

# Chapter 11

## Impact of Public Education Expenditure Across Different Levels on Higher Education Access in India: A Panel Data Study



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### Introduction

The idea, approach and context of the goals of higher education should keep evolving in order to be in coordination with the rapidly changing global and national challenges. Increasing access and equity are two of the globally accepted goals of higher education. Along with the socio-political commitment, it is finances which are of extreme importance for the realization of these goals. As India is the youngest nation of the world and sits on a demographic goldmine, the future of Indian higher education highly depends on how India will design its access policies and its approach towards financing the same. This chapter analyses the impact of educational finance on higher education access in India and advocates evidence-based policy-making for the cautious shaping of the future of Indian higher education.

Competition for creating comparative advantage in terms of human capital has been increasing globally. Therefore, over the past decade, the elite-centric nature of higher education has rapidly diluted in favour of the evolution of its mass-centric slant across the world. In India, the enrolment ratios have more than doubled from 9.97 in 2004–2005 to 24.5 in 2015–2016. As per Johnstone, this worldwide expansion of higher education has occurred not only because of growing individual demand for higher education but also because of national goal to achieve social justice and enhance competitiveness in global economy (Johnstone 2004). Thus, States play a fundamental role in college access and have the primary responsibility for providing education and ensuring equity in post-secondary education (St.John et al. 2004).

Another worldwide emerging trend in education finance is the reluctance of governments to subsidize the massification of higher education. There is gradual departure from the traditional approach of low or free tuition for higher education towards

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market-oriented strategies like privatization and student loans. Now the key issue that arises is how to finance the access to higher education considering the issue of equity and diminishing public resources for education sector across all the levels in proportion to rising demand. The analysis which can partially help Indian Government to understand and answer this question is the impact of public education expenditure on higher education access in India. This is what this chapter has endeavoured to offer.

Education is organized in a hierarchical manner, and financing lower stages is a precondition for attaining higher education (Su 2006). The state and private investments at the elementary and secondary level create the cohort, which is the potential demand group for higher education. Therefore, issues of financing the higher education access cannot be studied independently ignoring the influence of the education finance at elementary and secondary levels. The policies that the government use to finance all the three levels of education influence the college access directly. This chapter caters only to the public spending across the levels of education and hence tests the hypothesis that the expenditure allotted by state governments to elementary, secondary and tertiary education, along with per-student public spending on these three education sectors, affects the higher education access in India. The chapter also analyses how this relationship between public education finance and higher education access differs across different social groups (females, scheduled castes and scheduled tribes) and for high-income states.

As the context for this study has been set in this section, the next Section “[Theoretical background](#)” discusses the theoretical support weaved out of the selected literature available on the impact of finance policies on the higher education access. Section “[Methods and data](#)” deals at length on the methodology adopted to conduct this study followed by the results, comparative analysis and discussion in Section “[Results of fixed-effect estimations](#)”.

## **Theoretical Background**

Section “[Impact of public education finance on college access](#)” tailors out a brief narrative based on selected studies related to the impact of educational finance on higher education access. Section “[Literature gap and research objectives](#)” discusses the literature gaps and resulting research questions.

### ***Impact of Public Education Finance on College Access***

The policies that states use to finance education influence financial access (St.John et al. 2004). Numerous studies focus on the role of the education finance policies which shape up the students’ economic needs to finance their higher education access (Blondal et al. 2002; Johnstone 2002; Palfreyman 2004; Dolton et al. 1997; Vossensteyn 2004). These research studies have validated the notion that increase in

tuition costs hampers the higher education access across the countries, predominantly for students from disadvantaged backgrounds, which may lead to social exclusion. Barr (1993) highlighted the negative effects of reduced grants on higher education access of low-income students, the most financially needy. Mitra (2015) has argued that at all-India level, there is pro-rich distribution of subsidy at the higher education level. With respect to the impact of student loans on higher education access, Shen and Ziderman (2009) argue that whether a loan programme successfully promotes college access has not been clearly defined, and the evidence did not indicate any high degree of success in increasing the university access of the poor. The study by Yang and McCall (2014), while examining the relationship between education finance policies and higher education access among 86 countries from 1998 to 2009, has concluded that for a fixed amount of total budget and rising demands for higher education, various nations have reduced spending per college student and drawn on more private resources to expand higher education access. In addition, some research studies have explored the effect of net college cost, that is, grants minus tuition (Heller 2006; Palfreyman 2004). They find that as the costs of college are shifted from the government to the students, it is the lower income students who are most likely to be forced out of higher education, or at the very least forced to attend lower-cost or less-prestigious institutions. Thus, the literature on the impact of educational finance on higher education access mostly indicates the importance of the public expenditure on education as indispensable for promoting college access, especially among the socially and financially weaker section.

### *Literature Gap and Research Objectives*

Various studies to assess the impact of state financing policies on higher education access (Dresch 1975; St. John and Asker 2003; Daun-Barnett 2008) have been conducted mainly in the USA. St. John (2006) uses fixed-effect models to analyse state indicators and examines the relationship between the adoption of new education policies and related outcomes (e.g. college-going rates) across the 50 states in the USA. By modifying the analytical framework based on panel data model developed by St. John (2006), Lijing Yang and Brian McCall (2014) develop a strong framework to attain a macro view of the relationship between the world education finance policies and higher education access in 86 countries across the world. The contributions of these studies along with the studies mentioned in Section “[Impact of public education finance on college access](#)” have been very enriching in analysing the trends of higher education access along with public spending policies for education at the international or national level. But in the context of India, none of the existing research has provided inter-state empirical evidence as to whether or to what extent the public expenditure on education across different levels has promoted higher education access in 28 states of India in the past decade. Therefore, this study aims at employing the panel data econometrics to trace the impact which public education expenditure has on higher education access in India.

There are three main reasons which specifically carve out the rationale for this study of the impact of public expenditure across different levels on higher education access in India: firstly, changing demography reflected by the falling child population in elementary education, on the one hand, and the youth bulge resulting in greater demand for higher education, on the other hand; secondly, rising aspirations of higher education of burgeoning middle class due to the rapid economic growth; and thirdly, shrinking public resources in social sector, especially education, due to various budget constraints.

Therefore, inter-level distribution of public expenditure on education has a greater significance in addressing increasing aspirations and access for higher education.

In the light of the above arguments, three research objectives form the core of this study area: (1) to study the impact of public expenditure on education across different levels on the higher education access in 28 states of India in the time period of 2004–2005 to 2013–2014, (2) to assess how the relationship between the public expenditure on education and higher education access differs for the states having high Net State Domestic Product (NSDP) per capita (high-income states) from other states and (3) to find out how the public expenditure on education affects the higher education access in states across different social groups, viz. females, scheduled castes (SCs) and scheduled tribes (STs).

## Methods and Data

Following subsections explain in detail the econometric models, variables and the data sources used to achieve research objectives.

### *Econometric Model*

In the case of panel data, two of the most commonly used models are the fixed-effect model and the random-effect model. The fixed-effect model allows state-specific time-invariant effects to be correlated with the independent variables. On the other hand, the random-effect model assumes that a state-specific effect is drawn from a specified distribution and is independent of the other independent variables. Thus, the econometric model which has been used to estimate the impact of the education finance on higher education access in 28 states of India is as follows:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \dots + \beta_k X_{kit} + \mu_i + \varepsilon_{it}$$

where

$Y_{it}$  = Gross Enrolment Ratio (GER) in higher education across 28 states (GER in total for model 1, GER of females for model 2, GER of SCs for model 3 and

GER of STs for model 4 have been used as dependent variables in four different models).

$i = (1, 2, 3 \dots N)$  denotes the  $i$ th state,  $N = 28$ ,

$t = (2004-2005 \dots 2013-2014)$  represents the year,

$\alpha =$  intercept,

$\beta_k =$  coefficients associated with the independent variables  $X_k (k = 1 \text{ to } 9)$ .

$\mu_i =$  state-specific effects which are either random or fixed,

In the fixed-effect model,  $\mu_i$  is part of the intercept, while in a random-effect model, it is considered part of the error term.

$\varepsilon_{it}$  is the error term. By assumption,  $\varepsilon_{it}$  is independent and identically distributed with  $E(\varepsilon_{it}) = 0$  and  $\text{Var}(\varepsilon_{it}) = \sigma^2$ .

A random-effect model has the distinct advantage of being able to capture between-group variation and, if between-group variation does exist, the serial correlation can also be captured. In modern econometric parlance, 'random effect' is synonymous with zero correlation between the observed explanatory variables and the unobserved effect, i.e.  $\text{cov}(X_{it}, \mu_i) = 0$  (Wooldridge 2002). The model may lead to biased results if the random effect is correlated with other independent variables.

Therefore, the Hausman test has been conducted to check the independence assumption of the random-effect model. The Hausman specification test compares the fixed-effect and random-effect models under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model (Hausman 1978).

## Variables

Based on the objectives of the study, brief theoretical framework and the availability of the data, nine independent variables have been formulated to address the three research questions.

To address the first research objective, GER in higher education has been taken as a dependent variable along with the nine independent variables denoting education finance and economic growth. To address the second research objective, the 28 states of India are divided into two categories using the dummy 'A'<sup>1</sup>, where 'A' signifies the top ten states of India based on the NSDP per capita of 2013-2014 (at constant price of 2004) and are denoted by 1, and all the other states are denoted by 0. Nine interaction variables have been created that interact the dummy 'A' with independent variables. These interaction variables allow relationship between

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<sup>1</sup>The states taken as 'high-income states' in descending order of their NSDP per capita (2013-14) are Goa, Sikkim, Haryana, Maharashtra, Tamil Nadu, Gujarat, Kerala, Uttarakhand, Himachal Pradesh and Punjab.

higher education access and public expenditure on education to depend on the level of economic development in the states.

To address the third research objective, GER in higher education for SC, ST and females has been used as a dependent variable. Thus, in total, four different panel models have been generated and results are analysed accordingly. Independent variables used are the same for all the four panel models.

Independent variables identified are as follows:

1. Public spending on elementary education (percentage of NSDP).
2. Public spending on secondary education (percentage of NSDP).
3. Public spending on higher education (percentage of NSDP).
4. Log of per-student expenditure on elementary education in states.
5. Log of per-student expenditure on secondary education in states.
6. Log of per-student expenditure on higher education in states.
7. Log of the NSDP per capita of the states.
8. Proportion of total secondary education budget allocated to scholarships across states.
9. Proportion of total tertiary education budget allocated to scholarships across states.

### ***Significance of the Selected Variables: Essential Clarifications***

Cumulative GER, female GER, SCs GER and STs GER in higher education have been used as dependent variables in model 1, model 2, model 3 and model 4, respectively. Enrolment ratios used in this study are the combination of the enrolment in university and the technical education, which is calculated based on the number of young people in the age group of 18–23 by the All India Survey of Higher Education (AISHE).

There is no denying the fact that GER does not cover the qualitative aspect of the access to higher education like the academic preparation, social, economic or personal impediments faced by the students for attaining higher education, but it fairly provides a macro overview of the proportion of the population enrolled in higher education to that of the population in the relevant age group (18–23) traditionally declared for higher education. The net enrolment ratio (NER) is an alternative measure of access; however, part of the student population is outside the expected age cohort of 18–23. GER is therefore taken as the standard enrolment indicator for higher education access (Azam and Blom 2009). The Five Year Plan (FYP) documents (11th FYP and 12th FYP) also take GER as the indicator of higher education access (GOI 2012). Another argument which demands detailed addressing is that it is logically consistent to study the relationship between the independent variables representing only the public education finance (ignoring private spending on education) and the GER which includes the enrolments in the public, aided as well as unaided private institutes. It is important to note that the investments made by the state in elementary and secondary education prepare the cohort ready to demand

and attain higher education. Students ready for higher education can choose either public or the private institute based on their academic preparation, enrolment policies and the propensity to invest in higher education. Thus, it can be fairly argued that the public finance policies of education have a direct or indirect impact on the overall enrolment scenario in the higher education, be it in public or private institutes. There is only a meagre compromise by not taking the variables of private education finance (consistent data for the same anyhow are not available in cross-section time-series format). There has been effort to compensate this compromise by taking the NSDP per capita as one of the independent variables, which denotes the economic growth and is highly correlated with the individual's propensity to spend on education.

*The independent variables* included in the study are the variables that indicate the state of public funding of education. The main variables representing the public spending on education include budgeted expenditure across all the levels of education as the percentage of NSDP. The significance behind employing this variable is that it allows controlling the general increase or decrease in public expenditure on education across all the levels. Using the public spending on education as the percentage of the NSDP may support the study to capture different dynamics of the state budgetary process than other measures of the state's support to education (Tandberg and Griffith 2013). Thus, it helps in assessing whether the way in which a state prioritizes education in relation to its overall allocation of resources to all social sectors has an impact on higher education access.

The next important finance variable is the per-student expenditure on elementary, secondary and higher education in Indian states. Public expenditure per student measures how much governments invest in each student, not only in the form of student aid like scholarships but also in direction and administration, assistance to universities, government colleges, non-government colleges and engineering colleges and institutes and training. This indicates the role of government in sharing college cost and student unit cost in distributing public resources. The trend in the public expenditure per student across all the levels of education gives an extremely important insight into the proportionate change in the budgetary expenditure and the enrolments across different levels.

Proportion of secondary and tertiary budgets allocated to scholarships has also been taken as the independent variable to find out if these indicators of the government's commitment towards student aids have any influence in promoting access and equity in higher education.

The study uses NSDP per capita for each state (at the constant price of 2004) in the analyses to control for economic differences among the states. The employment of NSDP per capita as an indicator of economic growth is appropriate because it roughly reflects the economic prosperity of the state, average income of the people of the states and hints towards their affordability of higher education.

With the help of these variables, the study tests the hypothesis that the budgetary finance across all the levels of the education influences the GER in higher education in India. The data of these variables are transformed using the natural logarithm to reduce skewness as the NSDP per capita and public expenditure per student at different levels of education are not normally distributed.

## ***Data Source***

The data set for enrolment ratio that has been used in this study is drawn from the online database All India Survey of Higher Education (AISHE) maintained by the Ministry of Human Resource and Development (MHRD) for the years 2010–2011 to 2013–2014. The supplementary source of higher education enrolment data used is the Statistics on Technical and Higher Education for the period 2004–2005 to 2009–2010. The data for the enrolment in the primary and secondary education have been drawn from the state report cards maintained by the Unified District Information System for Education (U-DISE) and the database maintained by the National Institute of Educational Planning and Administration (NIEPA). The gaps have been filled by using the data on enrolments from the appendix of Annual Reports of MHRD for various years. The data on NSDP per capita have been drawn from the database managed by the Ministry of Statistics and Program Implementation (MOSPI). The population for this study includes 28 states (data for all the variables for newly formed state of Telangana are not completely available; hence, it has been excluded from the study) and covers a span of 10 years from 2004–2005 to 2013–2014. Therefore, the study has the panel data set of 280 observations.

## **Limitations of the Data**

Although the data quality has been continuously improvised by the data-collecting agencies, that is, the MHRD, NIEPA and the MOSPI, there are still innate data problems in the variables used in the study. The sample contains a considerable amount of missing data. Since the mechanism of the missing values is assumed to be completely at random, the study tried interpolation methods. The missing data for the scholarships in the secondary and the higher education have been adjusted with the average of the two data points in adjacent years. This dilutes the credibility of the finally generated data set on scholarships.

## **Results of Fixed-Effect Estimations**

As shown in Table 11.1, model 1, model 2, model 3 and model 4 have good explanatory power reflected by adjusted  $R^2$  values, as high as 0.860, 0.863, 0.61 and 0.64, respectively. The Hausman test for model 1 ( $\chi^2 = 51.48$ ,  $p < 0.05$ ), model 2 ( $\chi^2 = 32.36$ ,  $p < 0.05$ ), model 3 ( $\chi^2 = 69.14$ ,  $p < 0.05$ ) and model 4 ( $\chi^2 = 20.52$ ,  $p < 0.05$ ) rejects the random-effect specification, which indicates that the fixed-effect models in all the four cases are preferred over the random-effect model. With the inclusion of interaction effects, the F-test statistics show that the interaction effects are significant for all the four models [model 1 (F (39.24,  $p < 0.001$ )), model 2 (F (40.34,  $p < 0.001$ )), model 3 (F (10.62,  $p < 0.001$ )), Model 4 (F (12.15,  $p < 0.001$ ))].



**Table 11.1** Fixed-effect models of regression on tertiary enrolments (cumulative, females, SCs and STs)

	Model 1 <sup>a</sup> GER	Model 2 <sup>a</sup> GERFemale	Model 3 <sup>ab</sup> GER SC	Model 4 <sup>ac</sup> GER ST
Public expenditure on elementary education (% of NSDP)	-1.28** (0.47)	-1.07* (0.50)	-4.14* (1.80)	-0.38 (1.13)
Public expenditure on secondary education (% of NSDP)	1.36* (0.70)	1.57* (0.75)	4.60* (2.02)	0.37 (1.70)
Public expenditure on higher education (% of NSDP)	7.3*** (1.15)	8.4*** (1.24)	10.12** (3.27)	5.20 (2.78)
NSDP per capita (in constant 2004 INR, log)	24*** (7.05)	26.30*** (7.57)	-9.32** (19.30)	24.27 (16.97)
Public expenditure per elementary student (INR, log)	8.4** (3.02)	6.56* (3.24)	19.10* (9.95)	3.58 (0.62)
Public expenditure per secondary student (INR, log)	0.58 (1.67)	0.35 (1.79)	-1.5 (4.13)	1.03 (4.02)
Public expenditure per tertiary student (INR, log)	-10*** (1.31)	-8.7*** (1.41)	-15.8** (3.43)	-11.23*** (3.17)
Scholarships as the % of budgeted expenditure on secondary education	-0.10 (0.10)	-0.09 (0.10)	-0.06 (0.27)	-0.17 (0.24)
Scholarships as the % of budgeted expenditure on higher education	-0.01 (0.07)	-0.01 (0.08)	-0.35 (0.28)	-0.01 (0.18)
Interaction terms				
High-income states * elementary expenditure	1.2* (0.49)	0.98 (0.53)	4.19* (1.84)	-0.71 (1.19)
High-income states * secondary expenditure	-1.2 (1.56)	-0.65 (1.68)	-10.48** (3.96)	-2.49 (4.22)
High-income states * tertiary expenditure	19.7*** (4.36)	18.16*** (4.68)	16.31 (10.72)	-0.75 (11.06)
High-income states * NSDP	13.04 (9.34)	14.16 (10.02)	37.90 (24.36)	7.01 (23.14)
High-income states * expenditure per elementary student	-5.9 (3.73)	-5.13 (3.99)	-15.31 (11.26)	-11.20 (9.22)
High-income states * expenditure per secondary student	8.02 (6.19)	7.61 (6.64)	12.25 (15.05)	19.68 (16.65)
High-income states * expenditure per tertiary student	-23.15*** (4.07)	-23*** (4.37)	-10.28 (9.98)	-35.06*** (110.75)
High-income states * scholarships in secondary education	-0.37 (0.62)	-0.61 (0.66)	0.56 (1.50)	-0.39 (2.97)
High-income states * scholarships in higher education	-0.63 (0.34)	-0.55 (0.37)	0.09 (0.86)	-2.17* (0.93)
Intercept -	-82 (18.38)	-97.56 (19.77)	-2.02 (45.85)	-72.94 (46.63)

(continued)

**Table 11.1** (continued)

	Model 1 <sup>a</sup> GER	Model 2 <sup>a</sup> GERFemale	Model 3 <sup>ab</sup> GER SC	Model 4 <sup>ac</sup> GER ST
R2: Adjusted	0.860	0.863	0.618	0.64
F-test	39.24***	40.34***	10.62***	12.15***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\*  $p < 0.001$  (two-tailed tests)

<sup>a</sup>Models preferred by the Hausman test; standard errors (S.E) in parentheses, <sup>b</sup>Nagaland, Mizoram and Arunachal Pradesh have not been taken into model 3 due to zero reporting of tertiary enrolment ratios of SCs; <sup>c</sup>Punjab and Haryana consistently have reported zero enrolment for STs, and hence have been dropped from model 4

This implies that the effect of at least one of the education expenditure variables on higher education access differs for the high-incomes states.

### *Comparative Analysis and Discussion*

The results of the panel data models achieve research objectives with some discourse enriching findings. A statistically significant negative relationship between the public spending on elementary education as the percentage of NSDP and higher education access in India has been observed. This study puts forward a prima facie evidence that as funding is diverted from the elementary education, the tertiary enrolment ratios happen to increase for overall ( $\beta = -1.28$ ,  $p < 0.01$ ), females ( $\beta = -1.07$ ,  $p < 0.01$ ) and SCs ( $\beta = -4.14$ ,  $p < 0.01$ ) in India. Proper funding of elementary education is a necessary, if not the sufficient, condition for promoting higher education access if mediated by the highly effective secondary education system. This negative relationship can be explained by two probable reasons. Firstly, low quality and excessive wastage in the elementary education sector of India lead to low elementary-secondary linkage which further impedes the quality (in terms of academic preparation) and quantity of the student cohort ready for higher education. There are many research, which have proved the excessive wastage in the elementary education in India (Ekka and Roy 2014; Bhattacharjee 2015; Kumar et al. 2013). Secondly, excess allocation of public resources to elementary education impedes the investment in secondary and tertiary education under the scenario of the severe budget constraints for education sector. Therefore, when funds are diverted from elementary to secondary and higher education sectors with the vision to attain some balance in funding between different levels, the tertiary enrolments happen to increase.

Another interesting observation in this context is that the negative relation between the public expenditure on elementary level and higher education access in high-income states is extremely low ( $-1.3 + 1.2 = -0.1$ ) in comparison to other states; moreover, the relationship happens to be positive in case of scheduled castes' enrolments ( $-4.14 + 4.19 = 0.05$ ). This hints towards better forward linkages between different levels of education in high-income states as compared to other states.

The study finds a strong positive relation between the public spending on secondary & tertiary education and the overall, female and SCs higher education enrolment ratios. For high-income states, the positive impact of public funding on higher education is much more intense in comparison to other states. This hints towards the policy of reallocating funds from elementary to secondary and higher education to enhance higher education expansion. The diversion of the fund should be such that the spending per elementary student should not be reduced, but rather increased, as the study has registered a positive impact ( $\beta = 8.4$ ,  $p < 0.05$ ) of spending per elementary student on the higher education access. The child population in the elementary age group is gradually falling in India; therefore, the enrolments in the elementary sector are also decreasing. Due to this, the expenditure per elementary student is rising slowly even if the total amount of spending dedicated to elementary education is not rising. The study advocates for the policies focusing on enhancing the per-student expenditure at the elementary and secondary levels, on the one hand, and on the reduction of the wastage in these sectors, on the other. The strengthening of elementary-secondary-tertiary linkage for smooth transition of students across these levels of education is the area to be highly considered.

The negative relationship ( $\beta = -23$ ,  $p < 0.001$ ) between public expenditure per student in higher education and overall gross enrolment ratios in higher education for all the states needs a thorough explanation. It is likely that the competition for higher education resources under fixed budget allocation system may lead to an inverse relationship between public expenditure per student and college enrolment (Su 2006; Yang and McCall 2014). Therefore, the estimated negative relationship provides some evidence that budget levels on higher education are relatively fixed across the states and do not increase proportionately with enrolment levels. Also, the negative relationship between the public expenditure per tertiary student is much more intense ( $\beta = -10-23 = -33$ ) in the high-income states; this explicitly explains that the public budget on higher education in high-income states has been strictly out of proportion in relation to the increase in the number of tertiary enrolment over time. This shows that high-income states are more inclined towards market-based strategies like privatization of higher education for expanding higher education access in comparison to other states.

Consistent with the literature suggesting economic development as a determinant of higher education access, this study reveals NSDP per capita as an important predictor of college enrolment in states during the period of 2004–2005 to 2013–2014. Much of the observed increase in average higher education enrolment ratios appears to be due to the substantial increase in per capita NSDP in the given period ( $\beta = 24$ ,  $p < 0.001$ ). This shows that the affordability of the higher education increases with the increase in NSDP per capita. One of the most serious findings of the study is that the NSDP per capita has a negative impact on SCs tertiary enrolment ratios, whereas the impact on STs' tertiary enrolments is statistically insignificant. This shows that the rapid economic growth is not enough to facilitate SCs' and STs' access to higher education.

Next, the major finding in the context of the impact of NSDP per capita on tertiary enrolments is the statistically insignificant difference between the impact of

NSDP per capita on higher education access in high-income and other states. This simply means that the demand for higher education is increasing almost uniformly across the Indian states along with economic growth, or in more specific words, there is no significant difference in the way enrolment ratios respond to NSDP per capita in high-income states and the other states.

The medium explanatory power of the models assessing the impact of public education finance on SCs' and STs' tertiary enrolment ratios shows that there exist some other important determinants of SC and ST access to higher education which have been omitted in the model. The most important determinant of the higher education enrolments of the disadvantaged groups is the reservation policy. There are various studies, which prove the reservation policy as the dominant factor of higher education access for SCs and STs in India (Weisskopf 2004; Verma 2013; Bagde et al. 2016). Thus, it can be fairly argued that increasing the public expenditure on education is not a very effective policy instrument for strengthening the college access for SC and ST students. There should be targeted spending of student aid and proper implementation of reservation policy in order to enhance or establish a significant relationship between the public financing and enrolment ratios of the SC and ST students.

The student aid is supposed to have a positive impact on the higher education access, especially for the marginalized sections of the society. But in the case of Indian states, scholarships in secondary and higher education as the percentage of total budgeted expenditure on secondary and higher education happen to be statistically insignificant. The most probable reason for such a result is the nature of the data on amount allocated to scholarships in secondary and higher/technical education in India. It is widely misreported and there are significant numbers of missing values, which makes the data set weak for the successful employment in the econometric models.

Finally, this study demonstrates that the use of panel data models can be extremely beneficial for carrying out the future research in the education sector in India regarding themes where cross-section time-series data are available. The unavailability of cross-section time-series data on student loans, the transition rate from secondary to higher education and the need-based and the merit-based scholarships is a big hurdle in providing a complete macro overview of the higher education finance and access in India. Thus, it is suggested that agencies involved in data collection for the education sector in India should improve and expand their data collection and dissemination for all the states so that it can help in realizing the goals of the evidence-based policy-making in the education sector.

## **Concluding Remarks**

The empirical findings from this study suggest that the present pattern of public spending on education has failed to create an ideal linkage between different levels of education when seen from the perspective of impact of public spending on education in facilitating higher education access in India. Thus, this study recommends

that future access policies of higher education in India should target schools to guide students and raise their aspirations for higher education in their early receptive years. The access policies shall also focus on achieving higher levels of academic preparation of students for higher education by improving the quality of elementary and secondary education. There should be investment in confidence building among scheduled castes and scheduled tribes students and a proper distribution of the financial aid information among students belonging to the economically weaker section of the society. Therefore, what is required is that universities and schools must invest in achieving stronger backward and forward linkages and establish sturdier cooperation with schools located in the disadvantaged and rural areas of states.

Thus, there is need for enduring improvements in the overall education system of India. Higher education access and finance policies are going to have a limited impact if they focus merely on the aim of entry to universities or technical institutions. Strong transition within the education system across all the levels and within the stages of higher education is required to provide a wider picture of India's vision of higher education. Along with this, it is highly expected of the Indian state to reconsider its gradual withdrawal of funds from higher education, as the evidence provided in this study strongly show that privatization-dominated access expansion is highly biased against SC and ST students. Even economic growth is not a significant determinant of SC and ST enrolments. Hence, public funding is indispensable for achieving the goals of equity in Indian higher education.

There is a saying that, while driving, one must not look only in the rear-view mirror, but it is equally important to look at the road ahead. Drawing an analogy from this saying, the study finally concludes that the discourse on the access policies and how it is related to the public spending on education in India must be consistently updated with the new challenges emerging from the world of science and technology, international relations, labour market, demography, social and political scenarios and regional differences. The uncertainty engulfing the future of India's labour market due to rising protectionism and digital revolution can highly affect the education finance and higher education access scenario. India shall watch closely!

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