T_0}.\gamma_1} \quad (9)$$

This is a dynamic formula and is flexible to derive transfers for any given year and benchmark.

The data sources for per capita real GSDP, share of non-primary sector in total GSDP and population for 29 Indian states from 2005-06 to 2018-19 (in 2011-12 prices) are CSO, MOSPI and EPW Research Foundation. The data sources for own revenues, own tax revenues, own non-tax revenues, revenue expenditure and transfers to each state are the Comptroller and Auditor General (CAG) of India Audit Reports and Finance Accounts of the state governments. Using the GSDP deflator and population of the respective states, we compute the real per capita values of fiscal variables. We extrapolate the literacy data using Census 2001 and 2011. We obtain the projected urban ratios from Office of Registrar General and Census Commissioner (2006) till 2010-11 and National Commission on Population (2019) after 2010-11. The data source for per capita power consumption is RBI's Handbook of Statistics on the State Economy. The data used is a balanced panel data with (29 x 14 =) 406 observations.

The sample states are: (i) GCS: Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal; and (ii) SCS: Arunachal Pradesh, Assam, Goa, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.[11] Evidences indicate that the share of 11 SCS is approximately 4.8% in total own revenues of all 29 states, 13.8% in transfers, 9% in expenditures and 5% in GSDP.

As GCS and SCS differ in their characteristics, we analyse them separately (split sample). Finally, to analyse the effect of fiscal transfers on own revenues/own tax revenues/own non-tax revenues of each state, we allow the fiscal transfer variable to interact with state dummies in an alternative specification of the model.

To determine the standardised real per capita revenue expenditure C_1 for each state in given year, we consider separate benchmark for GCS and SCs as all state average or average of top three states' real per capita revenue expenditure. Using the equations (1) and (10), the additional per capita real transfers required without and with endogeneity correction respectively for each state in a given year can be computed. Multiplying the required transfers for each state by its population and by GSDP deflator will provide the estimates of additional transfers required in nominal term for each state.

Table 1 presents the descriptive statistics of the study variables. The average real per capita revenue expenditure of SCS is 2.26 times higher than that of GCS. While the average real per capita own revenue of SCS is 1.1 times higher than that of GCS, the average real per capita transfers to SCS is almost 5 times higher than the average transfers to GCS. Thus, GCS and SCS have different fiscal characteristics, indicating that they need a separate treatment in determining transfers and a common benchmark cannot serve the purpose. The correlation analysis (not shown) indicates that a few independent variables are correlated but not perfectly, implying there is no perfect multicollinearity issue in our analyses below.

4. Empirical Results

Estimation Results of State Government Revenues

General Category States: Column 1 of table 2 report the one-way fixed effects (FE) estimation results of (log) real per capita own revenue equation (6). The effect of transfers should be either neutral or should encourage own revenue efforts of states. But the coefficient of per capita transfers (γ_1) is negative and statistically significant at 5% level, indicating a strong disincentive (or crowd-out) effect. This result is consistent with median voter model hypothesis. The parameter of real per capita income is positive and significant at 5% level. The magnitude of this coefficient indicates that a 1% increase in per capita income leads to 0.3% increase of per capita own revenue. As expected, the controlling variables, urban ratio, literacy rate, and per capita power consumption are significant and positively associated with the own revenue. Interestingly the trend coefficient is positive and statistically significantly at 5% level, indicating that the real per capita own revenue of GCS on an average grew at about 2% per annum.

Table 1: Means and Standard Deviations of the Study Variables

Variables	General Category States		Special Category States	
	Mean	S. D	Mean	S. D
	(1)		(2)	
Real Per Capita Own Revenues (₹)	6,375.82	2,985.82	7,026.92	7,746.26
Real Per Capita Own Tax Revenues (₹)	5,288.11	2,668.56	4,267.71	4,900.31
Real Per Capita Own Non-Tax Revenues (₹)	1,087.71	623.07	2,744.16	3,198.72
Real Per Capita Revenue Expenditure (₹)	10,541.29	4,215.56	23,835.4	11,717.81
Real Per Capita Transfers (₹)	3,957.67	1,887.79	19,810.7	12,213.79
Real Per Capita Income (GSDP) in ₹	82,258	39,207.13	93,324.94	69,174.83
Non-Primary Sector Share in GSDP (%)	77.05	7.53	75.67	9.10
Literacy Rate (%)	74.96	8.05	80.53	9.15
Urban Ratio (%)	32.56	11.3	29.53	15.68
Per Capita Power Consumption (kwh)	1,069.31	514.11	726.88	577.42
Sample Size (N)	252		154	

Column 2 of table 2 shows the one-way FE results of (log) real per capita own tax equation. As expected, the transfers have a strong and significant crowding-out effect on own tax effort of GCS. The FCs (and earlier PC) assigned relative weights to the tax effort in recommending transfers. But these incentives may be too low and not captured in the system to provide a crowd-in effect of transfers on own tax revenues. Both per capita GSDP and non-primary sector share are positively and significant related to own tax revenue. These variables represent the taxable capacity and structural change of the economy respectively. Increases in GSDP and non-primary sector share as a result of faster growth of industry and services sectors help contribute to the growth of own tax revenue. The trend coefficient is positive and significant, indicating that on average, the own tax revenue of GCS grew at about 3.8% per annum. The other two control variables-urban ratio and literacy rate also have positive and significant impact on own tax revenue. Column 3 presents the one-way FE results of per capita own non-tax revenue equation. The transfers are positively related to per capita own non-tax revenue, but not statistically significant even at 10% level. As expected, the per capita GSDP has a positive and significant impact on own non-tax revenue.

Table 2: Panel Model Estimation Results of Stochastic Frontier Own Revenue, Own Tax and Own Non-Tax Revenue Functions for the General Category States and Special Category States (2005-06 to 2018-19)

Variables	General Category States			Special Category States		
	1-Way FE	1-Way FE	1-Way FE	1-Way FE	1-Way FE	1-Way RE
	Own Revenue	Own Tax	Own Non-Tax	Own Revenue	Own Tax	Own Non-Tax
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1582 (-0.800)	-1.013 (-0.59)	1.571 (1.23)	-1.914 (-1.75)	-7.617 (-6.75)	-5.978 (-2.99)
Ln Per Capita Transfers (T)	-0.109 (-2.37)	-0.149 (-3.76)	0.087 (0.60)	0.241 (2.55)	0.378 (4.66)	0.141 (1.01)
Ln Per Capita Income (GSDP)	0.279 (2.49)	0.338 (3.53)	0.417 (2.09)	0.345 (3.14)	0.302 (3.09)	0.879 (4.74)
Ln Non-Primary Sector Share (NP)	-	0.436 (2.59)	-	-	-	-
Ln Urban Ratio (UR)	0.293 (4.20)	0.107 (1.75)	-	-	-	-
Ln Literacy Rate (LIT)	1.459 (4.96)	1.089 (4.43)	-	0.982 (2.41)	1.341 (3.20)	-
Ln Per Capita Power Consumption (PC)	0.125 (1.96)	-	-	-	0.353 (3.72)	-
Trend	0.020 (2.10)	0.037 (4.56)	-	-	-	-0.072 (-5.14)
R Square	0.9786	0.9854	0.8086	0.9563	0.9697	0.7788
Hausman Statistics	19.26	58.65	87.32	127.19	41.06	8.16
State (n-1) Dummies	Included	Included	Included	Included	Included	Included

(Figures in the parentheses are t ratios).

Special Category States: Columns 4-6 of table 2 present the estimation results of own revenue efforts and its components for SCS. Interestingly, the coefficient of transfer's variable is positive in all three equations, indicating that higher the per capita transfers from the Centre, higher is the per capita own revenue, per capita own tax revenue, and per capita own non-tax revenue of SCS. However, it is significant only in own revenue and own tax revenue effort equations and not in own non-tax equation. There is, therefore, no adverse effect of transfers on the own revenue and its components of SCS. Instead of substituting for own revenue, the fiscal transfers are complements to own revenue efforts.

As expected, the per capita income is positively and significantly related to own revenue and its both components. The literacy rate is also positively and significantly associated with own revenue and own tax revenue. The power consumption has positive and significant impact on per capita own tax revenue. But the trend coefficient indicates that on average the per capita own non-tax revenue of SCS declined by about 7.5% per annum.

Results of Own Revenue Effort Equations with Transfers Interaction: Table 3 depicts the estimation results of the alternative specifications of own revenue (and its components) equations which allow interaction between the state dummies and transfers for GCS. In 7 states-Chhattisgarh, Kerala, Maharashtra, Odisha, Rajasthan, Telangana and Uttarakhand, the effect of transfers on own revenue is positive, but significant at 10% level only in Kerala, Maharashtra, and Telangana. In Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Punjab and Uttar Pradesh, the effect is negative and significant at 5 or 10% level. In Jharkhand, Madhya Pradesh, Tamil Nadu and West Bengal, the transfers' effect is negative, but not significant even at 10% level. The effects of other variables are more or less the same as in Table 2 except that the power consumption and trend variables turn out to be insignificant.

Table 3: Panel Model Estimation Results for Own Revenue Effort Equations for GCS with Transfer Interaction

Variables	1-Way FE		1- Way FE		1-Way FE	
	Own Revenue		Own Tax		Own Non-Tax	
	Coefficient	t ratio	Coefficient	t ratio	Coefficient	t ratio
Constant	-9.595	-2.78	-10.333	-3.29	2.060	1.79
Ln Per Capita Income (GSDP)	0.383	2.72	0.449	3.55	0.209	1.06
Ln Non-Primary Sector Share (NP)	-	-	0.456	2.10	-	-
Ln Urban Ratio (UR)	0.270	3.09	0.186	2.37	-	-
Ln Literacy Rate (LT)	3.144	4.57	2.811	4.49	-	-
Ln Per Capita Power Consumption (PC)	-0.003	-0.05	-	-	-	-
Trend	-0.001	-0.10	0.008	0.66	-	-
R Square	0.9999		0.9999		0.999	
Hausman Statistics	136.76		109.47		139.48	
General Category States						
Andhra Pradesh*Ln Per Capita Transfers	-0.270	-4.90	-0.192	-3.71	-0.670	-3.35
Bihar*Ln Per Capita Transfers	-0.493	-2.49	-0.565	-3.24	0.840	2.52
Chhattisgarh*Ln Per Capita Transfers	0.064	0.93	-0.029	-0.49	0.383	1.93
Gujarat *Ln Per Capita Transfers	-0.144	-1.94	-0.247	-3.70	0.437	1.64
Haryana * Ln Per Capita Transfers	-0.382	-4.78	-0.382	-5.25	-0.348	-1.19
Jharkhand*Ln Per Capita Transfers	-0.137	-1.39	-0.246	-2.85	0.729	3.41
Karnataka *Ln Per Capita Transfers	-0.199	-2.77	-0.261	-3.95	-0.287	-1.10
Kerala*LN Per Capita Transfers	0.185	1.91	-0.038	-0.43	1.559	6.49
Madhya Pradesh*Ln Per Capita Transfers	-0.001	-0.02	-0.002	-0.02	0.231	0.95
Maharashtra*Ln Per Capita Transfers	0.150	1.83	0.133	1.84	-0.154	-0.61
Orissa *Ln Per Capita Transfers	0.062	0.83	-0.047	-0.71	0.665	2.69
Punjab*Ln Per Capita Transfers	-0.241	-3.50	-0.133	-2.16	-0.590	-2.75
Rajasthan*Ln Per Capita Transfers	0.030	0.38	-0.039	-0.53	0.485	1.81
Tamil Nadu*Ln Per Capita Transfers	-0.055	-0.67	-0.190	-2.53	0.429	1.51
Telangana*Ln Per Capita Transfers	0.313	3.24	0.189	2.14	0.667	1.89
Uttar Pradesh* Ln Per Capita Transfers	-0.205	-1.95	-0.355	-3.75	0.860	3.07
Uttarakhand* Ln Per Capita Transfers	0.159	1.40	0.046	0.43	0.383	0.93
West Bengal*Ln Per Capita Transfers	-0.013	-0.17	-0.002	-0.03	-0.476	-2.02
State Effect	Included		Included		Included	

In own tax revenue equation, only in Maharashtra and Telangana, the transfers positively and significantly relate (at least 10%) to own tax. In Chhattisgarh, Kerala, Odisha, Rajasthan, Uttarakhand and West Bengal, transfers variable is not significant. In the remaining 10 states, it has negative impact. In the own non-tax revenue equation, the effect of transfers is positive in Bihar, Chhattisgarh, Gujarat, Jharkhand, Kerala, Odisha, Rajasthan, Telangana, and Uttar Pradesh. It is negative in Andhra Pradesh, Punjab, and West Bengal and in remaining 6 states, it is zero.

Table 4 shows the estimation results of own revenue effort equations allowing interaction of transfers with state dummies for SCS. The transfers had a crowd-in (positive and significant) effect on own revenue effort in Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. In the remaining 5 SCS, it had no impact. The transfers crowd-in own tax revenue of Arunachal Pradesh, Goa, Himachal Pradesh, Manipur, and Mizoram, but crowd out in Jammu & Kashmir and Sikkim. In the own non-tax revenue equation, the effect of transfers is positive in Jammu & Kashmir, Meghalaya, Nagaland, and Tripura and in the remaining states, it is not significant.

Table 4: Panel Model Estimation Results of SCS with Transfer Interaction

Variables	1-Way FE		1-Way FE		1-Way FE	
	Own Revenue		Own Tax		Own Non-Tax	
	Coefficient	t ratio	Coefficient	t ratio	Coefficient	t ratio
Constant	-2.106	-1.46	-13.236	- 12.07	-3.073	-0.70
Ln Per Capita Income (GSDP)	0.284	1.64	0.241	2.07	0.658	1.69
Ln Non-Primary Sector Share (NP)	-	-	-	-	-	-
Ln Urban Ratio (UR)	-	-	-	-	-	-
Ln Literacy Rate (LT)	0.745	1.08	3.585	7.41	-	-
Ln Per Capita Power Consumption (PC)	-	-	-0.040	-0.53	-0.093	-0.41
Trend	-	-	-	-	-0.045	-1.77
R Square	0.9997		0.9999		0.889	
Hausman Statistics	62.750		215.380		36.060	
Special Category States						
Arunachal Pradesh*Ln Per Capita Transfers	-0.224	-1.10	0.435	3.28	-0.513	-1.38
Assam *Ln Per Capita Transfers	0.328	1.59	-0.007	-0.05	0.505	1.22
Goa *Ln Per Capita Transfers	0.173	1.63	0.206	2.94	0.032	0.16
Himachal Pradesh * Ln Per Capita Transfers	0.255	1.33	0.335	2.67	-0.045	-0.12
Jammu & Kashmir *Ln Per Capita Transfers	0.712	2.19	-0.426	-2.02	2.108	3.56
Manipur *Ln Per Capita Transfers	0.612	2.06	1.335	6.73	-0.405	-0.62
Meghalaya *Ln Per Capita Transfers	0.577	2.75	0.135	0.99	0.688	1.75
Mizoram *Ln Per Capita Transfers	0.784	3.16	1.417	8.64	0.479	1.14
Nagaland*Ln Per Capita Transfers	0.629	2.54	0.191	1.18	0.843	1.84
Sikkim *Ln Per Capita Transfers	-0.098	-0.30	-0.545	-2.48	-0.211	-0.31
Tripura*Ln Per Capita Transfers	0.970	3.45	0.271	1.46	1.190	2.18
State Effect	Included		Included		Included	

State-wise Efficiency Scores

Table 5 shows the state-wise efficiency scores using the coefficients of state dummies (effects) from Table 2 (not shown). The overall mean own revenue efficiency score for GCS is 74.67%, indicating that on an average the GCS approximately utilised only about 75% of their own revenue potential during the study period. Therefore, it could be possible for them to raise their existing own revenues by 25% more with existing resource bases. The efficiency scores varied widely from 42.18% (in West Bengal) to 100% (in Andhra Pradesh). The estimated mean own tax revenue efficiency score for GCS is about 72% and the scores also varied widely between 35.2% (in Bihar) and 100% (in Andhra Pradesh). The overall mean own non-tax revenue efficient score is 64.44%. Bihar obtained the lowest score of 13.18% while Haryana achieved 100%. In the case of SCS, the average own revenue efficiency score is only 29.19%, indicating that there is a greater possibility for them to improve their own revenues. The estimated mean own tax revenue efficiency score is 38.96% and the mean own non-tax revenue efficiency score is 64%.

Table 5: State-wise Own Revenue, Own Tax and Own Non-Tax Efficiency Scores

GCS	Own Revenue	Own Tax	Own Non-Tax	SCS	Own Revenue	Own Tax	Own Non-Tax
Andhra Pradesh	100.00(1)	100.00(1)	67.73(8)	Arnica Pradesh	26.63(5)	22.13(8)	100.00(1)
Bihar	49.32 (17)	35.48(18)	13.48(18)	Assam	25.62(6)	66.98(2)	80.06(3)
Chhattisgarh	87.38(4)	80.69(7)	99.03(2)	Goa	100.00(1)	100.00(1)	90.58(2)
Gujarat	68.99(13)	76.14(8)	66.82(9)	Himachal Pradesh	36.33(2)	46.32(4)	52.22(7)
Haryana	92.74(3)	91.56(4)	100.00(1)	Jammu & Kashmir	31.81(4)	46.82(3)	49.28(9)
Jharkhand	55.92(16)	42.19(17)	75.97(7)	Manipur	10.89(10)	19.31(9)	51.67(8)
Karnataka	86.51(5)	92.23(3)	39.43(16)	Meghalaya	19.42(7)	30.29(6)	45.30(10)
Kerala	66.81(14)	69.13(12)	56.31(11)	Mizoram	12.81(8)	13.64(11)	69.31(5)
Madhya Pradesh	69.86(12)	67.81(13)	62.24(10)	Nagaland	10.66(11)	18.01(10)	54.28(6)
Maharashtra	70.02(11)	75.32(9)	53.32(13)	Sikkim	34.19(3)	35.04(5	79.34(4)
Orissa	79.32(8)	64.41(14)	92.85(3)	Tripura	12.69(9)	30.06(7)	32.31(11)
Punjab	80.27(7)	83.43(5)	90.36(4)				
Rajasthan	85.74(6)	74.20(10)	81.97(6)				
Tamil Nadu	72.89(10)	83.20(6)	50.49(15)				
Telangana	97.71(2)	92.76(2)	85.44(5)				
Uttar Pradesh	64.39(15)	53.40(15)	53.07(14)				
Uttarakhand	73.29(9)	71.30(11)	55.00(12)				
West Bengal	42.89(18)	44.42(16)	16.39(17)				
Mean TE%	74.67	72.09	64.44	Mean TE%	29.19	38.96	64.03

Figures in parentheses are ranks.

Determining Fiscal Equalisation Transfers

To derive how much additional transfers (in current prices) are required for each state to provide the same amount of public services (under revenue head) in 2018-19, given their bench mark own revenue effort, we consider four scenarios on the following parameters (i) top 3 states' average own revenue effort and top 3 states' average revenue expenditure (Scenario 1); (ii) top 3 average own revenue effort and average level of public services (Scenario 2); (iii) average own revenue effort and average expenditure bundle (Scenario 3); and (iv) average own revenue effort and top 3 average level of public services (Scenario 4). Table 6 presents the derived additional transfers required in four alternative scenarios with and without endogeneity bias correction. After the endogeneity bias correction, the additional transfers required for all 29 states, considering both top 3 average own revenue effort and level of public services is ₹10,656 billion (5.8% of GSDP of 29 states) in Scenario 1, ₹1,072 billion (0.6%) in Scenario 2, ₹4,716 billion (2.57%) in Scenario 3 and ₹15,948 billion (8.68%) in Scenario 4.

Without endogeneity correction, the additional transfers required in respective scenarios worked at ₹12,026 billion, ₹3,769 billion, ₹5,877 billion, and ₹16,247 billion. The actual transfers to these 29 states in 2018-19 was ₹11,933 billion (i.e., 6.5% of GSDP). To start with, the Centre can consider the Scenario 3 (Australia also considers the average benchmarks). Under this Scenario, 17 out of 29 states would get additional transfers. Over the years, the Centre may target to reach Scenario 1.

5. Summary and Policy Conclusion

In this study, an attempt has been made to design an appropriate methodology to determine the transfers from the Centre to state governments in India. It has considered a normative approach to fiscal transfers with reference to the principle of equalisation as it is consistent with both efficiency and equity. Specifying the stochastic own revenue function, this study has estimated the own revenue potentials of 29 state governments from 2005-06 to 2018-19. As fiscal attributes have varied among small and hilly states (SCS) and larger or General category states (GCS), it has considered separate benchmarks for these two groups of states.

The empirical results indicate a strong disincentive or the crowding-out effect of transfers on own revenue and own tax effort of GCS and a strong incentive or crowding-in effect on own revenue and own tax revenue effort of SCS. Results also indicate that in Kerala, Maharashtra, Telangana, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, the fiscal transfers significantly and positively contribute to the own revenue effort. In Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Punjab and Uttar Pradesh, the transfers effect is negative.

The study determines fiscal equalisation transfers under four alternative scenarios with and without endogeneity corrections. With endogeneity correction, the total additional transfers required for all 29 states in 2018-19 (nominal prices): (i) under Scenario 1, which considers top 3 states' average own revenue effort and top 3 states' average revenue expenditure was ₹1,06,565 billion; (ii) in Scenario 2, which uses top 3 average own revenue effort and all states' average benchmark revenue expenditure, was ₹1,072 billion; (iii) under Scenario 3, which considers average own revenue effort and average expenditure needs, was ₹4,716 billion (this is consistent with the Australian approach which equalises with respect to average benchmarks); and (iv) under Scenario 4, which considers average own revenue effort and top 3 states' average revenue expenditure, was ₹15,948 billion.

In 2018-19, the Centre's actual gross revenue receipts (GRR) was ₹25,679 billion and the actual transfers to all 29 States was ₹11,933 billion (i.e., 46.47% of GRR). It could be possible for the Centre to fully or mostly equalise these transfers. To start with, it could consider Scenario 3. In the long run, the Centre could aim at reaching Scenario 1. Thus, our analyses broadly indicated the relevance of the First-Generation Theorem which suggests the importance of equalisation transfers.

Table 6: Equalization Transfers for Indian States with and without Endogeneity Bias in 2018-19 (₹ Crore=10 million)

States	Top 3 Avg. Revenue Effort &Top 3 Avg. Expenditures		Top 3 Avg. Revenue Effort & Average Expenditures		Average Revenue Effort & Average Expenditures		Average Revenue Effort & Top 3 Avg.Expenditures	
	Without Endogeneity Correction	With Endogeneity Correction	Without Endogeneity Correction	With Endogeneity Correction	Without Endogeneity Correction	With Endogeneity Correction	Without Endogeneity Correction	With Endogeneity Correction
General Category States								
Andhra Pradesh	28,471	16,887	0	0	806	0	42,295	41,476
Bihar	2,07,433	1,42,236	1,09,864	40,871	1,24,924	68,302	2,22,493	1,65,861
Chhattisgarh	14,927	3,746	0	0	238	0	22,309	15,273
Gujarat	15,556	62,521	0	0	0	34,811	45,575	84,568
Haryana	5,403	22,710	0	0	0	11,506	17,476	35,262
Jharkhand	39,334	30,360	10,759	0	19,871	11,077	48,446	40,060
Karnataka	21,414	43,651	0	0	0	19,979	47,936	74,971
Kerala	0	0	0	0	0	0	0	11,722
Madhya Pradesh	1,10,224	80,027	36,452	0	56,354	29,913	1,30,126	1,04,729
Maharashtra	0	74,670	0	0	0	39,111	61,094	1,35,350
Orissa	26,882	7,240	0	0	6,667	0	39,333	25,863
Punjab	4,652	9,408	0	0	0	0	15,454	22,327
Rajasthan	54,611	18,006	0	0	12,371	0	74,237	47,629
Tamil Nadu	0	25,057	0	0	0	0	20,229	63,199
Telangana	20,482	27,621	0	0	6,133	15,430	37,409	48,013
Uttar Pradesh	3,37,640	2,22,602	1,46,315	11,965	1,97,980	1,00,530	3,89,304	2,93,682
Uttarakhand	0	0	0	0	0	0	0	1,181
West Bengal	78,098	87,001	0	0	26,942	26,014	1,11,343	1,12,146
All GCS total	9,65,127	8,73,742	3,03,391	52,836	4,52,286	3,56,673	13,25,061	13,23,312
Special Category States								
Arunachal Pradesh	0	0	0	0	0	0	0	0
Assam	1,54,995	1,20,771	70,309	46,996	96,374	79,691	181059	1,53,466
Goa	2,536	3,548	0	1,199	955	5,357	4258	7,707
Himachal Pradesh	14,463	12,379	0	0	4,913	7,275	22381	22,844
Jammu& Kashmir	34,642	22,439	0	0	11,211	8,521	46966	41,259
Manipur	10,593	11,705	1,659	3,041	4,738	5,034	13672	13,698
Meghalaya	10,239	9,284	1,545	1,168	4,708	4,336	13402	12,451
Mizoram	0	0	0	0	0	0	0	160
Nagaland	1,307	3,383	0	0	0	0	4164	4,901
Sikkim	0	0	0	0	0	0	304	967
Tripura	8,733	11,315	0	1,955	3,545	4,701	13393	14,062
All SCS total	2,37,507	1,94,824	73,513	54,359	1,26,444	1,14,916	299599	2,71,515
All States Total	12,02,634	10,68,566	3,76,903	1,07,195	5,78,730	4,71,589	1624660	15,94,827

To our knowledge, this is the first empirical study to show the state specific effect of transfers on own revenues/own tax revenues of Indian states and provides the estimates of normatively determined transfers for GCS and SCS in India. The advantage of this approach is that it provides a single measure of transfers instead of the existing complicated formula to determine transfers. It is also simple to implement. The benchmark levels can be altered based on funding availability. It takes into account the actual population, same amounts of public services to all citizens and is free from endogeneity bias that arise due to the impact of the past transfers on current transfers. It also provides an incentive for the states to collect their own revenues efficiently. This is the complement to the existing transfers system and not the substitute. Further, Once the equalisation transfers are given to the states, the expenditure gap or need will reduce or eliminate in the next and subsequent years which will reduce the transfers burden of the centre subsequently.

It is noted that based on the recommendations of each FC, the centre distributed the transfers to states. But FCs did not evaluate how the transfers were utilized and whether the transfers helped the laggard states to provide adequate level of services. That is why Rao (2019) commented that general purpose transfers are given to enable the states to provide comparable levels of public services at comparable tax effort and specific purpose transfers are given to ensure a minimum standard of public services. The shortcomings in both the design and implementation of the transfers system in India hinder its ability to achieve the objectives. Therefore, before distributing the equalization transfers, for each state the union government needs to identify the revenue heads/sectors where these transfers should be spent. After a year, it is necessary to evaluate how much revenue gap is reduced before determining the equalisation transfers for the next year.

Nevertheless, the study is not free from limitations. First, it considers only revenue equalisation and does not consider the capital expenditure. The reason is that the FRBM Act allows the states to borrow 3% of their GSDP for investment purposes. In the Australian model, the capital expenditure needs are supplemented by an elaborate framework of distribution of loans for the states. This study, therefore, ignores this. Second, the study shows that own revenue efficiency scores of 10 GCS and 7 SCS are below the mean efficiency level and own tax efficiency scores of 8 GCS and 7 SCS are below the mean efficiency level. One may ask how we can improve their revenue efficiency. These states need to avail appropriate consultancy from either neighbouring better performing states or from the Centre or from fiscal experts for improving their performances. Third, this study considers a normatively determined revenue effort but not normatively determined revenue expenditure. As stated in end note 6 of this study, the difference of our estimates from the normatively determined expenditure is minimum. Fourth, it computes spending needs based on benchmark expenditure. This may provide an adverse incentive or favour the gap-filling approach. Lastly, the results are sensitive based on benchmark.

Despite these limitations, we hope that the findings of this study are useful to policy makers, international agencies and other researchers to take appropriate strategies to design effectively equalisation transfers policy to Indian states such that all citizens can avail comparable standard level of public services.

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Notes

[1]Boadway, Sandra and Shah (1993) argue that the equalization transfers that reduce net fiscal benefit differentials create one of those rare instances in economics when equity and efficiency considerations coincide. Other considerations used for equalization transfers include the prevention of secessionist tendencies in countries with relatively high regional tension (Spahn, 2007; Martinez-Vazquez and Searle, 2007).

[2]As per the XVth Finance Commission Report, Vol. IV The States, October 2020.

[3]While the approach pursued by the Finance Commission has an equalising content, none of the Commission so far has formulated an explicit methodology on normative basis to derive the equalisation transfers. The partial gap filling approach also creates a potential adverse incentive among states. Further, the cost conditions are only partially equalized. Thus, the goal of horizontal equalisation remains fundamentally unachieved in India.

[4] Pessino and Fenochietto (2010, 2013) employed the SFA to estimate the tax capacity of 96 countries. Cyan, Martinez-Varquez and Vulovic (2013) compute the tax capacity of 94 countries using the SFA. Alm

and Duncan (2014) estimates the tax efficiency of OECD and select non-OECD nations using both DEA and SFA. Jha and Sahni (1997) used Cornwell et al., (1990)'s time varying stochastic frontier approach to measure the tax efficiency of Canadian provincial governments for the period 1971 to 1993. Alfirman (2003) applied the frontier model for cross section data to measure the tax efficiency of provincial governments in Indonesia from 1996 to 1999.

[5] Studies such as Allers, de Haan and Sterks (2001) and Sole-Olle (2006) considered political economy factors. A few other studies use natural, social and demographic factors as determinants of local revenues. For instances, regions with larger natural resources are more likely to generate larger revenues through royalties from mining etc. Regions with greater non-farm economic activities may be able to collect more fees and tax revenues.

[6] Various approaches can be used to measure the expenditure need as explained in Section 2. This study uses a simple procedure due to space constraints. In the initial estimations, this study has measured the spending needs of states based on a panel regression results of revenue expenditure equation. However, differences in the estimates in the simple measure and the panel regression-based one are small. Results are available with authors on request.

[7].

$$T_1 - T_0 = C_1 - R_1 - (C_0 - R_0)$$

$$T_1 - T_0 = \frac{(C_1 - C_0)C_0}{C_0} - \frac{(R_1 - R_0)R_0}{R_0}$$

Dividing by T_0 throughout, we get:

$$\frac{T_1 - T_0}{T_0} = c\,\frac{C_0}{T_0} - r\,\frac{R_0}{T_0}$$

[8] As state governments generate own revenues from their own tax sources like state VAT/GST, sales tax, motor vehicle tax, stamp and registration duties, state excise etc. and from their own non-tax sources including fee, fines etc, specifying and estimating source specific revenues are difficult task.

[9] This procedure estimates a separate intercept for every state by suppressing the overall intercept term and by adding a dummy variable for each of the N sample states or equivalently by keeping the overall intercept and adding N-1 dummies.

[10] Given the GLS estimates of β say $\hat{\beta}$ one can recover the estimate the individual state intercept, $\hat{\alpha}_i$ from the residuals. Let $\varepsilon_{it} = y_{it} - x_{it}'$. Then one can estimate $\hat{\alpha}_i$ from the mean (overtime) of the residual for state i as: $\hat{\alpha}_i = (1/T)\ \Sigma_t \hat{\varepsilon}_{it}$; i=1,2,...,N. Then one can get max ($\hat{\alpha}_i$) and $\hat{u}_i$ and finally, exp ($-\hat{u}_i$) as explained above.

[11] Almost all SCS are small and hilly states except Goa which is a small state but not a hilly. In the GCS, all states are major Indian states including Uttarakhand which is also a hilly state.