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IMPACT OF TRANSFERS ON ELEMENTARY EDUCATION EXPENDITURE AND MEASURING EQUALIZATION TRANSFERS TO INDIAN STATES

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Abstract

This study examines the impact of Central transfers on elementary education expenditure and determines fiscal equalization transfers using the data for 28 Indian States from 2009-10 to 2020-21, the Australia's expenditure equalization framework and the static panel data methodology. Based on the estimated values from the expenditure model and two benchmarks: all States' average and top three States' average per student expenditure on elementary education, it computes the State specific finance gap and total transfers needs. Results indicate that States with larger fiscal capacity tend to spend more on elementary education and the existing transfers mechanism has failed to compensate the lagging States. Bihar, West Bengal, Uttar Pradesh, and Madhya Pradesh have a large expenditure gap. Given the magnitude of the Centre's budget, the estimated additional transfers seem to be feasible. The findings of the study will be useful for policymakers and researchers to create appropriate strategies and design equalization transfers that can enable all Indian Sates to provide a standard level of elementary education.

Keywords: *Fiscal equalization, Australian transfer mechanism, elementary education, public education expenditure, Indian States, panel data*

JEL Codes: *I22, H52, H72, H77, J18*

Preface

Madras School of Economics (MSE) established the Centre for Public Finance (CPF), which started functioning from April 1, 2021. This Centre is financed by the Government of Tamil Nadu. Its activities are guided by an Advisory Council (headed by me). The Centre focuses on both theoretical and empirical issues of public finance covering the following areas: deficit financing and public debt, monetary and fiscal interactions, tax policy and reforms, public expenditure management, public investment appraisal and cost benefit analysis, public enterprises reform, intergovernmental transfers, local finances and environmental issues.

Apart from general research activities, the Centre is committed (i) to review the Tamil Nadu Economy and State Finances every year, (ii) to conduct an Annual Conference on topics related to public finance and policy and (iii) to conduct Training Programs on public finance. It will also undertake specific studies on public finance funded by Government of Tamil Nadu and other National and International agencies.

During the academic year 2021-22, the Centre organized "Virtual Meeting on Improving the Presentation of Tamil Nadu Budget Document" on April 29, 2021 and conducted 5-day Training Programs on Public Finance for 15 batches covering a total of 270 Group A and Group B officials of Government of Tamil Nadu through online mode (from August 31, 2021 to December 31, 2021). It organized a two-day national Conference on "Issues of Public Finance" during January 20-21, 2023. It has also initiated several research studies.

The study "Impact of Transfers on Elementary Education Expenditure and Measuring Equalization Transfers to Indian States", by Jyotsna Rosario and K.R. Shanmugam is the Eleventh working paper of the CPF. This study determines the state specific finance gap and the fiscal equalization transfers required based on two benchmarks: the estimated all states' average per capita expenditure on elementary education and top 3 states' average per capita expenditure. While the estimated quantum of transfers differ according to these bench marks, relative ranking of states remains the same. Given the target of 6 percent of GDP to the education sector, these additional transfers might help states to provide a standard level of elementary education in the country.

C.Rangarajan
Chairman

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Jyotsna Rosario
K. R. Shanmugam

INTRODUCTION

Elementary education being a merit good is jointly funded by the national (or Central) and sub- national (or State) governments in India. In fact, education was on the State list, but moved to the Concurrent List after the 42nd Constitutional amendment 1976 in order to prioritize this sector. Since the Indian Constitution assigns more expenditure functions to States and empowers the Centre with more buoyant revenue sources, there is a mismatch in revenues and expenditures. This has implications for the elementary education sector as well. Major responsibility for providing accessible, inclusive and quality elementary education lies with the States. States also bear around 80% of the expenditure on elementary education. To fill the gap between revenues and expenditures, the Central Government provides general purpose and specific purpose transfers to the States. For the education sector, the Central Government channelizes funds through the centrally sponsored schemes and through the Finance Commission of India to ensure an equitable standard of service by all States. However, evidence indicates interstate disparity in public elementary education expenditure. For instance, in 2020-21, the per student expenditure of Sikkim (₹96,968) was 9 times the per student expenditure of Bihar (₹10,710). Disparities in schooling infrastructure and outcomes also exist across States. Hence, there is a need to revisit and redesign the fiscal transfers mechanism, to facilitate equity in elementary education services across Indian States.

International experiences reveal that federal countries adopt various methodologies for designing equalization transfers. For instance, Canada has a Representative Tax System that equalizes revenues of the sub- national governments. Additionally, Provinces in Canada provide two types of sector specific grants for education: per pupil equalization grant and categorical grants based on students' or districts' specific needs (Herman, 2013; Tombe, 2018). In Australia, the Common Wealth Grants Commission (CGC) estimates transfers based on both revenue and expenditure needs of the sub- national Governments. In addition, the

CGC also makes specific purpose transfers to directly influence education outcome (Thompson, 1985; Searle, 2002). Brazil too deploys a mix of general-purpose grants and specific-purpose grants. The Brazilian Government created the basic education equalization fund (FUNDEF) in 1996 that set a per student minimum spending at national level and redistributed State funds for the purpose. It also ensured that at least 60% of total allocation is spent on teacher' salaries (Litschig, 2008; Cruz and Silva, 2020).

In India, the Finance Commission (FC), appointed once in every five years, determines the resource sharing arrangements between the Centre and the State Governments. Various FCs develop their own methodology to recommend equalization grants to States. Prior to the 9th FC, transfers for education were mostly based on past expenditure projections. The 9th FC used a normative approach to equalize revenue and expenditure (for various services)[1]. The 12th FC adopted a two-stage normative approach to equalize education expenditure across Indian States while the 13th FC provided equalization grants to States for the successful implementation of the RTE Act, 2009[2] (Government of India [GOI], 2004, 2009). The 14th FC abstained from giving any service specific transfers and recommended a reduction in grants in aid (GOI, 2014). Additionally, after the Planning Commission was dissolved in 2014, States no longer receive plan assistance for elementary education. Recently, the 15th FC recommended a performance based grants of ₹4,800 crore (1 crore=10 million) to States for school education during its award period (GOI, 2020a).

A few empirical studies have emerged in literature that use methodologies similar to the FCs. For instance, Ramachandran, Rawal,

[1] The 9th FC estimated the normative non-plan revenue expenditure for each service category based on an estimated unit cost function and used it as a guideline to determine States' share in developmental grants. However, their methodology was criticized for being manipulated and lacking objectivity. It failed to meet the goal of equalization (Thimmaiah, 1993).

[2] The Right to Education Act (RTE), 2009 was implemented to provide free and compulsory elementary education to children aged between 6 and 14 years.

and Swaminathan (1997) and Tilak and Kar (1994) calculated the expenditure needs of each Indian State following a methodology similar to that of the 9th FC. Bose, Ghosh, and Sardana (2020a, 2020b) adopt a methodology similar to the 13th FC. One interesting feature is that both FCs and the empirical studies, either employ the estimation of a cost function (using econometric methods), or use detailed estimation of cost of each item of education expenditure and then summing it up (using accounting methods). These methodologies suffer from several drawbacks. A major drawback is that they are one sided (based solely on cost conditions), and therefore they are only partially equalizing and disincentivizes the fiscally disadvantaged States.

Addressing the drawbacks of the existing fiscal equalization transfer mechanism in India, Saraf and Srivastava (2009) deliberated an integrated approach to determine service specific transfers in India based on the Australian transfer mechanism (ATM) – which looks into both the revenue and expenditure side. The ATM suggests a macro base for revenue side equalization while focusing on expenditure side equalization for selected services. Australia's comprehensive approach may resolve the problems pertaining to the current intergovernmental resource sharing arrangement for elementary education in India. Relevance of the ATM to India was discussed in detail by Rangarajan and Srivastava (2004).

This study adopts the Australian's expenditure equalization for a service and designs fiscal equalization transfers to 29 Indian States for providing benchmark level of elementary education. In order to do so, it initially examines the impact of transfers on States' expenditure on elementary education during 2009-10 to 2020-21 by estimating the Elementary Education Expenditure Function. In the second stage, it calculates the transfers requirement (resource gap / expenditure need) based on two different benchmarks (all States' average and top 3 average).

This study contributes to the existing literature by demonstrating an alternative methodology for estimating the equalization transfers for elementary education. This methodology is an improvement over the methods previously used in literature, as it provides treatment for the exogenous and structural disabilities of the States. In addition to the cost factors, variables indicating the fiscal capacity of the States are also included in the expenditure function. It is also superior to the traditional gap-filling approach. Additionally, to ensure efficient allocation of resources, the ATM uses all State average expenditure as a benchmark which reflects average efficiency and any departure from the benchmark can be justified by the disabilities faced by the States. The study uses the latest data to estimate transfers and the findings are quite relevant in the context of the FC of India. The study also reiterates the importance of grants in public education financing. Finally, while this study provides policy suggestions based on the Indian experience, they may be relevant for other similar federal nations.

The rest of this study proceeds as follows. The next section briefly discusses the status of elementary education financing, outcome and infrastructure in Indian States. The following two sections present a brief review of literature and explain the model, data and estimation. The subsequent sections present and discuss the empirical results and concluding remarks and policy implications of the study.

STATUS OF ELEMENTARY EDUCATION IN INDIAN STATES

India spends approximately 4% of its gross domestic product (GDP) on public education; 49 percent of which (1.3% of GDP) is spent on elementary education. The average per student real (2011-12 prices) public expenditure on elementary education was ₹9,401 in 2009-10 and it increased to ₹24,325 in 2020-21. On the other hand, despite the regulation for free elementary education, the average per student private expenditure at primary level was ₹ 4,610 in 2013-14 and increased to ₹6,024 in 2017-18. At upper primary level, private expenditure was

₹5,386 in 2013-14 and ₹6,866 in 2017-18[3]. However, private expenditure relative to public expenditure declined from 50 percent in 2013-14 to 35 percent in 2017-18 (GOI, 2015, 2019), indicating the significance of public expenditures on education.

The Centre (Ministry of Education), States (Department of School Education and Literacy) and local bodies are involved in the financing of elementary education. The Central Government channelizes funds through the centrally sponsored schemes and through the FC of India. When compared to the Center, States are the major contributors to elementary education in India as they contributed 90 percent and 82 percent of the total elementary education expenditure in 2009-10 and 2020-21 respectively.

Among the States, Sikkim (₹96,968) had the highest per student expenditure on elementary education in 2020-21, followed by Nagaland (₹79,071) and Arunachal Pradesh (₹71,405) and Mizoram (₹66,954). Bihar (₹10,710), West Bengal (₹12,626), Jharkhand (₹15,213) and Assam (₹19,531) had the lowest per student expenditure. Bihar (₹30,220) also had the lowest real per capita gross state domestic product (GSDP) followed by Uttar Pradesh (₹45,683) and Jharkhand (₹55,326). Additionally, States that spend less on elementary education also have relatively more children in the elementary schooling age (6-13 years). For example, in 2020-21, Uttar Pradesh (365 lakh) had the maximum number of elementary schooling children, followed by Bihar (223 lakh), Maharashtra (148 lakh) and Rajasthan (123 lakh), whereas Sikkim (1 lakh) had the lowest. These States also had a relatively high Pupil Teacher Ratio and a lesser number of schools per lakh child population (Table1).

[3] Data on private expenditure is collected by the National Sample Survey Organisation and the latest data is available only for 2017-18.

Table 1: Fiscal Capacity and Elementary Education Expenditure, Infrastructure and Outcome of Indian States, 2020-21

States	GSDP Per Capita (₹)	Per Student Public Expenditure (₹)	Number of Schools per lakh Child population	Population in Age 6-13 Years (in lakh)	Pupil Teacher Ratio	Net Enrolment Ratio	Out of School Children (%)
	1	2	3	4	5	6	7
Andhra Pradesh	137813	23227	977	103	18	88	12.2
Arunachal Pradesh	110724	71405	1544	2	11	93	3.3
Assam	63531	19531	1212	51	17	100	0.0
Bihar	30220	10710	386	223	38	90	5.3
Chhattisgarh	79978	25406	1191	44	19	89	9.7
Goa	340717	25873	660	2	17	88	10.2
Gujarat	176219	32091	490	92	26	85	11.8
Haryana	179647	47225	604	39	16	88	5.5
Himachal Pradesh	149900	59607	2111	8	9	95	0.0
Jammu and Kashmir	74195	52980	1473	19	10	75	20.4
Jharkhand	55326	15213	725	60	28	90	7.1
Karnataka	164327	28096	777	81	25	99	0.0
Kerala	147477	23363	397	39	16	93	3.2
Madhya Pradesh	65794	32478	984	131	20	83	14.8
Maharashtra	147109	28299	710	148	21	96	1.8
Manipur	69282	55340	1118	4	11	100	0.0
Meghalaya	64127	19896	2585	5	16	100	0.0
Mizoram	108683	66954	1936	2	12	100	0.0
Nagaland	91412	79071	828	3	9	77	22.3
Odisha	80743	21555	1008	59	17	90	0.0
Punjab	128178	20045	831	34	14	100	0.0
Rajasthan	80932	20100	868	123	17	90	6.3
Sikkim	279594	96968	1502	1	5	81	17.8
Tamil Nadu	151518	37415	697	84	14	90	1.3
Tripura	89506	22537	1054	5	14	100	0.0
Uttar Pradesh	45683	22454	675	365	25	89	6.6
Uttarakhand	151892	44851	1521	15	14	99	0.0
West Bengal	77283	12626	816	114	22	100	0.0
Maximum	340717	96968	2585	365	38	100	22
Minimum	30220	10710	386	1	5	75	0
Coefficient of Variation	0.57	0.60	0.49	1.20	0.40	0.08	1.17

Source: GSDP: CSO; Per student public expenditure: Author's calculation based on revenue expenditures of State Governments on Elementary Education from CAG and Enrolment in Government and Government aided schools from UDISE; Net Enrolment Ratio, Student Classroom Ratio, Pupil teacher Ratio, Out of School Children in age 6-13 years: U-DISE

There exists an interstate disparity in education outcomes as well. While several States like Assam, Manipur, Punjab, etc., have 100 percent Net Enrolment Ratio (NER) at elementary level, Jammu and Kashmir has a NER of 75. Clearly, the goal of universal elementary education is not yet achieved. Further, the percent of out of school children (OSC) in elementary schooling age is maximum in Nagaland (22.3%) followed by Jammu and Kashmir (20.4%) and Sikkim (17.8%). Madhya Pradesh (14.8%), Uttar Pradesh (6.6%) and Bihar (5.3%) also have a large percent of OSC. In several States like Himachal Pradesh, Manipur, Meghalaya, Tripura and Uttarakhand, there are no OSC (Table 1).

It is observed that poorer States like Bihar, Uttar Pradesh, Jharkhand, Madhya Pradesh and West Bengal, incur less per student public expenditure on elementary education, but they have more children in elementary schooling age. These States also lag in terms of access to elementary education and infrastructure. The lagging States often do not have the fiscal capacity to match up to the service standards of the better-off States. Hence, fiscal equalization is essential to ensure horizontal equity.

A BRIEF REVIEW OF LITERATURE

This section discusses the empirical and theoretical literature on the determinants of public expenditure on education, the role of transfers and its estimation.

Impact of Transfers and Other Determinants on Public Education Expenditure

Various economic theories examine the impact of grants on public expenditure. The Veil hypothesis suggests that as unconditional transfers, like lump sum transfers, can be spent on any combination of public goods and services or used to provide tax relief to residents, they do not affect relative prices (so there is no substitution effect). Therefore, they are no

different from the effect of distributing lump sum funds directly to local residents. In theory, a US$1 increase in local resident's income should have exactly the same impact on local spending as the receipt of US$1 of transfers (Bradford and Oates, 1971).

The disincentive effect (hypothesis) states that most sub-national Governments distribute transfers as lower taxes and this crowds out local spending (Scott, 1952). Flypaper effect hypothesis suggests that unconditional transfers given to sub-national Governments have greater stimulatory effect on spending than an equivalent increase in income i.e., Money sticks where it hits.

Levin (1985) observed that conditional grants increased States' expenditure on education in the USA whereas unconditional grants did not have a positive flypaper effect. Verstegen (2014) and Reschovsky (1994) also discussed various fiscal equalization mechanisms adopted in the USA for elementary and secondary education. Arvate, Mattos, and Rocha (2015) found that both conditional grants (FUNDEB) and unconditional grants (Municipalities Participation Fund) increased public education spending by Brazilian Municipalities.

Literature also discusses the impact of income (GDP) on public expenditure. Wagner's law suggests a long run positive association between income and public expenditure, whereas Keynesian Counter Cyclical theory states that during contractionary fiscal policy, income and public expenditure are negatively associated. Apart from income and grants, Median Voter theorem, Model of Generational Competition in the allocation of public sector resources, Fiscal Illusion and Voting Bias Model, and the Interest Group Model of public spending suggest that demographic characteristics of an electorate also impact public expenditure allocations.

Empirical studies prove that economic factors like GDP, grants, tax and non- tax revenue, etc., ascertain the fiscal capacity of the

Government and positively associated with public expenditure on education (Chatterji, Mohan, and Dastidar, 2014; Chakrabarti and Joglekar, 2006; Saastamoinen and Kortelainen, 2018; Litschig, 2008; Jabbar and Selvaratnam, 2017; Verbina and Chowdhury, 2004; Dragomirescu-Gaina, 2015). Cost variables like infrastructure and manpower requirements also increase public expenditures unless there is an excess capacity (Fernandez and Rogerson, 2001; Bischoff and Prasetyia, 2015).

Population in school going age have a positive impact on education expenditure, unless the additional cost of education increases beyond the fiscal capacity of the government (Verbina and Chowdhury, 2004; Yun and Yusoff, 2018; Akanbi and Schoeman, 2010; Busemeyer, 2007, Chatterji et al., 2014; She, 2004). Urbanization was observed to have a mixed impact (Bischoff and Prasetyia, 2015; Chakrabarti and Joglekar, 2006; Inman, 2017; Akanbi and Schoeman, 2010; Arvate and Zoghbi, 2010). Special programs for the disadvantaged communities (like the Schedule Tribe (ST) and Schedule Caste (SC) population in India) can also impact on public expenditure (Chakrabarti and Joglekar, 2006). Bischoff and Prasetyia (2015) found literacy rate to have a positive impact on education expenditure. Lastly, private school enrolment can either have a negative or positive impact depending on the demand for the two types of schooling (Nose, 2015, Jabbar and Selvaratanam, 2017). These studies serve as a guide to construct the *Elementary Education Expenditure Function.*

Fiscal Equalization Transfers for Elementary Education in India

In India, fiscal equalization in education was first attempted by the 9th FC. It estimated a unit cost function using data from 1981-82 to 1986-87 and applied pooled OLS methodology. Non-plan revenue expenditure per child was regressed on enrolment rate, student teacher ratio, price differences and differences in teachers' salaries across States. Actual data figures for the year 1986-87 were substituted in the estimated function to obtain normative values. Finally, finance gap in 14 major States were

projected for 1990-91 to 1994-95, using expenditure growth rate (GOI, 1990). However, the 10th and the 11th FC only provided upgrading grants to States, for the provision of key educational facilities. Grant estimation was based on past expenditure projections (GOI, 1995, 2000).

The 12th FC adopted a two-stage normative approach to equalize education expenditure across States. In the first stage, ratio of revenue expenditure on general education to total revenue expenditure was estimated for each State for 2002-03, and averages were worked out separately for general and special category States. States below the respective groups' average were bench-marked to the average. In the second stage, per capita expenditure on education was worked out and States that were below the respective groups' average were given an additional grant equal to 15 percent of the difference between the States' per capita expenditure and the average. Assam, Bihar, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal were given additional transfers (GOI, 2004). The major limitation of this approach is that the actual resource requirements of States were not calculated.

The 13th FC overcame the above limitation and provided equalization grants for elementary education by estimating the annual funding required to cover all the recurring items of expenditure as per the Sarva Shiksha Abhiyan (SSA)[4] norms. While the SSA norms obligated the States to contribute 50 percent of the total expenditure, the FC determined that the States did not have the fiscal capacity to contribute more than 35 percent. Therefore, a grant of 15 percent of estimated SSA expenditure was given to each State (GOI, 2009). Later, the 14th and 15th FC did not prioritize equalization. While the 14th FC focused on giving more autonomy to the States and increased tax devolution, the 15th FC is challenged by economic repercussions of the Covid-19 crisis (GOI, 2014, 2020a).

[4] SSA is a centrally sponsored scheme introduced to universalised elementary education in India. In 2011-12, the Centre-State resource sharing arrangement for SSA was 50-50.

Among the empirical studies, Tilak and Kar (1994) estimated the expenditure required to universalize elementary education in the context of the 10th FC. They regressed per capita expenditure, on enrolment to obtain a function. Resource requirement was estimated by substituting the population in age group 6-14 years, in the estimated function. Ramachandran et al., (1997) criticized the approaches of both Tilak and Kar (1994) and the 9th FC as they underestimated the expenditure needs of Indian States; suffered from endogeneity problem; and could not make accurate projections. They proposed a modified Colclough and Lewin methodology, which combines the unit costs of schooling and flow of students through each grade to estimate the expenditure requirements. The study generalized the cost structure and norms of West Bengal to all the States. Tilak (1997) argued that in absence of detailed information on costs and norms of States, ex- post per student expenditure is a better indicator of cost.

Roy, Kamaiah, and Rao (2000) used panel data of 15 Indian States (from 1992-97) to estimate an expenditure function. They regressed per capita expenditure, on enrolment, student teacher ratio, teacher's salary, price differences, urban population, literacy rates, dropouts, and ST-SC population. Actual education expenditure was then compared to the normative to compute the expenditure needs. They found that elementary education expenditure in Gujarat and Maharashtra was higher than the normative, while Bihar, Haryana, Uttar Pradesh (UP) and West Bengal had significantly lower expenditure.

Bose et al., (2020a) estimated the resources requirement for elementary education as the sum of total capital costs and recurring costs. The estimates were based on the enrolment patterns and schooling structure in the Indian States and Union Territories with reference to the RTE Act norms. The difference between actual expenditure and resource requirements gave the finance gap for 2015-16. Bose et al., (2020b) used these estimates to project transfers (from 2016-17 to 2019-20) for financing RTE in 16 major States. They showed

that Uttar Pradesh, Bihar, Maharashtra, West Bengal, Madhya Pradesh and Rajasthan had the largest resource gap. However, this methodology is information intensive as it requires meticulous examination of cost parameters in each State. Further, cross sectional estimation of expenditure does not reflect changes and developments over time, which is essential for the development of an effective transfer mechanism.

Rangarajan and Srivastava (2004) discussed that, like India, Australia too, has vertical and horizontal imbalances in the fiscal structure. However, the ATM aims to enable States to provide comparable level of services, given that they make comparable revenue efforts and operate at comparable levels of efficiency. The CGC in Australia makes equalization transfers under the category of Special Purpose Payments (SPPs). It defines total public expenditure as the sum of expenditure categories, which, in turn, is the weighted sum of components and each component is a function of one or more disability factors. Thus, equalization transfers for a particular expenditure component (or service category) can be calculated only after listing out the disabilities and adjusting for its' effects. Disabilities can be of two types: (i) Use disabilities: these are differences in use of a service between States due to demographic factors and accessibility to the private sector; and (ii) Cost disabilities: these are differences in per unit cost of providing a service, due to regional, cultural and economic factors. Grants estimation under the ATM can be illustrated as under:

The all-States average per capita grant (g_s) is given as:

$$g_s = e_s - r_s + d_s - o_s \quad (1)$$

The per capita grant to State i (g_i) is given as:

$$g_i = e_i - r_i + d_i - o_i \quad (2)$$

where, subscripts 's' and 'i' represents all States averages and individual State respectively; 'e' is standardized per capita expenditure; 'r' is

standardized per capita revenue; 'd' is standardized per capita budget surplus, and $d_i=d_s= r_s –e_s$; 'o' is standardized SPPs (transfers).

All standardizations are made relative to all State averages thus the respective expenditure and revenue terms can be given as: $e_i = \gamma_i e_s$ and $r_i = \rho_i r_s$, where, 'γ_i' and 'ρ_i' is expenditure disability and revenue disability of State i, respectively.

The Standardized per capita total grant (g_i^*) estimated by CGC includes SPPs (o_i),

i.e., $(g_i^*) = g_i + o_i$ (3)

Upon substitution, the Standardized per capita grants to State i (g_i^*) can be given as: $g_i^* = \gamma_i e_s – \rho_i r_s + d_i$

Since $d_i = d_s = r_s - e_s$; $g_i^* = \gamma_i e_s – \rho_i r_s + r_s – e_s$; Therefore,

$g_i^* = (\gamma_i-1) e_s + (1-\rho_i) r_s$ (4)

Equation (4) indicates that total grants given to a State is the sum of the expenditure and revenue disabilities and an appropriate equalization mechanism must incorporate both.

Borrowing from the Australian concept of equalization, Saraf and Srivastava (2009) estimated the transfers for health and education sectors by allowing for both revenue and expenditure disabilities in a panel framework. They estimated the expenditure function for each service. Transfers requirement was calculated as the difference between the State's estimated expenditure and average expenditure of top three States (benchmark). Prachita (2012) estimated the health expenditure needs of the State Governments from 2004-05 to 2014-15 based on a similar methodology. The present study adopts a similar methodology to estimate the transfers requirement for elementary education in Indian States. Table 2 provides the summary of the key studies in the Indian context.

Table 2: Summary of Selective Studies on Indian States

Study	Area / Time	Methodology	Key Findings	
Tilak and Kar (1994)	18 states; elementary, secondary & tertiary education; 1980-81 to 1991-92	State- wise OLS	Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra	States with the largest resource gap / transfer requirement
Ramachandran et al. (1997)	14 states; primary education; 1987- 88 to 1995-96	Modified Colclough-Lewin Methodology	Uttar Pradesh, Bihar, Maharashtra, Madhya Pradesh	
Roy et al. (2000)	15 states; primary, secondary & tertiary education; 1992-93 to 1997-98	Panel Data Methodology	Bihar, Hayana, Uttar Pradesh, West Bengal	
Saraf and Srivastava (2009)	15 states; education & health sector; 1991-92 to 2005-06	Expenditure Equalization based on ATM	Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan	
Bose et al. (2020a, 2020b)	29 states; elementary education; 2015-16	Cost Aggreagtion	Uttar Pradesh, Bihar, Maharashtra, Madhya Pradesh	
Chakrabarti and Joglekar (2006)	15 states; elementary education; 1980-81 to 1999-2000	Panel Data Methodology	Positive: NSDP, grants, rural population, population 15-19 years. Negative: SC & ST population, population 10-14 years	Sign (+/-) of significant determinants of public education expenditure
Chatterji et al. (2015)	16 states; education sector; 2001 to 2010	Mundlak's Approach (1978)	Positive: NSDP, grants, tax revenue. Negative: population 0-14 years	

Source: Author's compilation

MODEL, DATA AND ESTIMATION

This study designs the equalization transfers for elementary education to Indian States. This involves three steps: (i) specifying and estimating the public expenditure (on elementary education) function for Indian States; (ii) selection of a benchmark(s) or a norm(s) based on which the equalization transfers can be estimated, and (iii) deriving fiscal equalization transfers for elementary education to each State based on alternative benchmarks.

In order to estimate the expenditure function, the key determinants of elementary education expenditure are identified from past studies. These variables basically represent various revenue and cost disabilities of the States. The State Governments' Expenditure function for elementary education is specified as:

$$\ln EXP_{it} = \alpha + \beta_1 \ln GSDP_{it} + \beta_2 \ln OTR_{it} + \beta_3 \ln NTR_{it} + \beta_4 \ln GR_{it} + \beta_5 \ln DEV_{it} + \beta_6 P6\text{-}13_{it} + \beta_7 SCST_{it} + \beta_8 RP_{it} + \beta_9 LR_{it} + \beta_{10} PR_{it} + \beta_{11} SN_{it} + \beta_{12} \ln SL_{it} + \beta_{13} TPR_{it} + \beta_{14} RA_{it} + \beta_{15} GS_{it} + \beta_{16} GT_{it} + \beta_{17} C_{it} + \beta_{18} E_{it} + \beta_{19} R_{it} + \mu_i + \eta_t + e_{it} \quad (5)$$

where, $\ln EXP_{it}$ is log of real per student public expenditure on elementary education; $\ln GSDP_{it}$ is log of real per capita gross state domestic product; $\ln OTR_{it}$ is log of real per capita State's own tax revenue; $\ln NTR_{it}$ is log of real per capita State's own non-tax revenue; $\ln GR_{it}$ is log of real per capita grants-in-aid; $\ln DEV_{it}$ is log of real per capita tax devolution (shared tax) from Centre to State; $P6\text{-}13_{it}$ is percentage of population in age group 6 to 13 years (elementary schooling age group); $SCST_{it}$ is percentage of Schedule Caste and Schedule Tribe children in the total child population; RP_{it} is percentage of rural population; LR_{it} is literacy rate; PR_{it} is percentage of total enrolment in private schools; SN_{it} is percentage of students with special needs/ disability; $\ln SL_{it}$ log of schools per lakh; TPR_{it} is Teacher- pupil Ratio; RA_{it} is the percentage of teachers having regular appointment; GS_{it} is the percentage of government schools to the total number of schools; GT_{it} is the percentage of schools having functional girl's toilet; C_{it} is the percentage of schools having functional computer; E_{it} is the percentage of schools having functional electricity; R_{it} is the percentage of schools having ramp.

In equation (5), μ_i captures time invariant unobserved heterogeneity of the States (i.e., state/regional effect); η_t captures the time variant unobserved heterogeneity of the States (i.e., time/year effect); μ_i and η_t may be fixed or random depending on the choice between random effects and fixed effect models; and e_{it} is the standard stochastic error term, $e_{it} \sim N(0,\sigma^2)$. Subscript 'i' represents the i^{th} State (or cross section) and 't' represent the t^{th} Year (time period). The error terms takes care of unexplained variations such as cost/ price differences across States, political factors, etc.

Equation (5) can be estimated using the standard (static) panel data estimation techniques: pooled OLS or fixed effects (FE) or random effects (RE) methods. Pooled OLS is relevant when there are no state and/or year effects. The FE method assumes a correlation between the explanatory variables included in the model and the unobserved individual (State) effect and year effect, while the RE method assumes no such correlation. The FE model can be estimated using the Least Square Dummy Variable (LSDV) procedure by incorporating State dummies and year dummies along with other explanatory variables or "within estimation" procedure. The RE model can be estimated using the Generalized Least Square (GLS) procedure. The Chow test is used to choose one-way or two-way model, while the Hausman Statistics is used to decide FE or RE model. The Breusch - Pagan LM tests is used to determine selection between pooled OLS and RE models.

Estimated values of the dependent variable from equation (5) are used to design the equalization transfers to States as they represent how State i spends in year t on the elementary education, conditional on its needs and cost disability and revenues. Transfers have been designed using the ATM approach. According to the ATM approach, firstly, the expenditure need (finance gap) of each State is measured by the difference between the State's expenditure estimated by the model (equation 5) and the benchmark expenditure. This study uses two benchmarks: 1. All States' average expenditure per student; and 2. Top 3 States' average expenditure per student, on elementary education. [5] Secondly, required transfers (real) is computed by multiplying the expenditure needs of the respective State with its elementary school student population. States with a negative finance gap (i.e., States that spend more than the benchmark), are assigned zero transfers.

[5] The ATM approach uses the average expenditure as a benchmark, as they reflect average efficiency. It does not consider any exogenous target or norm, such that any departure from the benchmark can be explained on account of the disabilities faced by the States. However, the second benchmark is more egalitarian.

The study uses the State level data drawn from various secondary sources for 28 Indian States during 2009-10 to 2020-21. Andhra Pradesh and Telangana have been taken together. Jammu and Kashmir is also included in the study despite the fact that recently it got union territory status. The data source for States' expenditure on elementary education, States' own tax and non- tax revenues, grants in aid and tax devolution was Finance Accounts of States (CAG, 2022). Data on the percentage of population in the age group 6-13 years, and SC and ST child population were collected from the Ministry of Education (GOI, 2022). The percentage of rural population and literacy rates were extrapolated using the Census 2001 and 2011 (GOI 2001, 2011). Enrolment in government, government aided and private schools, enrolment of children with special needs, and data on all the infrastructure variables were collected from the Unified District Information System (2022). GSDP data were compiled from the National Statistical Office (2022). GSDP deflator of respective State was used to transform all nominal values in to real terms and population data were used to compute per capita figures. Data consists of 336 observations. However, Jammu and Kashmir became a Union Territory in 2020 and its shared tax for that year was zero and all transfers were made in the form of grants- in aid. Hence, observation for Jammu and Kashmir was dropped in certain specifications.

EMPIRICAL RESULTS

Impact of Transfers on Public Elementary Education Spending

Table 3 reports the panel model estimation results of equation (5) and its alternative specification. Specification 1 includes all the key economic, infrastructure and socio-demographic variables. Specification 2 includes the variables that are significant in specification 1. In specification 3, grants and tax devolution are taken together (i.e., as total transfers). Specification 3 has been used for equalization transfers estimations in the next sub-section. The Hausman statistics supports a one-way random effects model in specifications 1 and 2, but it supports a one–way fixed effects model in specification 3 (i.e., state specific unobserved heterogeneity is significant in specification 3).

As expected, (in specification 1), all 5 economic variables (GSDP, OTR, NTR, GR and DEV) have a positive impact on per student public expenditure on elementary education, indicating that the States that have more fiscal capacity allocate more funds to elementary education. However, the coefficients of own tax and non-tax revenue are not statistically significant even at 10% level of significance. GSDP, GR and DEV are the key or significant economic determinants. However, the magnitude of the estimated coefficient of grant (and total transfers in specification 3) is less than the magnitude of the estimated GSDP coefficient, indicating the absence of the flypaper effect. This signifies that general purpose transfers fail to boost States' expenditure on elementary education and specific purpose transfers might be more successful in increasing public spending to the desired level.

Among the infrastructure variables, only teacher- pupil ratio, and schools having functional girl's toilets and ramps have significant impact on per student public expenditure on elementary education. As expected, all these three infrastructure variables have positive coefficients, indicating that the States that have these schooling facilities tend to incur higher per student expenditure. This also emphasizes that the poor-performing States must allocate more resources to improve the quality of service.

Among the socio-demographic variables, the percentage of rural population has a positive and significant impact on per student public expenditure on elementary education. Since the Government is the chief provider of education in the rural areas, such an association is expected. However, rural population is insignificant in specification 3 (and so dropped). A positive association between private school enrolment and public education expenditure indicates that public expenditure is not crowding out private schooling. Nonetheless, private schools are competitors to public schools and more enrolment in such schools may

Table 3: Panel Data Estimation Results of Elementary Education Expenditure Function

Dependent variable: log real per student public expenditure

VARIABLES	Specification-1	Specification- 2	Specification- 3 (final)
log of real GSDP per capita	0.3113**	0.4528***	0.4450*
	(0.1436)	(0.0967)	(0.2402)
log of own tax revenue of the State	0.1104		
	(0.0893)		
log of own non-tax revenue of the State	0.0577		
	(0.0367)		
log of tax devolution	0.1071***	0.1352***	
	(0.0310)	(0.0274)	
log of grants in aid	0.1200***	0.1138***	
	(0.0359)	(0.0272)	
log of total transfers (grants + devolution)			0.1358*
			(0.0710)
Percentage of population in rural areas	0.0123***	0.0089**	
	(0.0047)	(0.0037)	
Literacy rate	0.0070		
	(0.0060)		
Percentage of SC ST children	0.0025		
	(0.0028)		
percentage of population in age 6 to 13 years	-0.0233	-0.0191*	-0.0348***
	(0.0155)	(0.0114)	(0.0103)
Percentage of enrolment in private schools	0.0153***	0.0151***	0.0144***
	(0.0024)	(0.0020)	(0.0034)
Percentage of students with special needs	0.0018		
	(0.0237)		
log of schools per lakh	-0.1787		
	(0.1362)		
Teacher- pupil Ratio	4.6866***	4.6578***	4.3391**
	(1.3162)	(1.0819)	(2.0848)
Percentage of teachers with regular appointment	-0.0002		
	(0.0008)		
Percentage of government schools to total	0.0030		
	(0.0029)		
Percentage of schools having girl's toilet	0.0020**	0.0023***	0.0029**
	(0.0009)	(0.0008)	(0.0011)
Percentage of schools having computer	0.0003		
	(0.0012)		
Percentage of schools having Electricity	-0.0001		
	(0.0012)		
Percentage of schools having ramp	0.0034**	0.0040***	0.0049***
	(0.0015)	(0.0012)	(0.0014)
Constant	1.5741	0.8729	2.5720
	(1.6846)	(1.2350)	(2.0487)
Hausman Test p- value	0.4666	0.1131	0.0543
BPLM test p -value	0.0000	0.0000	0.0000
Model	Random Effects	Random Effects	Fixed Effects
R- square	0.7924	0.7986	0.7500
Observations	335	335	336
Number of States	28	28	28

Source: Author's estimation

Note: Standard errors in parentheses; overall R^2 and within R^2 are reported for RE and FE models respectively; for model (3) robust standard errors are reported. *** p<0.01, ** p<0.05, * p<0.1

induce higher public expenditure to attract/retain students. This may be considered as a demonstration effect.

Percent of population in elementary schooling age (6 to 13 years) has a negative and significant effect, indicating that States that have more children in elementary schooling age incur less expenditure and they must receive assistance to boost up their spending. Literature explains that literacy creates awareness about the benefits of education, and this may create higher demand for education resulting in increased public expenditure. However literary rate is not significant in our model. Percent of ST-SC children in total child population (SCST) and percentage of students with special needs (SN) are not statistically significant even at 10% level. Governments run special programmes for children from the disadvantaged sections of society (like, Tribal Area Sub Plan, Special Component plan for SC, Special Central assistance to SC, Integrated development of disabled children, etc.,) but the percent of SC-ST children and SN do not impact States' elementary education expenditure, suggesting a scope for revaluation and revision of these Government programs. Column 2 and 3 of table 3 includes only statistically significant variables. The effects of these variables are similar to that in Column (1). The results in Column (3) are used to derive the fiscal equalization transfers.

Fiscal Equalization Transfers for Elementary Education to State Governments

The estimation of transfers is contingent on the selection of an appropriate benchmark[6]. The study uses two types of benchmarks, *estimated average expenditure of all the States* (Benchmark 1); and *average expenditures of top three States* in respective years (Benchmark 2). Table 4 compares the total equalization transfers estimated using these two benchmarks with the per student expenditure of Kendriya

[6] Transfers Requirement = [Benchmark Expenditure (-) Per Student Expenditure estimated in the State by the model] (X) [Elementary school student population of the State].

Vidyalayas (Central schools designed to cater to the children of Central government employees). Both the benchmarks are quite reasonable when compared to the per student expenditure incurred by Kendriya Vidyalayas (KV). Benchmark 1 is much lower than KV's expenditure whereas benchmark 2 is quite at par. Alternatively, both the benchmarks are quite reasonable when compared to the per student cost of ₹23,200 (in 2015-16) estimated by Bose et al., (2020b), for universalizing elementary education.

Table 4: Comparison of Benchmark 1 (all States' average) and Benchmark 2 (top 3 States' average) with Real Per Student Expenditure of Kendriya Vidyalayas (in ₹)

Year	Benchmark 1	Benchmark 2	Kendriya Vidyalaya
2009-10	9290	19381	23,533
2010-11	11376	20397	20,925
2011-12	10651	19996	20,468
2012-13	12336	23236	21,894
2013-14	13406	27088	22,830
2014-15	15269	31403	27562
2015-16	17087	36040	27,190
2016-17	18858	40529	32,471
2017-18	20746	45127	39,821
2018-19	22145	48312	36,060
2019-20	23787	50886	48,140
2020-21	23856	51500	46,339

Source: Author's estimation.

Table 5 shows the estimated transfers requirement based on (all States average) Benchmark 1. It is noted that Arunachal Pradesh, Haryana, Himachal Pradesh, Jammu and Kashmir, Manipur, Mizoram, Nagaland, Sikkim and Uttarakhand spent more than the benchmark in all the years, and therefore they required no additional transfers. Bihar had the largest expenditure gap, followed by Uttar Pradesh, West Bengal, Madhya Pradesh, and Jharkhand. Karnataka had no transfers requirement initially but in 2020-21, it had an expenditure gap of ₹1785 crore. Tamil Nadu had a transfers requirement of ₹184 crore and ₹599 crore only in 2015-16 and 2016-17 respectively and zero requirement in

the remaining years. According to this all States' average benchmark, the total additional Central Government transfers (real) needed for elementary education was ₹43,693 crore (0.57% of GDP) in 2009-10, which increased to ₹102828 crore (0.76% of GDP) in 2020-21.

Table 5: Equalisation Transfers Requirement (Real) for Elementary Education during 2009-10 to 2020-21 based on All States' Average Benchmark (in ₹. Crore)

States	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Andhra & Telangana	816	762	838	1497	1996	1613	1265	1691	1800	2098	1474	2448
Arunachal Pradesh	0	0	0	0	0	0	0	0	0	0	0	0
Assam	983	991	1552	1425	2250	2726	2581	3177	2996	3344	3733	3624
Bihar	**12296**	**15543**	**15197**	**16418**	**19232**	**22883**	**27108**	**28299**	**27006**	**24538**	**25986**	**27842**
Chhattisgarh	900	1222	957	988	762	963	984	984	1396	1333	1593	1260
Goa	41	26	0	3	29	32	29	37	60	71	93	92
Gujarat	148	0	0	0	0	0	107	52	206	52	285	658
Haryana	0	0	0	0	0	0	0	0	0	0	0	0
Himachal Pradesh	0	0	0	0	0	0	0	0	0	0	0	0
Jammu & Kashmir	0	0	0	0	0	0	0	0	0	0	0	0
Jharkhand	**3325**	**3528**	**3214**	**3582**	**3998**	**4374**	**4800**	**4717**	**4804**	**4861**	**5082**	**5338**
Karnataka	0	0	0	49	140	346	452	1227	1604	2406	1944	1785
Kerala	615	541	27	0	0	0	0	0	0	464	686	684
Madhya Pradesh	**4202**	**5525**	**4495**	**5142**	**5729**	**6225**	**5934**	**6030**	**6689**	**6225**	**6744**	**6425**
Maharas-htra	**2966**	**3382**	**2248**	**1414**	**1655**	**1805**	**2816**	**3057**	**4036**	**4028**	**4724**	**4894**
Manipur	0	0	0	0	0	0	0	0	0	0	0	0
Meghalaya	165	133	148	187	238	306	356	390	507	588	624	625
Mizoram	0	0	0	0	0	0	0	0	0	0	0	0
Nagaland	0	0	0	0	0	0	0	0	0	0	0	0
Odisha	2345	2572	2687	3035	3115	3578	3498	3552	3806	3725	3871	3915
Punjab	1009	1154	1114	1230	1524	1581	1825	1983	1723	1621	1465	1491
Rajasthan	1228	1587	956	1831	1765	1803	2573	3197	3753	4398	4559	5187
Sikkim	0	0	0	0	0	0	0	0	0	0	0	0
Tamil Nadu	0	0	0	0	0	0	184	599	0	0	0	0
Tripura	266	296	286	303	320	332	420	450	484	455	501	500
Uttar Pradesh	**4629**	**5477**	**5464**	**6382**	**7155**	**9132**	**10070**	**11268**	**15128**	**15648**	**17914**	**19265**
Uttarakha-nd	0	0	0	0	0	0	0	0	0	0	0	0
West Bengal	**7761**	**9446**	**9150**	**10733**	**10944**	**12253**	**12974**	**13825**	**15133**	**14664**	**16441**	**16795**
Total Transfers	**43693**	**52184**	**48333**	**54219**	**60851**	**69954**	**77975**	**84535**	**91131**	**90518**	**97721**	**102828**

Source: Author's Estimation

Table 6: Equalisation Transfers (Real) Requirement for Elementary Education during 2009-10 to 2020-21 based on Top 3 States' Average Benchmark (in ₹ Crore)

States	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Andhra & Telangana	7184	6347	7027	8472	10671	11278	12017	13500	14808	15744	15827	18403
Arunachal Pradesh	118	55	144	170	218	174	255	233	249	263	211	290
Assam	5226	4688	5977	6425	8963	10552	10956	12837	13057	14305	15075	15357
Bihar	**31469**	**33194**	**34665**	**37284**	**46904**	**56197**	**68701**	**72692**	**71409**	**67502**	**69351**	**74485**
Chhattisgarh	4701	4657	4597	5169	5740	6621	7348	7960	9081	9147	9400	9252
Goa	209	176	145	183	258	300	343	392	466	502	541	542
Gujarat	6082	5233	5063	6713	8224	9744	11593	12786	13974	14131	14467	15141
Haryana	1720	1118	962	1204	1590	1982	1671	1852	2247	2096	1859	2295
Himachal Pradesh	339	137	0	0	0	0	0	0	0	53	7	47
Jammu & Kashmir	924	657	789	922	1214	1470	1605	1780	1997	1862	1905	1842
Jharkhand	**9134**	**8578**	**8544**	**9545**	**11316**	**12648**	**14312**	**14592**	**15615**	**16055**	**16170**	**16722**
Karnataka	4712	3788	4952	6163	7713	8951	10326	12173	13428	15002	14727	14821
Kerala	3671	3242	2792	2669	3185	3930	4584	5298	6026	7115	7676	7951
Madhya Pradesh	**14763**	**15137**	**14394**	**16322**	**19171**	**20710**	**21487**	**22803**	**24802**	**24260**	**25028**	**24653**
Maharashtra	**17104**	**15735**	**14753**	**15552**	**19171**	**21899**	**25729**	**28544**	**31877**	**33163**	**34334**	**34290**
Manipur	149	113	193	233	325	319	384	394	381	443	434	422
Meghalaya	772	676	711	820	1052	1281	1538	1649	2050	2135	2239	2299
Mizoram	45	0	40	64	5	0	17	24	39	42	60	89
Nagaland	84	35	84	82	137	151	204	138	171	142	129	126
Odisha	7891	7672	8152	9284	10803	12481	13612	14733	15715	15851	16073	16301
Punjab	3074	3111	3298	3731	4845	5199	5998	6602	6042	5905	6084	6358
Rajasthan	8772	7996	7805	9456	10778	11681	14789	16942	19340	20557	21207	22776
Sikkim	0	11	0	0	8	15	6	0	0	0	0	0
Tamil Nadu	3115	1925	5704	5746	7204	9592	11631	13442	10434	11033	11156	11441
Tripura	872	799	814	913	1048	1169	1368	1490	1621	1588	1646	1619
Uttar Pradesh	**24702**	**23240**	**25970**	**30258**	**36042**	**41896**	**47221**	**52445**	**62257**	**63097**	**66850**	**70707**
Uttarakhand	730	438	504	468	623	784	982	1117	1166	999	1048	890
West Bengal	**21261**	**21569**	**21873**	**25259**	**27604**	**31471**	**34907**	**37333**	**41367**	**41308**	**44749**	**46486**
Total Transfers	**178824**	**170328**	**179950**	**203105**	**244812**	**282496**	**323587**	**353750**	**379619**	**384302**	**398253**	**415608**

Source: Author's Estimation

Table 6 shows the estimated transfers based on the top three States' average benchmark (Benchmark 2). States with the larger expenditure gaps were Bihar, Uttar Pradesh, West Bengal, Maharashtra and Madhya Pradesh. According to this benchmark, the total transfers (real) requirement was ₹178824 crore (2.3% of GDP) in 2009-10 which

increased to ₹415608 crore (3% of GDP) in 2020-21.[7] It is observed that the total transfers estimated using the Benchmark 2 is approximately 4 times larger than the estimates based on Benchmark 1. However, the lagging States are similar irrespective of the benchmark. While Benchmark 2 is more egalitarian compared Benchmark 1, the extent of actual transfers may be limited by resource availability[8].

Table 7 compares the total transfers estimated by the study with the transfers given by the 13th FC and the transfers estimated by Bose et al., (2020b). While both the 13th FC and Bose et al. (2020b) assumed a cost structure based on Government norms to estimate transfers, extent of Central transfers suggested by the latter is much more than the former. Further, both methods are one sided and only partially equalizing. The 13th FC incorporated all the recurring items of expenditure and estimated the total cost of providing elementary education.

[7] If we use top 5 States' average, the total transfers required is estimated at ₹ 1,53,889 crore (2% of GDP) and ₹ 3,56,829.92 crore (2.6% of GDP) for 2009-10 and 2020-21 respectively.

[8] Feasibility of resource allocation is contingent on revenue side equalization, which is beyond the scope of this paper.

Table 7: Comparison of Transfers estimates (total) with the 13th Finance Commission and Bose et al. (2020) (in ₹ crore)

States	13th FC (2010-11 to 2014-15)	Bose et al.(2020 (2015-1(to 2019-20)	Present study (at current prices)			
			2010-11 to 2014-15		2015-16 to 2019-20	
			Benchmark 1	Benchmark 2	Benchmark 1	Benchmark 2
Andhra Pradesh (undivided)	942	NC	7399	47922	11215	96991
Arunachal Pradesh	24	*	0	856	0	1731
Assam	238	49387	9814	40016	20791	86915
Bihar	4018	216312	98285	230402	180123	474288
Chhattisgarh	857	31769	5092	28579	8146	55333
Goa	11	NC	100	1157	381	2926
Gujarat	483	NC	0	37162	865	81950
Haryana	229	NC	0	7484	0	12553
Himachal Pradesh	113	NC	0	130	0	76
Jammu and Kashmir	449	*	0	5504	0	12106
Jharkhand	1528	46759	20179	54857	30881	97820
Karnataka	667	NC	636	34878	10252	87299
Kerala	140	NC	511	16998	1659	42122
Madhya Pradesh	2216	93387	29917	95216	46285	173411
Maharashtra	744	NC	10900	93250	23655	194110
Manipur	15	*	0	1294	0	2811
Meghalaya	52	*	1093	4879	3258	12654
Mizoram	5	*	0	115	0	244
Nagaland	7	*	0	564	0	1148
Odisha	1016	59476	15972	51816	22692	93563
Punjab	224	NC	6992	21466	10715	38190
Rajasthan	1766	72493	8476	51154	25103	125448
Sikkim	5	NC	0	37	0	8
Tamil Nadu	700	NC	0	33419	976	75175
Tripura	23	*	1607	4983	3115	10397
Uttar Pradesh	5040	146326	36911	173333	96865	401488
Uttarakhand	197	NC	0	3001	0	6422
West Bengal	2359	89619	58070	141935	103839	284039
Special Category States*	-	45992				
Total	**24068**	**851520**	**307436**	**1170963**	**576050**	**2397722**

Note: NC= Not Considered for transfers

It realized that the lagging States could not adhere to the centre-state resource sharing arrangement of the Sarva Shiksha Abhiyan mainly

due to lack of fiscal capacity. States were mandated to contribute 50% of the SSA expenditure from their own resources, but several States' could not contribute more than 35%. Thus, it gave grants that were equal to 15% of the estimated SSA expenditure. Transfers estimated by this study is 13 times and 49 times more than the transfers given by the 13th FC based in benchmark 1 and 2 respectively.

Bose et al. (2020) identified 16 States where the expenditure gap is more than 1% of GSDP and estimated transfers for only these States. Transfers estimated by our study is 0.68 times (benchmark 1) and 2.8 times (benchmark 2) of the total transfers estimated by Bose et al. (2020b). It is noted that the transfers estimated by our study is much more equalizing and seems to be quite reasonable when compared to the existing literature.

Equalization Transfers for General and Special Category States

Prior to the 14th FC, Indian States were classified into General Category States (GCS) and Special Category States (SCS). SCS were given additional transfers because they faced certain geographical and socio-economic disadvantages. One may argue that the General and Special Category States must be treated differently while estimating the transfers. Table 8 presents the panel data estimation of the elementary education expenditure functions, separately for GCS and SCS. In the GCS, per capita GSDP, transfers, percentage of rural population, percent of enrolment in private schools, percentage of students with special needs, teacher pupil ratio, and percent of schools with ramps have positive and significant impact on per student public expenditure on elementary education while percent of SC/ST students and percent of children in elementary schooling age (6-13 years) have a negative and significant effect on per student public expenditure on elementary education. In the case of SCS, own tax revenue, transfers, percentage of enrolment in private schools, teacher pupil ratio, percent of schools with girls' toilet, and percent of schools with ramps have positive and significant impact on per student public expenditure on elementary

education whereas the other variables were not significant and hence dropped from the model.

Table 8: Estimation Results of Elementary Education Expenditure Functions for General Category and Special Category States

VARIABLES	Special Category States	General Category States
ln GSDP	-	0.6525*** (0.1100)
ln OTR	0.3535*** (0.0991)	
ln total transfers	0.2335*** (0.0641)	0.2331*** (0.0452)
% of Rural population	-	0.0232*** (0.0049)
% of SCST children	-	-0.0108** (0.0050)
Percent of population aged 6-13 years	-	-0.0380*** (0.0141)
% of enrolment in private schools	0.0150*** (0.0035)	0.0156*** (0.0018)
% of students with special needs	-	0.0379*(0.0199)
Teacher -pupil ratio	4.9152*** (1.7333)	4.1602**(1.8002)
% of schools with Girls' toilets	0.0045*** (0.0017)	
% of schools with ramps	0.0040* (0.0025)	0.0036*** (0.0010)
Constant	3.3009*** (0.9069)	-1.6155(1.4516)
Hausman Test p- value	0.2175	0.9927
BPLM Test p-value	0.0000	0.0000
Model	Random Effects	Random Effects
R- square	0.7500	0.7934
Observations	132	204
Number of States	11	17

Note: *** p<0.01, ** p<0.05, *p<0.1; standard errors are in parentheses.

The equalization transfers for SCS and GCS determined based on the estimated results in Table 8 and the two benchmarks are shown in Tables 9 and 10. Assam, Meghalaya, Tripura and Jammu and Kashmir have larger transfers need among the SCS based on both benchmarks, while Bihar, West Bengal, Uttar Pradesh, Madhya Pradesh, Maharashtra and Jharkhand have the larger transfers needs among the GCS in both benchmarks. Based on the All-States' Average Benchmark, the combined (GCS + SCS) additional Central Government transfers (real) needed for elementary education was ₹23,772 crore (0.31% of GDP) in 2009-10, which increased to ₹51,316 crore (0.38 % of GDP) in 2020-21. Based on the top 3 States' Average Benchmark, the combined transfers estimates were ₹70,121 crore (0.92% of GDP) and ₹1,65,229 crore (1.22% of GDP) in 2009-10 and 2020-21, respectively.

Table 9: Equalisation Transfers Required (Real) for Elementary Education for SCS and GCS during 2009-10 to 2020-21 based on respective All States' Average benchmark (in ₹. Crore)

States	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Special Category States (SCS)												
Arunachal Pradesh	98	106	110	158	152	109	128	89	87	109	81	60
Assam	2261	2147	3039	3309	4497	5339	5331	6448	6141	6829	7146	7415
Him.Pradesh	0	0	0	0	0	0	0	0	0	0	0	0
Jammu & Kashmir	19	0	0	0	0	52	0	0	0	32	93	252
Manipur	31	0	0	0	0	0	6	31	0	29	11	2
Meghalaya	398	375	357	447	505	625	695	773	922	1034	1059	1104
Mizoram	17	0	0	0	0	0	0	0	0	0	0	0
Nagaland	0	0	0	0	0	0	10	0	0	0	0	0
Sikkim	0	0	0	0	0	0	0	0	0	0	0	0
Tripura	302	258	283	285	314	322	485	567	625	601	610	630
Uttarakhand	0	0	0	0	0	0	0	0	0	0	0	0
SCS Total	**3127**	**2885**	**3790**	**4199**	**5468**	**6448**	**6655**	**7908**	**7775**	**8634**	**9000**	**9462**
SCS Benchmark	11755	13853	13943	16942	17986	20570	22943	25955	27923	30212	31030	31929
General Category States (GCS)												
Andhra & Telangana	0	0	0	0	0	0	0	0	0	0	0	0
Bihar	7621	9819	9896	10583	11769	13973	17392	18077	16481	15091	16013	16350
Chhattisgarh	582	768	741	897	615	684	804	716	960	1094	1270	928
Goa	0	0	0	0	0	0	0	0	0	0	0	0
Gujarat	0	43	0	0	0	0	0	0	0	0	0	0
Haryana	0	0	0	0	0	0	0	0	0	0	0	0
Jharkhand	2499	2486	2361	2501	2735	2799	3337	3234	3110	3232	3415	3437
Karnataka	0	0	0	0	0	0	0	0	0	0	0	0
Kerala	0	0	0	0	0	0	0	0	0	0	224	179
Mad.Pradesh	2278	3162	2976	3166	3437	3450	3192	2934	3294	2990	3358	2856
Maharashtra	1562	1806	1253	627	778	470	1052	548	1079	706	1129	1145
Odisha	695	679	1042	1327	1131	1362	1290	1013	652	574	480	519
Punjab	0	0	0	0	0	0	0	0	0	0	0	0
Rajasthan	0	0	0	0	0	0	0	0	0	0	0	13
TamilNadu	0	0	0	0	0	0	0	0	0	0	0	0
Utt. Pradesh	1878	2190	2638	2700	2620	3311	3773	3823	6334	6698	8352	8574
West Bengal	3531	4534	4002	5029	5228	5880	6381	7098	7592	7220	8438	7853
GCS Total	**20646**	**25486**	**24909**	**26829**	**28313**	**31930**	**37220**	**37443**	**39502**	**37607**	**42679**	**41854**
GCS Benchmark	7453	8607	8466	9431	10138	11394	12976	14250	15550	16874	18019	17340
Total(SCS +GCS)	**23772**	**28371**	**28699**	**31028**	**33782**	**38378**	**43875**	**45351**	**47277**	**46241**	**51678**	**51316**
Estimates used in the Study (based on table 4 and 5)												
Benchmark	9290	11376	10651	12336	13406	15269	17087	18858	20746	22145	23787	23856
SS Total	1414	1420	1986	1915	2808	3364	3357	4017	3987	4387	4858	4748
GS Total	42279	50764	46347	52304	58043	66590	74618	80518	87144	86131	92862	98080
Total (SCS+ GCS)	**43693**	**52184**	**48333**	**54219**	**60851**	**69954**	**77975**	**84535**	**91131**	**90518**	**97721**	**102828**

Source: Author's Estimation. Benchmarks are given in ₹ per student per annum

Table 10: Equalisation Transfers (Real) Required for Elementary Education for SCS and GCS during 2009-10 to 2020-21 based on respective Top 3 States' Average benchmark (in ₹. Crore)

States	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Special Category States (SCS)												
Arunachal Pradesh	309	224	271	361	373	346	404	344	330	367	336	351
Assam	5442	3935	5760	6778	8718	9872	10262	11931	11245	12908	13384	14121
Him. Pradesh	471	0	0	0	0	0	0	0	0	0	0	28
Jammu & Kashmir	968	388	574	731	863	1011	997	1114	1071	1305	1366	1581
Manipur	178	68	101	179	213	187	253	271	210	289	271	280
Meghalaya	853	637	703	886	1016	1190	1391	1488	1705	1891	1947	2061
Mizoram	154	42	99	144	78	82	86	84	79	95	96	143
Nagaland	120	22	91	113	164	149	196	114	106	84	71	83
Sikkim	0	0	0	0	0	0	0	0	0	0	0	0
Tripura	756	502	608	707	772	807	1043	1157	1202	1229	1239	1269
Uttarakhand	698	82	256	317	327	355	530	604	638	525	628	461
SCS Total	**9951**	**5899**	**8464**	**10217**	**12526**	**13998**	**15164**	**17105**	**16587**	**18693**	**19339**	**20379**
SCS Benchmark	19320	18218	19691	24504	26590	29914	34103	38253	40293	44723	45934	47729
General Category States (GCS)												
Andhra & Telangana	547	461	510	1119	1275	803	899	995	1097	1739	2224	2804
Bihar	14503	17488	17976	18803	21231	24170	31018	31993	30514	30189	34303	34179
Chhattisgarh	1946	2260	2252	2544	2317	2416	2888	2902	3389	3840	4563	3983
Goa	30	11	0	17	56	46	43	52	90	132	186	165
Gujarat	2004	2362	2291	2589	2677	2677	3617	3474	3699	4183	5264	4941
Haryana	28	0	0	0	0	0	0	0	0	0	0	0
Jharkhand	4584	4680	4574	4850	5237	5332	6454	6330	6526	7165	8091	7788
Karnataka	146	455	857	1156	1248	1191	1608	2029	2167	2968	3788	3513
Kerala	764	1047	425	47	0	433	728	933	1383	2218	3172	2957
Mad.Pradesh	6069	7339	7084	7570	8033	7883	8287	8192	9018	9328	11069	9823
Maharashtra	6637	7173	6443	6196	6767	6620	8558	8538	9878	10945	13617	12382
Odisha	2686	2895	3310	3789	3759	4087	4603	4518	4416	4836	5626	5254
Punjab	645	383	491	191	419	218	621	660	339	275	180	0
Rajasthan	2121	2017	2048	2532	2145	1536	2797	3351	4081	5314	6565	6736
Tamil Nadu	0	0	1874	1699	1606	2116	3149	3597	2216	2660	3452	2886
Uttar Pradesh	9084	9907	11149	12105	12497	13339	15943	16731	21228	23372	28991	28237
West Bengal	8376	9801	9282	10751	10925	11762	13566	14467	15882	16584	20377	19202
GCS Total	**60170**	**68281**	**70566**	**75959**	**80194**	**84628**	**104781**	**108763**	**115922**	**125749**	**151468**	**144850**
GCS Benchmark	11075	12526	12344	13725	14816	16332	19184	21043	23255	26069	29448	27907
Total (SCS+GCS)	**70121**	**74180**	**79030**	**86176**	**92719**	**98626**	**119944**	**125868**	**132509**	**144243**	**170807**	**165229**
Estimates used in the Study (based on table 4 and 6)												
Benchmark	19381	20397	19996	23236	27088	31403	36040	40529	45127	48312	50886	51500
SCS Total	9259	7610	9255	10096	13592	15914	17316	19661	20730	21832	22754	22983
GCS Total	169565	162719	170695	193009	231220	266582	306271	334088	358888	362469	375499	392625
Total (SCS+ GCS)	178824	170328	179950	203105	244812	282496	323587	353750	379619	384302	398253	415608

Source: Author's Estimation. Benchmarks are given in ₹ per student per annum

It is noted that the total estimated transfers needs are less when separate models (expenditure functions) are used for GCS and SCS. Given that currently India allocates only 1.3% of GDP on elementary education, additional transfers of 2% – 2.7% (as recommended in tables 4 and 6) would increase public elementary education spending to the desired level[9]. Further, table 4 shows that the benchmarks used in the study are quite comparative to that of the Kendriya Vidyalayas and Bose et al. (2020b). The SCS benchmarks are quite close to the benchmarks used in the study (i.e., SCS benchmarks are 1.3 times of benchmark 1, and 0.9 times the benchmark 2). However, the GCS benchmarks are almost half of the benchmarks used in the study (0.7 times of benchmark 1 and 0.5 times of benchmark 2). This would penalize the lagging GCS States.

Further, the separate analyses lead to additional transfers to certain SCS that already have a considerably high public spending. For example, Arunachal Pradesh had a per student expenditure of ₹ 71,405 crore in 2020-21 (3rd highest among all the States) and it may not require additional transfers. The classification also reduce the transfers going to the needy GCS like Bihar (from ₹27842 crore to ₹16350 crore), Uttar Pradesh (from ₹19265 crore to ₹8574 crore), West Bengal (from ₹16795 crore to ₹7853 crore). In addition, the Central Government already compensates the SCS by giving additional transfers through the centrally sponsored schemes (the Centre-State resource sharing arrangement under Samagrah Shiksha Abhiyaan for SCS is 90:10 as against 60:40 for GCS).

CONCLUDING REMARKS

The Government of India is committed to universalize elementary education. However, huge interstate disparity exits in public expenditure

[9] The Kothari Commission, 1964 recommended that India should allocate 6% of GDP to the education sector. Typically, half of the total education expenditure is allocated for elementary education. Therefore, a targeted allocation of 3% of GDP to the elementary education sector is justifiable.

on elementary education. This study has attempted to address this problem of horizontal fiscal imbalances in the allocation of public resources to elementary education. Specifically, it has examined the impact of transfers on per student expenditure incurred by 29 Indian States on elementary education and determined empirically the fiscal equalization (additional) transfers required for them from 2009-10 to 2020-21. It has employed a methodology similar to ATM framework and using two benchmarks (all States' average real per student public expenditure on elementary education: Benchmark 1, and top 3 States' average real per student public expenditure on elementary education: Benchmark 2).

Results show that per capita GSDP, grant-in-aid and tax devotion are the key economic determinants of public elementary education expenditure and they all have a positive impact, indicating that States having more fiscal capacity allocate more funds to elementary education. The estimated magnitudes of per capita GSDP coefficient and grant coefficient indicate the absence of flypaper effect. This means that the elementary education expenditure fails to respond to unconditional Central transfers. This finding suggests that the Finance Commission must give specific-purposes transfers to States for elementary education. Bose et al., (2020b) also made similar recommendations.

Larger percent of private school enrolment induces State Governments to incur more expenses on elementary education. This may be a demonstrative effect. The percent of the population in elementary schooling age (6 to 13 years) has a negative and significant effect, implying that States having more children in elementary schooling age incur less expenditure and must receive assistance to boost their spending. Despite special programs for children from the disadvantaged communities like, Tribal Area Sub Plan, Special Component plan for SC, Special Central assistance to SC etc., percent of SC-ST children and children with special needs do not impact States' elementary education

expenditure, suggesting a scope for revaluation and revision of these programs.

As per benchmark 1, the total additional Central Government transfers (real) needed for elementary education was ₹43,693 crore (0.57% of GDP) in 2009-10, which increased to ₹1,02,828 crore (0.76% of GDP) in 2020-21. According to benchmark 2, the total transfers (real) requirement was ₹1,78,824 crore (2.3 % of GDP) in 2009-10 which increased to ₹4,15,608 crore (3% of GDP) in 2020-21. These estimates are quite reasonable when compared to the Government's targeted allocation of 6% of GDP to the education sector (GOI, 2020b). Currently, only 1.3% of GDP is spent on elementary education and the additional transfers may increase public spending on elementary education to the targeted level. Given the magnitude of the Centre' budget, these additional amounts may not pose a problem.

The results also indicate that the finance gap is the largest in Bihar followed by Uttar Pradesh and West Bengal. Except Assam, the other north eastern States have a relatively small finance gap. While the quantum of transfers vary in two different benchmarks, relative ranking of States remains the same. In the separate analyses for Special Category States and General Category States, total equalization transfers required come down significantly. Given the Government's targeted allocation of 6% of GDP to the education sector, the transfers based on the combined model may be more relevant than the transfers based on separate analyses for SCS and GCS.

The findings of the study are similar to the findings of recent literature. However, the methodology used here is much more comprehensive and the transfers estimates are more equalizing and reasonable. It is noticed that the focus of the study is solely on expenditure side equalization and the extent of actual transfers is subject to resource availability. Given the multiplicity of services provided by the States, revenue equalization exclusively for the elementary education

sector is a futile task. The Australian Transfers Mechanism suggests a macro base for revenue equalization and gives importance to expenditure equalization for services. The findings of this study will be useful to policymakers, international agencies, and other researchers to formulate appropriate strategies and to design equalization transfers for Indian States.

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