Education and Inequalities in a Post-Liberalized India: An Empirical Study

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Abstract

In this paper, using a panel of 32 states/UTs of India and unit level data drawn from the thick rounds of consumption expenditure surveys (CES) by National Sample Survey Organization (NSSO) between 1993-94 and 2011-12, we first investigate if the efficiency-equity relation in terms of educational outcomes-educational inequality holds true. Next, we examine the relationship between education expansion (characterized by an improvement in educational outcomes and a decrease in educational inequality) and economic inequality. After controlling for economic characteristics, household characteristics, state education policy, age structure, etc., we find a virtuous equity-efficiency relation between educational inequality and educational outcomes. Finally, after controlling for the respective effects of per capita state domestic product, heterogeneity in population, urbanization, state spending policies, occupation structure, etc., it is seen that there exists a positive relationship between educational inequality and consumption expenditure inequality as well between educational outcomes and consumption expenditure inequality. While the former relationship is expected as per our hypothesis, the latter can be explained by a possibility that an increase in returns to education at higher levels of schooling in India led to an increase in economic inequality.

Keywords: Equity-Efficiency Relationship; Educational Outcomes; Educational Inequality; Consumption Expenditure Inequality

1 Introduction

Education is said to be one of the primary channels through which an individual augments her income and such individuals collectively promote the growth and development of an economy. Also, in literature, education has been identified as one of the key vehicles by which income inequality is perpetuated in a society (Stiglitz, 1973) wherein educational inequality (at both supply and demand sides) plays a major role in its generation (Becker & Chiswick, 1966; Mincer, 1974; Ahluwalia, 1976).

It is intuitively clear that at a micro level, education enhances skills of individuals, makes them more employable, facilitates their social and economic mobility, makes them more informed participants in the market economy, and raises labour market participation. Hence, individuals seek higher educational achievements to increase their chances of earning a higher income. However, on the aggregate level, such demand for education doesn't translate into all individuals grouped at the same, highest point of educational attainment (Checchi, 2006). Decreasing returns to education with increasing educational attainment (Becker, 1975; Psacharopoulos, 1994), labour market imperfections, and differences in talent, family resources, and access to education among individuals, in part, explain this disjunction. These supply and demand factors go on to explain the existence of educational inequality and subsequently, of income inequality.

As for the Indian context, since the turn of the decade of the 1990s, with the emergence of economic liberalization and the country's progress towards being a free market economy, income growth has ensued, and shackles have broken in terms of educational participation as well, especially at secondary and tertiary levels. However, uneven distributional effects of these high growth rates have stood out as a cause of concern. The skewed income distribution can be argued to have been preceded by inequalities that got created as certain sections of the society were unable to take advantage of benefits of the growth process as they didn't possess sufficient 'capabilities'. Such inequalities have its origins at the level of uneven distribution of family resources. Next, the inequalities at this starting phase combine with an increase in demand for education (especially higher education) in a new service economy along with limited opportunities in schooling and at higher education institutes. This leads to an increase in the returns to (higher levels of) education and further intensifies social and economic inequality. Education and inequality go hand in hand in a vicious circle and are hence, intimately related.

In the context of this study, inequality refers to economic inequality as well as educational inequality[1]. Apropos the relationship between educational inequality and educational outcomes, it has been observed in Checchi (2006) that countries having higher educational achievements are also the ones that are characterized by an equal distribution of educational attainments in its population. One of the reasons points to the virtuous efficiency-equity relation in educational attainment (Freeman, Machin & Viarengo, 2011). Additionally, it has been formally proven that it is irrational for an individual to continue schooling beyond a certain age (Checchi, 2006). So, with time and beyond a threshold value, as the average educational attainment of a country increases, the dispersion in the number of years of schooling in its population decreases. This happens as the greater majority of the population converges towards the optimal level of education. Let's argue that educational inequalities precede economic inequalities and a more equitable spread of education promotes higher educational outcomes and improves the stock of human capital. This, in turn, advances economic growth in addition to affecting the subsequent distribution of the fruits of that growth. Then, it becomes essential to lay threadbare, in a rigorous manner, the relationships among educational inequality, educational outcomes, and economic inequality to aid policymakers to prescribe strategies to ameliorate the inequalities and improve the outcomes for the society. The society benefits as the growth potential of its population gets realized.

The rest of the paper is organized as follows. We explain the linkages between educational inequalities, educational outcomes, and economic inequalities from the literature in section 2. In section 3, we describe the data, lay down the variables, and discuss the economic framework and the empirical strategy. We present the results in section 4. In the final section, we summarize and conclude.

2 Review of Literature

Becker and Chiswick (1966) and Mincer (1974) propose a human capital model with income inequality. In the model, they contend that both human capital stock (characterized by average years of schooling) and its distribution affect income inequality. In support, through cross-country regressions, Ahluwalia (1976) affirms that improvements in educational

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[1] Educational inequality further refers to inequality in educational attainment (measured by the number of years of schooling) characterized by Education Gini (coefficient). Economic inequality refers to inequality in consumption expenditure or income or wealth, in separate contexts. For our study, though, we characterize economic inequality by consumption expenditure inequality, which in turn is measured by the Gini coefficient.

outcomes (literacy rate and secondary school enrolment) have a beneficial impact on the income shares of the lowest 40% and the middle 40% respectively at the cost of a reduction in the income share of the top 20%. In a similar vein, Gregorio and Lee (2002), via their empirical study based on a panel of 70 advanced and developing countries covering the period between 1965 and 1990, found that more unequal the distribution of education is, higher the income inequality will be. Gregorio and Lee (2002) also found that social spending by the government and an expansion in the average level of education of the population have ameliorative effects on income inequality.

Further lending support to the preceding authors' central thesis is a meta-regression analysis of 64 empirical studies by Abdullah, Doucouliagos and Manning (2011). They find that education increases the income share of the bottom quantiles of earners, decreases the share of the top quantiles of earners and has no effect on the share of the quantile in the middle; expansion of education has an equalizing impact on income inequality. Coady and Dizioli (2017) view education expansion as an increase in average years of schooling and a decrease in the inequality of educational inequality. They investigate the relationship between education expansion and income inequality by addressing the estimation issues of endogeneity across developed and developing nations. The authors find a large positive and statistically significant association between educational inequality and income inequality stably across all specifications. However, although the relationship between educational attainment and income inequality is positive, the same is small and not always statistically significant.

In the converse relationship wherein income inequality impacts educational inequality, Galor and Zeira (1993) start with assumptions of an imperfect credit market and indivisibility of investment in human capital. In such a scenario, an initial gap in income distribution leads to different levels of investment in human capital, further leading to a gap in the educational outcomes.

Through a static model driven by the mechanism of 'signalling' role of education proposed by Spence (1973), Willen, Hendel and Shapiro (2004) show that making education affordable can increase income inequality. This result is in contrast to the general intuition. Willen, Hendel and Shapiro (2004) reason that in the face of credit constraints, only the one with low ability or the one with high ability and low financial resources would go without higher education. Once credit constraints are relaxed, and education is made more affordable, high-ability persons become educated, raise the skill premium and drive down the wage for unskilled workers as they remain uneducated or under-educated.

Next, analogous to Kuznet's inverted U-curve relationship between income level and income inequality, Ram (1990) establishes that as the average level of schooling increases, inequality in education first increases, and then declines in later stages of educational expansion with the peak value occurring at seven years of AYS. Knight and Sabot (1983) explain a similar non-linear relationship between education expansion and income inequality through the two conflicting effects of composition effect and compression effect based on their study in Tanzania and Kenya. Education expansion changes the proportion of labour force that is educated and initially causes an increase in inequality as postulated by composition effect. After hitting a certain threshold, however, due to compression effect, increased supply of skilled labour increases competition in the labour market, decreases the wage premium to higher education and this reduces income inequality.

In contrast to the preceding results, Checchi (2001) obtains a U-shaped relationship between income inequality and average years of education in the population, with the turning point at 6.5 years, translating into a favourable effect of education expansion on income inequality for poorer countries. However, Checchi (2001) cautions against the generalizability of the results and implores them to be interpreted in a specific manner to different regions. He reasons that the overall effect of education would be significant if the starting level of education is lower and expansion of education is done faster.

Through a comprehensive cross-country study on 146 countries from 1950 to 2010, Castello-Climent and Domenech (2014) summarize the scenario yet far. Although human capital inequality has diminished across many regions in the world, the inequality has hardly changed with the income Gini coefficient at a similar level in 2005 as it was in 1960. Hence, even if the living standards of people at the bottom of the income distribution have improved; technological progress and globalization have ushered capital-skill complementarity which has worked towards increasing returns to higher education, thereby offsetting the effects of a reduction in educational inequality. This explains the low correlation between the changes in income and educational inequality (Castello-Climent & Domenech, 2014).

There have been a sizeable number of studies in the Indian context to have separately looked at economic inequality (Deaton & Dreze, 2002; Sen & Himanshu, 2004; Dev & Ravi, 2007; Himanshu, 2007; Bhalla, 2011; Subramanian & Jayaraj, 2013, 2014) and educational inequality (Desai & Kulkarni, 2008; Asadullah & Yalonetsky, 2012; Castello-Climent & Mukhopadhyay, 2013; Agrawal, 2014; Bhakta, 2015). The former set of papers analysed trends in economic inequality (consumption expenditure/income) spanning various periods between 1970 and 2010. The studies differed in their methodologies, the data sources used (most of the

studies used NSSO, some used IHDS), the measures of inequality used (relative, absolute, and intermediate measure of the Gini coefficient, the coefficient of variation, income percentiles and quantiles, etc.), and the questions sought to answer.

The consensus to have arrived from the studies on India is that the inequality in consumption expenditure decreased in the eighties and the early nineties. Since then, the consumption expenditure inequality has seen a rising trend, within states, across states, and between rural and urban areas.

As for educational inequality, while Desai and Kulkarni (2008)'s study examines the efficacy of various positive discrimination policies in India by analysing whether the inequalities in educational attainment between various social groups have declined over time, Asadullah and Yalonetsky (2012) construct three indices to assess changes in inequality of educational opportunity over time and across states in India. Both studies make use of National Sample Surveys conducted during the period between 1983 and 2004. Employing Indian census data from 1961 to 2001 as a benchmark, Castello-Climent and Mukhopadhyay (2013) computed educational attainment levels for a panel of 16 Indian states to assess the link between human capital and economic growth. Through a static and dynamic panel data analysis, the authors establish that an increase in the proportion of the population with tertiary education has a greater positive bearing on growth than a decrease in the share of illiterates in the population. Agrawal (2014) examine the changes in educational attainment inequality for both rural and urban sectors in the major Indian states during the period 1993-94 – 2009-10. Using education Gini and decomposing the overall inequality into within- and between-components through analysis of Gini (ANOGI), Agrawal (2014) note that the overall educational inequality is composed majorly of intra-sector inequality and also that while intra-sector inequality increased during the period of the survey, inter-sector inequality decreased. Finally, Bhakta (2015) makes use of various measures of educational outcomes such as literacy rates, the proportion of the population to have completed higher education, and mean years of schooling and discovers significant disparities in achievements across regions, rural-urban sectors within states, and genders.

Among the studies to have examined the association between economic inequality and educational inequality, Tilak (1979) describes a two-stage filtering process wherein people from differing backgrounds first enter into a given educational level to further proceed to an occupation or economic level. Inequalities exist at both stages in India. Further, Tilak (1979) also points to inequalities in educational attainments, educational opportunity, occupational achievements, and returns to education in India and also lists policy prescriptions to reduce the

magnitude of each of them. Since this study, very few empirical studies exist to have looked at the relationship between inequality and education (outcomes/inequality) in the Indian context.

A recent study by Dev (2016) describes income/assets/expenditure inequality as inequality of outcome and inequality in dimensions such as health and education as inequality of opportunities. Through a careful exposition of inequality trends in income, consumption expenditure, educational outcomes (attendance rates, enrolment rates, attainments, etc.), and certain other macroeconomic indicators across social groups and gender over the past three decades, the author comes up with a few policy recommendations. Based on the trends in economic inequality and inequality of opportunities, Dev (2016) advocates better access to health services and educational institutions along with well-targeted conditional transfers and creation of productive employment opportunities to mitigate economic inequality.

3 Data, Variables, and Empirical Framework

From the discussion on literature so far, we can safely deduce that there is still a gap in our understanding of the linkages among educational outcomes, educational inequality, and economic inequality in the context of India. There have been numerous studies to have analyzed the trends and features of income inequality and educational inequality on a standalone basis and the findings broadly suggest that there has been an increase in economic inequality over the past 25 years. Concurrently, there have been improvements in school participation and educational outcomes. There has also been a decrease in the overall inequality in educational attainments. In this scenario, we attempt to contribute to the literature on education and economic inequality in India in two ways – First, by examining if the virtuous equity-efficiency relationship has bearing in case of educational inequality-educational outcomes. Secondly, by exploring the association between education expansion (characterized by improving educational outcomes and decreasing inequality in educational attainments) and economic inequality.

We consider the cross-section of 32 Indian states and union territories contingent on the data availability for the variables under study. The time-period of the study spans post-liberalization phase from 1993-94 till 2011-12. We use the unit level data of large sample survey rounds on household consumption expenditure conducted by National Sample Survey Organization (NSSO). The data is drawn from five rounds of the survey, i.e. 50th, 55th, 61st, 66th, and 68th, which were conducted in the years 1993-94, 1999-2000, 2004-05, 2009-10, and 2011-12 respectively.

Each NSS Consumption Expenditure Survey (CES) round reports a wealth of information on households and individuals pertaining to identification of household (state, district, urban/rural sector, etc.), household characteristics (household size, principal industry and occupation, religion, social group, land ownership, etc.), individual demographic characteristics (age, sex, marital status, education, etc.), and details on consumption (of food items and non-food items). We aggregate the unit level data at the level of respective states/union territories for the primary variables of this study – educational attainment (mean years of schooling), inequality in educational attainment, monthly per-capita expenditure, and inequality in consumption expenditure. The entire set of variables used in this paper along with their brief descriptions and respective data sources are listed in table 1.

Table 1

Data set – descriptions and sources

Variable	Description	Source
Main Variables		
ays	Educational Attainment - Mean years of schooling	
eai_ovl	Gini Coefficient of educational attainment inequality of the overall population	Constructed from NSSO CES unit level data (50th, 55th, 61st, 66th, and 68th rounds)
eai_lit	Gini Coefficient of educational attainment inequality of the literate population	
mpce	Monthly per capita consumption expenditure at constant prices (Base Year: 2004-05)	
ce_ineq	Gini Coefficient of consumption expenditure inequality	
Control Variables		
gsdppc	GSDP per Capita at Constant Prices (Base Year: 2004-05)	
urb	Urban population (% of total)	
flf	Labour force, female (% of total labour force)	
infra	Road Density - Kilometers per 100 Square Kms	
pop	Population	Centre for Monitoring Indian Economy (CMIE) – States of India
ptr_sec	Pupil-Teacher Ratio (Secondary and Higher Secondary Schools)	
educ_gsdp	Expenditure on Education, sports, art & culture as a proportion of GSDP	
ss_sge	Expenditure on Social Services as a proportion of State Government Expenditure	
os_agri	Occupation Structure - % Share in Working Population (Cultivators and Agricultural Labourers)	

os_hhi	Occupation Structure - % Share in Working Population (Household Industry Workers)	
agri_gsdp	% share in GSDP at Constant Prices (Base Year: 2004-05) (Agriculture, Forestry and Fishing)	
indus_gsdp	% share in GSDP at Constant Prices (Base Year: 2004-05) (Industry)	
serv_gsdp	% share in GSDP at Constant Prices (Base Year: 2004-05) (Services)	
adr	Age Dependency Ratio - Population aged less than 15 and greater than 64 (% of total population)	Derived from NSSO CES unit level data (50th, 55th, 61st, 66th, and 68th rounds)
hhs	Number of persons in a household	

Educational attainment is characterized by a stock variable – mean years of schooling. We construct this variable loosely based on Barro and Lee (2013). We follow Thomas, Wang, and Fan (2001) to assign the following values as years of schooling (educational levels in parentheses) to each individual aged six and above – 0 (illiterate + literate without formal schooling), 2.5 (literate but below primary), 5 (primary), 7.5 (middle), 10 (secondary), 12.5 (higher secondary + diploma/certificate course), 15 (graduate and above). Subsequently, to calculate the average years of schooling for each state/union territory at a given point in time, we apply the following formula –

$$ays_i = \sum_{l=1}^{7} p_i^l y_i^l$$

where, ays_i represents average years of schooling of ith state for a given NSS-CES round, p_i^l denotes population share of persons (aged six and above) at an educational level of *l*, and y_i^l marks the number of completed years of schooling ascribed to the educational level *l*. There are seven educational attainment levels in all.

We measure educational inequality by employing education Gini coefficient. The education Gini coefficient is further based on educational attainment (in years of schooling) of the pertinent population in our study. As an index that measures inequality, the Gini coefficient fulfils four basic properties – scale independence[2], population size independence[3], Pigou-

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[2] For a given set of individuals, if the income of everyone is changed by the same proportion, the inequality remains unchanged.

[3] If two identical distributions of populations are merged, the inequality would not change.

Dalton condition[4], and anonymity[5] (Sen, 1973). Education Gini coefficient can be mathematically stated as the half of the ratio between the average absolute difference of educational attainment of all possible pairs of units (of the population) under consideration and their mean years of schooling.

$$Gini_{EI} = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} |x_i - x_j|}{2n \sum_{i=1}^{n} x_i}$$

where, x_i and x_j is the educational attainments of persons i and j respectively, and there are n persons. However, since educational attainment of individuals in the population are imputed to represent discrete levels, we modify the formula as laid down below –

$$Gini_{EI}^{modified} = \frac{1}{2\mu} \sum_{j=1}^{m} \sum_{k-1}^{m} p_j |y_j - y_k| p_k$$

where $\mu = \sum_{j=1}^{m} p_j y_j$ is the mean years of schooling in a state (assumed here as the unit of analysis); p_j and p_k are the proportions of population at levels j and k respectively; y_j and y_k represent years of schooling for individuals with educational levels j and k respectively; and m is the number of educational levels, and *j=1, 2.....7*. The Gini coefficient thus obtained represents the educational inequality among the adults (aged 15 and above) in the state.

To quantify economic inequality, Gini coefficients are calculated to represent dispersion in consumption expenditure for different states/union territories of India over the five NSS rounds. Although consumption based Gini indices tend to overstate economic inequality, partly due to household consumption smoothing and in part due to social spending by the government, the measure of consumption expenditure is considered to represent "*current and long-run household (and implicitly individual) welfare*" (Filmer & Pritchett, 2001, p. 116).

$$Gini_{CEI} = \frac{1}{2N \sum_{a=1}^{N} z_a} \sum_{a=1}^{N} \sum_{b=1}^{N} |z_a - z_b|$$

where, z_a is consumption expenditure of a person a and N is the size of the sample. Appropriate sample weights have been applied in constructing the preceding three variables.

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[4] If income is transferred from a rich person to a poor person such that their ranks are not reversed decreases inequality of the distribution.

[5] Inequality in the population is independent of any other characteristic of individuals except for their income.

After analysing the respective trends of the three primary variables, we explore how educational inequality is associated with educational outcomes. To do so, we regress mean years of schooling on the education Gini controlling for factors that could have a bearing on the educational outcomes in a panel data set-up.

Even though education is a concurrent subject and the funds come from both the state and the central levels, the onus of utilization of those funds lie on the respective state governments. As a consequence, the level of aggregation of our data is chosen at the state/union territory level. The base regression equation is stated as below -

1. $EO_{it} = \beta_0 + \beta_1 Gini_{it}^{EI} + \gamma_j X_{it} + a_i + \epsilon_{it}$

where, EO_{it} is the mean years of schooling of state/union territory i at time t; $Gini_{it}^{EI}$ denotes Gini coefficient of educational inequality and shall be used in two way – one, for the entire adult population, and two, for only the literate section of the population; X_{it} is the vector comprising of the control variables; a_i captures the unobserved heterogeneity; and ϵ_{it} represents the error term.

Thereupon, we investigate if improving educational outcomes and decreasing inequality in education (together considered as education expansion) mitigates economic inequality or not. The economic logic behind this is given in Coady and Dizioli (2017). The essence of the same is reproduced as follows. In the traditional human capital model, let the earnings of an individual be given by Y_S. Then,

$$Y_S = Y_0 + \beta S + \epsilon$$

where, Y_S is the earnings of an individual with S years of schooling and Y_0 are the earnings of an individual with no formal schooling. Further, β denotes the returns to an additional year of schooling. Now, the spread of earnings among individuals in an economy can be stated as –

$$Var(Y_S) = \bar{\beta}^2 Var(S) + Var(\beta)Var(S) + \bar{S}^2 Var(\beta) + 2\bar{\beta}\bar{S}Cov(\beta, S) + Cov(\beta, S)^2$$
$$+ Var(\epsilon) + 2Cov(\beta S, \epsilon)$$

where, the terms with bar accent represent their respective mean values. From the first two terms in the right-hand side of the equation, it can be argued, ceteris paribus, that an increase in the inequality in schooling (i.e. $Var(S)$) would lead to an increase in earnings inequality. On the other hand, keeping educational inequality and the rest of the factors constant, the effect of improvement in schooling attainment on earnings inequality would depend on the dispersion of returns to schooling and on the relation between β and S, i.e. ($Cov(\beta, S)$). In two cases – one, the rate of return to an additional year of schooling is constant at all levels of education; and two, the rate of return to an additional year of schooling is higher at higher levels of

education – an increase in average educational attainment of an economy clearly leads to an increase in earnings inequality. In the third case (returns to an extra year of schooling is lower at higher levels of schooling), however, the effect of improvement in education achievements on income inequality would depend on the magnitude of $Cov(\beta, S)$ (Coady & Dizioli, 2017).

Following from the previous equation, the empirical relation between education expansion and economic inequality can be probed through variants of the following base specification -

2. $Gini_{it}^{CEI} = \delta_0 + \delta_1 EO_{it} + \delta_2 Gini_{it}^{EI} + \mu_j \boldsymbol{Z_{it}} + \varphi_i + u_{it}$

where, $Gini_{it}^{CEI}$ represents Gini coefficient of consumption expenditure inequality in state/union territory i at time t; $\boldsymbol{Z_{it}}$ is the vector of control variables; φ_i encapsulates time-invariant state/union territory level fixed effects; u_{it} is the error term. At this point, we elicit Knight and Sabot's (1983) exposition of 'composition' and 'compression' effects. Since India experienced relatively lower levels of educational outcomes (a low base) as compared to the developed nations during the start year of our period of study (1993-94), considering the education expansion that followed, we hypothesize there to be an increase in economic inequalities explained by the 'composition effect'.

We check the error structure of our model for heteroscedasticity (Modified Wald Test), serial correlation (Wooldridge's Test), and cross-sectional dependence (Pesaran cross-sectional dependence (CD) Test) to ensure that the estimates are free of biases and apply corrective measures in case one or more assumptions stand falsified.

4 Results

We start our analysis by looking at their raw trends in India in the two decades following the economic reforms of 1991. Overall, educational attainment has improved unequivocally across all states/union territories over the period of this study (Table 2). Except for a couple of cases, all states/UTs have witnessed a 'round-on-round' increase in their population's mean years of schooling. These increases are on the expected lines as most states started the nineties languishing at low literacy levels. Hence, the low base coupled with policy implementations to alleviate the state of education in India contributed to the improvements in average educational outcomes of its population. Supply side factors such as educational expansion policies in form of increases in per capita public spending at various levels of education across states, improving accessibility to education in terms of an increase in number of secondary/higher secondary schools and colleges per unit area, and demand side factors

constituting increases in per capita GSDP on the account of economic growth, changes in sectoral composition of GSDP (increasing share of GSDP in manufacturing and services), etc. also had significant bearing on the upswing of average educational attainments across the Indian states over the time period of this study (Bhakta, 2015).

Table 2

Mean years of schooling of population across states/union territories

State	1993-94	1999-00	2004-05	2009-10	2011-12
A & N Islands	4.889	5.125	6.132	6.110	6.856
Andhra Pradesh	2.771	3.494	4.007	4.968	5.225
Arunachal Pradesh	2.457	3.342	4.705	5.587	5.938
Assam	4.067	4.232	4.953	5.459	5.601
Bihar, Jharkhand	2.576	2.705	3.463	4.037	4.447
Chandigarh	6.587	7.264	8.305	8.615	7.761
Dadra & Nagar Haveli	2.884	3.914	4.479	5.324	5.572
Daman & Diu	5.546	6.190	7.616	8.154	8.611
Delhi	6.604	7.682	7.715	8.138	8.174
Goa	5.764	6.544	7.145	6.815	8.020
Gujarat	3.980	4.540	5.262	5.636	5.750
Haryana	3.733	4.368	5.191	5.681	6.508
Himachal Pradesh	4.005	5.033	5.617	6.568	6.814
Jammu & Kashmir	4.077	4.421	4.939	5.612	5.694
Karnataka	3.635	4.403	5.026	5.748	6.122
Kerala	6.013	6.373	6.957	7.430	7.483
Lakshadweep	4.727	4.993	6.057	6.663	6.935
Madhya Pradesh, Chhattisgarh	2.764	3.237	3.790	4.672	4.905
Maharashtra	4.469	5.193	5.842	6.568	6.772
Manipur	5.144	5.541	6.441	7.359	7.426
Meghalaya	3.615	4.135	4.985	6.061	6.591
Mizoram	5.389	6.064	6.811	6.788	7.021
Nagaland	5.806	5.669	6.713	7.311	8.384
Orissa	2.714	3.333	4.135	4.664	4.870
Pondicherry	5.356	5.869	6.316	7.497	8.022
Punjab	4.122	4.591	5.354	5.799	6.197
Rajasthan	2.518	3.174	3.536	4.122	4.499
Sikkim	3.987	4.222	4.767	5.686	5.216
Tamil Nadu	4.087	4.735	5.451	6.139	6.510
Tripura	4.277	4.240	4.846	4.760	5.085
Uttar Pradesh, Uttarakhand	2.926	3.440	3.901	4.589	4.810
West Bengal	3.593	3.914	4.559	5.071	5.194

All India	**3.467**	**3.996**	**4.591**	**5.226**	**5.493**

As for educational inequality, there has been a secular decrease in the Gini coefficient of educational attainment for the entire population of adults (aged 15 years and above) in all states/union territories (Table 3). In fact, in a majority of the cases, there has been a 'round-on-round' improvement in education inequality situation hinting at the success of compensatory discrimination policies by the government. For many states, the decrease in inequality over the period has been of the order of about 15 percentage points. However, the inter-state disparity in educational inequality is quite discernable. Although it is beyond the scope of our present study, it is important to note that these disparities in outcomes exist along the lines of gender, geographical regions, rural/urban areas, income, and stratification in Indian society across caste, religion and ethnic boundaries. However, educational expansion over previous few decades and intensified affirmative action (both in education and in employment) during the 1990s have ensured bridging of these gaps, especially in primary education (Desai & Kulkarni, 2008).

Table 3

Education Gini for the overall population across states/union territories

State	1993-94	1999-00	2004-05	2009-10	2011-12
A & N Islands	0.455	0.439	0.380	0.383	0.353
Andhra Pradesh	0.718	0.670	0.624	0.552	0.542
Arunachal Pradesh	0.758	0.674	0.537	0.470	0.432
Assam	0.529	0.528	0.435	0.385	0.391
Bihar, Jharkhand	0.741	0.717	0.640	0.601	0.559
Chandigarh	0.426	0.365	0.309	0.310	0.326
Dadra & Nagar Haveli	0.661	0.617	0.564	0.436	0.493
Daman & Diu	0.448	0.407	0.274	0.229	0.294
Delhi	0.429	0.352	0.329	0.295	0.307
Goa	0.443	0.387	0.336	0.355	0.280
Gujarat	0.588	0.542	0.486	0.459	0.444
Haryana	0.611	0.563	0.492	0.466	0.417
Himachal Pradesh	0.569	0.491	0.438	0.379	0.370
Jammu & Kashmir	0.573	0.539	0.519	0.466	0.466
Karnataka	0.635	0.577	0.515	0.464	0.449
Kerala	0.327	0.328	0.297	0.282	0.286
Lakshadweep	0.415	0.390	0.310	0.306	0.297
Madhya Pradesh, Chhattisgarh	0.714	0.661	0.609	0.531	0.517
Maharashtra	0.540	0.484	0.431	0.390	0.379

Manipur	0.483	0.479	0.389	0.310	0.312
Meghalaya	0.558	0.511	0.394	0.308	0.289
Mizoram	0.303	0.279	0.234	0.237	0.248
Nagaland	0.388	0.406	0.334	0.298	0.222
Orissa	0.693	0.646	0.574	0.523	0.497
Pondicherry	0.467	0.420	0.384	0.319	0.310
Punjab	0.582	0.542	0.480	0.457	0.419
Rajasthan	0.738	0.677	0.649	0.598	0.576
Sikkim	0.557	0.526	0.452	0.396	0.432
Tamil Nadu	0.568	0.525	0.471	0.427	0.415
Tripura	0.506	0.502	0.444	0.432	0.414
Uttar Pradesh, Uttarakhand	0.700	0.652	0.602	0.552	0.537
West Bengal	0.592	0.579	0.516	0.478	0.477
All India	**0.637**	**0.594**	**0.539**	**0.493**	**0.478**

Finally, In the case of inequality in consumption expenditure, 27 out of 32 states/union territories have experienced a rise in inequality over the five rounds of the survey (Table 4). Barring the 55th round which has been established as being inconsistent (Deaton & Dreze, 2002) (due to changes in questionnaire design as compared to all other rounds under consideration), we have observed a rise in 'round-on-round' increase in inequality for most of the states/union territories. The 55th round is said to have underestimated consumption expenditure inequality, hence, as compared to the 50th round, 22 of the 32 states/UTs display a fall in the Gini coefficient in the subsequent round. Post economic reforms in 1991, one of the main reasons attributable to rising economic inequality is the rise in skill premium (especially in the urban areas) with the shift in the sectoral composition of the economy towards manufacturing and services. Reduction in public spending (especially in agriculture) combined with systematic neglect of the agriculture sector leading to agrarian distress further added to the economic disparities as a majority of the population still depended (and depends) on agriculture as a source of livelihood. Other reform related reasons include the economy becoming more open to foreign trade and capital flows, and a conservative fiscal policy approach (Basole & Basu, 2015).

Table 4

Economic Inequality (Gini based on Consumption Expenditure) for the overall population across states/union territories

State	1993-94	1999-00	2004-05	2009-10	2011-12
A & N Islands	0.338	0.256	0.379	0.285	0.379

Andhra Pradesh	0.312	0.298	0.345	0.364	0.333
Arunachal Pradesh	0.316	0.305	0.278	0.343	0.386
Assam	0.216	0.245	0.240	0.283	0.267
Bihar, Jharkhand	0.253	0.241	0.259	0.273	0.269
Chandigarh	0.465	0.340	0.369	0.453	0.474
Dadra & Nagar Haveli	0.283	0.330	0.395	0.257	0.415
Daman & Diu	0.238	0.238	0.264	0.297	0.240
Delhi	0.396	0.341	0.336	0.350	0.370
Goa	0.299	0.291	0.373	0.316	0.289
Gujarat	0.279	0.286	0.334	0.343	0.324
Haryana	0.311	0.269	0.355	0.339	0.350
Himachal Pradesh	0.325	0.272	0.328	0.336	0.354
Jammu & Kashmir	0.270	0.217	0.260	0.266	0.293
Karnataka	0.310	0.313	0.361	0.350	0.433
Kerala	0.316	0.304	0.393	0.473	0.444
Lakshadweep	0.281	0.231	0.358	0.356	0.340
Madhya Pradesh, Chhattisgarh	0.315	0.293	0.357	0.351	0.357
Maharashtra	0.376	0.354	0.393	0.409	0.378
Manipur	0.155	0.210	0.170	0.192	0.212
Meghalaya	0.293	0.203	0.213	0.236	0.244
Mizoram	0.198	0.240	0.253	0.269	0.302
Nagaland	0.178	0.212	0.257	0.213	0.248
Orissa	0.282	0.278	0.324	0.326	0.314
Pondicherry	0.304	0.296	0.336	0.335	0.293
Punjab	0.285	0.271	0.351	0.339	0.324
Rajasthan	0.281	0.246	0.303	0.300	0.299
Sikkim	0.234	0.250	0.286	0.292	0.246
Tamil Nadu	0.344	0.366	0.379	0.342	0.345
Tripura	0.257	0.231	0.280	0.256	0.255
Uttar Pradesh, Uttarakhand	0.302	0.282	0.327	0.322	0.341
West Bengal	0.308	0.298	0.353	0.338	0.360
All India	**0.325**	**0.319**	**0.363**	**0.369**	**0.374**

4.1   Equity – Efficiency

In figure 1, we present the graphical representation of relationships between educational attainment and education Gini (of the overall sample and for the literate lot) through a matrix plot. There appears to be a clear negative relationship in both cases: i.e. with falling inequality, there is a rise in educational attainment. This confirms the equity-efficiency nexus.
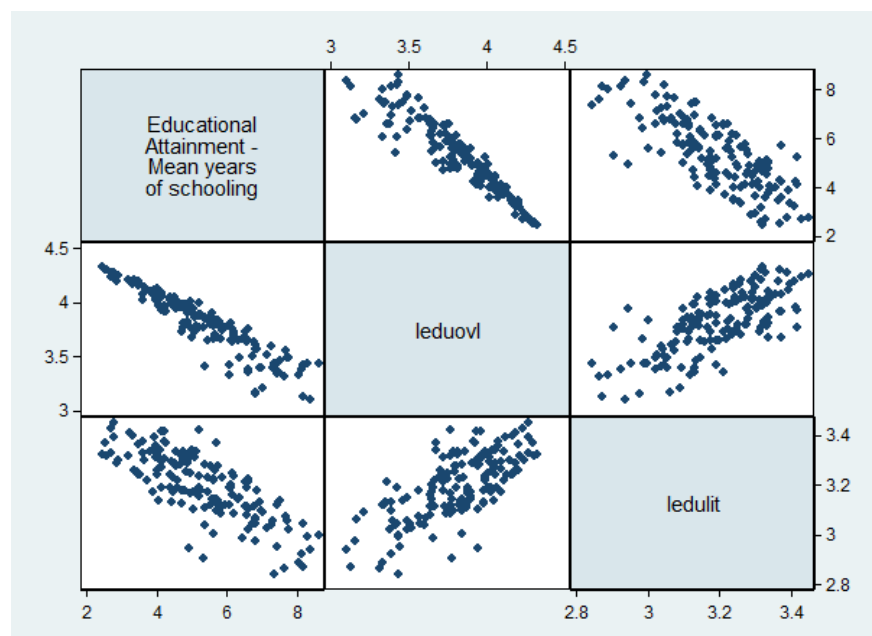
16

Figure 1. *Matrix plot for the relationship between educational attainment and educational inequality*

Notes: 'leduovl' – natural log of Educational attainment Gini for the overall population; 'ledulit' – natural log of Educational attainment Gini for the literates in the population.

4.1.1 Empirical Results

Here, we shall empirically attempt to determine if a state that has lesser inequality in educational attainment also boasts of better educational outcomes. The equity-efficiency relationship for the entire sample of states/UTs is displayed in table 5. Various specifications of equation 1 are estimated with Driscoll and Kraay (1998) standard errors that have been corrected for heteroscedasticity, serial correlation and cross-sectional dependence.

Table 5

Educational Inequality-Educational Attainment Relationship (Dependent Variable "average years of schooling (ays)") – Entire Sample over all five rounds of NSSO

VARIABLES	Model 1	Model 2	Model 3
Natural log of Education Gini (leduovl)	-4.400***	-4.434***	-4.542***
	(0.167)	(0.174)	(0.273)
Natural log of per capita GSDP (lgsdppc)	0.439**	0.412**	0.400**
	(0.082)	(0.073)	(0.085)
Age Dependency Ratio (adr)	-0.0181*	-0.00938*	-0.00797
	(0.005)	(0.003)	(0.005)
Pupil-Teacher Ratio in Middle School (ptr_mid)	-0.00320*	-0.00294*	-0.00243
	(0.001)	(0.001)	(0.001)

Spending on Education as a proportion of GSDP (educ_gsdp)	0.0794**	0.0910*	0.0813*
	(0.016)	(0.022)	(0.021)
Household Size (hhs)		-0.139	-0.0938
		(0.086)	(0.107)
Female Labor Force Participation (flf)			0.00112
			(0.006)
State Effects	FE	FE	FE
N	118	118	113

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001

It can be seen from the coefficients on 'leduovl' that the virtuous equity-efficiency relationship between educational inequality-educational outcomes is statistically as well as economically significant and stable across all specifications. For example, as per column four (Model 3), if Gini of educational attainment decreases by ten percent, we should expect an increase of about a half a year of average schooling attainment in the population. In conformity to literature, the respective coefficients on 'lgsdppc' (per capita GSDP of a state), 'adr' (age dependency ratio), 'ptr_mid' (pupil-teacher ratio at middle level of schooling) and 'flf' (female labour force participation) return expected signs, with some of them being statistically significant at various levels.

In case of 'educ_gsdp' (expenditure on education as a proportion of a state's GSDP), it is expected that higher spending spurs education outcomes (enrolment rates, years of schooling, scores in standardized tests) on the account of better access to schooling, recruitment of more qualified, experienced, and better quality teachers, smaller classrooms (i.e. low pupil-teacher ratio), and influx of other schooling inputs. However, this positive relation may not come through if allocative efficiency is lacking or other factors (e.g. household characteristics) are not controlled for. The same is reflected in literature as Hanushek (1986, 2003) and De and Endow (2008) find no evidence of a systematic relationship between schooling expenditure and student achievements. All the same, there is also literature that suggests a positive relationship between the two (James, King & Suryadi, 1996; Gupta, Verhoeven & Tiongson, 2002; Bhakta, 2014; Obi et al., 2016), especially in developing economies. In our case, we obtain a positive and statistically significant effect of government's spending on education and allied activities on average years of schooling overall specifications. We also include a control variable to account for household characteristics – 'hhs' (Number of persons in a household). The literature is divided on whether there exists a quantity-quality trade-off (Hanushek, 1992; Cobb-Clark & Moschion, 2013) or whether there is no such association between household size and student education achievements (Angrist, Lavy & Schlosser, 2009). For our data, we

do find a negative relationship between household size and education attainment hinting at a quantity-quality trade-off, although the association is not statistically significant.

We check for the robustness of the results by considering two separate variables to denote education inequality - the proportion of the population with five or more years of schooling, and proportion of the population with ten or more years of schooling. The results are listed in Table 6.

Table 6

Education Inequality - Education Attainment Relationship (Dependent Variable "ays") – Entire Sample over all five rounds of NSSO

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
five_ays	0.0653***	0.0654***	0.0662***		
	(0.00406)	(0.00348)	(0.00378)		
ten_ays				0.0662***	0.0682***
				(0.00797)	(0.00822)
lgsdppc	0.654***	0.708***	0.563**	0.823**	0.846***
	(0.0985)	(0.0879)	(0.127)	(0.212)	(0.168)
adr	-0.0303**	-0.0339**	-0.0275*	-0.0238	-0.0406***
	(0.00829)	(0.0102)	(0.0109)	(0.0133)	(0.00820)
ptr_sec	-0.000812			-0.00172	-0.000365
	(0.000710)			(0.00146)	(0.00169)
educ_gsdp		0.0581	0.0743**	0.0197	-0.0100
		(0.0294)	(0.0261)	(0.0391)	(0.0332)
hhs		0.0690			0.308**
		(0.0991)			(0.0856)
ptr_mid		0.00132	0.00153		
		(0.000968)	(0.00108)		
urb			0.0157*		
			(0.00684)		
State Effects	FE	FE	FE	FE	FE
N	130	118	116	118	118

Notes: Driscoll Kraay Standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$; In models 1, 2, and 3, the main explanatory variable is proportion of population with five or more years of schooling. In models 4 and 5, the main explanatory variable is proportion of population with ten or more years of schooling.

A greater proportion of the population with five or ten years of schooling represents greater equality in educational attainment. Hence, the positive and statistically significant coefficient on the two education inequality variables further corroborates the equity-efficiency relationship. For example, an increase in the proportion of the population with more than five years of schooling by 10% is contemporaneously associated with an increase of about 0.65

mean years of schooling. One notable difference in these regressions is the positive and statistically significant relationship between average years of schooling and average household size. That is, on an average, a child with a greater number of siblings obtains more schooling that a child with fewer siblings. Contrary to the resource dilution theory (Becker, 1991), this finding alludes to a possible mechanism where a greater number of siblings share household and labour market work, which in turn releases more resources for children to acquire more education.

4.1.2 Sub-Sample Analyses

The NSS-CES rounds are held quinquennially. However, the interval between the two consecutive thick sample consumption expenditure surveys as part of 66th and the 68th NSS rounds respectively was just two years. Regarding this anomaly, to quote the study description of the 68th NSS round – *"The last survey - the eighth - of the quinquennial series was conducted during the 66th round (July 2009 - June 2010). As it is desirable that a quinquennial survey of household consumer expenditure be conducted in a normal year free from the effects of economic upturns and downturns as far as possible, the 66th round survey of household consumer expenditure is being repeated in 2011-12 as part of the 68th round of NSS."* In addition, the 55th round of NSS was marred by the limitation of not being comparable to the other rounds as the recall period was tweaked[6]. Thus, in the sub-sample analysis, we drop the data pertaining to the 55th and 66th rounds and estimate the same specifications as listed in table 2. The overall period of study remains 1993-94 to 2011-12. The results are listed for the main variables in table A.1.

When compared to the results in table 5, the coefficients on the explanatory variables in table A.1 remain stable and their signs are consistent. This shows our results are robust even when a couple of rounds of data are factored out. Next, we estimate the specifications separately for low-income and high-income states. This distinction is based on per capita net state domestic product at factor cost at current prices data by the Reserve Bank of India. States, where the per capita income is higher than the national average, are termed as the high-income states and the rest are classified as the low-income state. This list is provided in table A.2.

The results, displayed in table A.3 for the high-income states and in table A.4 for the low-income states, show that for both high-income and low-income states, the equity-

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[6] Although the change in recall period mostly affects reporting of consumption expenditure by the households, for the sake of parity with the sub-sample analysis in section 4.2, we omit data from the 55th round as well.

efficiency relationship between educational inequality and educational attainment stands true. The estimated coefficients of the educational inequality variables in case of the high-income states are higher than those estimated for the low-income states. In a state belonging to the high-income bracket, the contemporaneous negative association between education inequality and education outcome is stronger than in case of a state from the low-income grouping. It can perhaps be then said, with certain qualifications, that an attempt to improve educational outcomes by reducing inequality in educational attainment would bear better fruits in a high-income state.

4.2 Education Expansion and Consumption Expenditure Inequality

From the trends visible in tables 2 to 4, the direction of the relationship between educational achievements and economic inequality, and between educational inequality and economic inequality isn't discernible.
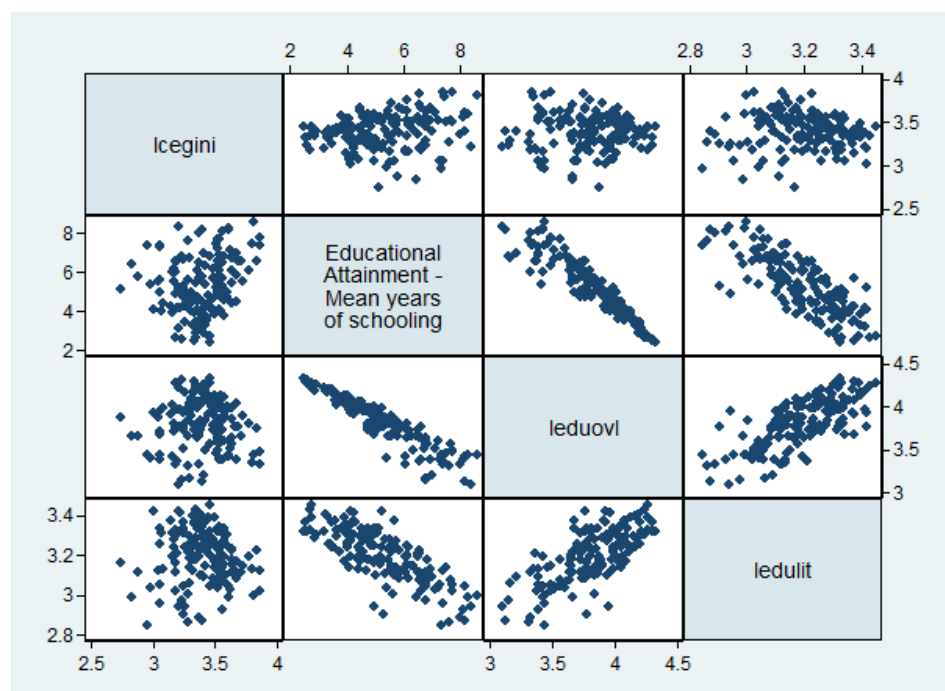

Figure 2. *Matrix plot for the relationship between education expansion and economic inequality*

Notes: 'lcegini' – natural log of Consumption Expenditure Gini Coefficient; 'leduovl' – natural log of Educational attainment Gini for the overall population; 'ledulit' – natural log of Educational attainment Gini for the literates in the population.

Figure 2 plots the relationship between the combinations of 'lcegini', 'ays', 'leduovl', and 'ledulit'. Even here, the three plots in the top row displaying a graphical representation of the associations between the primary variables in this section do not provide any clue about the direction of the relationships. We turn our focus on the empirical results (Table 3) to understand the associations better.

4.2.1 Empirical Results

Table 7

Education Expansion and Consumption Expenditure Inequality (Dependent Variable "lcegini") – Entire Sample over all five rounds of NSSO

Variable	Model 1	Model 2	Model 3	Model 4
Average Years of Schooling (ays)	0.133***	0.115**	0.147***	0.132**
	(0.014)	(0.016)	(0.011)	(0.016)
Natural log of Education Gini (leduovl)	0.467**	0.438***	0.664**	0.588**
	(0.099)	(0.049)	(0.096)	(0.099)
Natural log of per capita GSDP (lgsdppc)	0.721*	0.663	0.362	-0.0655
	(0.244)	(0.462)	(0.269)	(0.454)
Square of Natural log of per capita GSDP (lgsdppc2)	-0.0370*	-0.0353	-0.0188	0.00226
	(0.012)	(0.022)	(0.015)	(0.024)
Urbanization (urb)	0.00792*	0.00582	0.00608	-0.00352
	(0.003)	(0.002)	(0.003)	(0.002)
Natural log of Population (lpop)		0.212	0.144	0.173
		(0.196)	(0.102)	(0.169)
Female Labor Force Participation (flf)		-0.00437		
		(0.005)		
ss_sge			-0.00661**	-0.00593**
			(0.001)	(0.001)
os_agri				-0.00806
				(0.003)
os_hhi				0.000838
				(0.010)
State Eff.	FE	FE	FE	FE
N	137	125	116	113

Notes: Driscoll Kraay Standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$; 'ss_sge' - Expenditure on Social Services as a proportion of State Government Expenditure; 'os_agri' - Occupation Structure - % Share in Working Population (Cultivators and Agricultural Labourers); 'os_hhi' - Occupation Structure - % Share in Working Population (Household Industry Workers)

After controlling for factors such as income per capita, urbanization, female labour force participation, occupation structure among others, there appears to be a positive relationship between consumption expenditure inequality and educational inequality and between consumption expenditure inequality and average years of schooling (Table 7). While the former association follows from the theory specified in section 3, the latter positive association, as elucidated in the same section, suggests that there are either constant or increasing returns to education in India.

The proportion of the population with five/ten and more years of schooling as a measure of education inequality was again considered to check for the robustness of our results. Table 8 lists the estimates.

Table 8

Education Expansion and Consumption Expenditure Inequality (Dependent Variable "lcegini") – Entire Sample over all five rounds of NSSO

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ays	0.0801***	0.0696***	0.0693**	0.0840*	0.0832	0.0467
	(0.017)	(0.012)	(0.016)	(0.036)	(0.041)	(0.035)
five_ays	-0.00351**	-0.00302**	-0.00367*			
	(0.001)	(0.001)	(0.001)			
ten_ays				-0.00368	-0.00366	-0.0012
				(0.004)	(0.004)	(0.004)
lgsdppc	1.074**	0.948	0.962**	0.781*	0.777*	0.710**
	(0.379)	(0.539)	(0.343)	(0.307)	(0.348)	(0.193)
lgsdppc2	-0.0541**	-0.0482	-0.0467*	-0.0400*	-0.0399*	-0.0346**
	(0.018)	(0.026)	(0.019)	(0.015)	(0.016)	(0.010)
urb	0.00785**	0.00523	0.006	0.00847*	0.00851**	0.00627
	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)
lpop	0.0641	0.174	0.0757		0.0084	0.049
	(0.235)	(0.207)	(0.133)		(0.225)	(0.111)
flf		-0.00381				
		(0.005)				
ss_sge			-0.00478**			-0.00443**
			(0.001)			(0.001)
State Effects	FE	FE	FE	FE	FE	FE
N	137	125	116	137	137	116

Notes: Driscoll Kraay Standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$; In models 1, 2, and 3, the main explanatory variable is proportion of population with five or more years of schooling. In models 4, 5, and 6, the main explanatory variable is proportion of population with ten or more years of schooling.

An increase in the proportion of the population with five/ten or more years of schooling means a reduction in schooling inequality. This in turn, as per the results in table 8, is contemporaneously associated with a decrease in consumption expenditure inequality at various conventional levels of statistical significance, at least for the 'five_ays' (proportion of the population with five or more years of schooling) variable. The positive and statistically significant coefficients on average years of schooling in most specifications further strengthen the earlier finding.

4.2.2 Sub-Sample Analyses

The coefficients in table A.5 that are estimated for the same specifications as those in table 7 after omitting the data from 55th and 66th NSS rounds fortify our findings. Even after exclusion of data points, the positive relationship between consumption expenditure inequality and educational inequality (in the overall population), and between consumption expenditure and educational attainment remains true, and statistically and economically significant. To cite an instance, in model three, an increase in average years of schooling by one year contemporaneously increases Gini of consumption expenditure by 17.3%. On the other hand, a decrease of one percent in Gini of educational attainment for the overall population is associated with a corresponding decrease of 0.943% in Gini coefficient of consumption expenditure inequality.

Finally, in tables A.6 and A.7, we report the results when the regression model 2 from section 3 is specified for high and low-income states separately. Although the statistical significance for the associations between the primary variables is lost due to the loss in observations, the economic significance, denoted by the size of the coefficients remains intact, especially for the low-income states. Increase in educational attainment, and educational inequality has a stronger positive effect on consumption expenditure inequality for the poorer states.

5 Summary and Conclusion

Whenever a discussion on poverty and inequality crops up, and policy prescriptions are suggested, reform in education policy is suggested to be one of the main ameliorative means along with financial inclusion, fiscal policy reforms, employment generation, reduction of gender disparities, eradication of corruption, strengthening of institutions, etc. In case of emerging economies, education is touted to be pivotal in reducing inequality, in addition to the role it plays in promoting economic growth. On the contrary, education is also thought to be one of the vehicles by which inequality intensifies in the society. Given this, it becomes important to understand, empirically, the association between education and inequality. We inform this literature in the context of India in two parts. First, we check whether the virtuous equity-efficiency nexus in the case of educational inequality-educational outcomes holds true or not. And secondly, we explore the relationship between economic inequality (characterized by Gini of Consumption Expenditure) and education expansion (denoted by decreasing educational inequality and increasing average educational outcomes). The analysis is

conducted for 32 states/union territories of India spanning a period of about 20 years (1993-94 to 2011-12).

The main variables in this paper are average educational attainment, educational inequality, and consumption expenditure inequality. We start our analysis by looking at their raw trends in India in the two decades following the economic reforms of 1991. In doing so, we employ the five large-sample CES rounds – 50th (1993-94), 55th (1999-2000), 61st (2004-05), 66th (2009-10), and 68th (2011-12) by NSSO.

First, we take inspiration from Summers' (2015) view on Okun's possible stance on expansion in higher education in America leading to both efficiency and equity in contrast to Okun's own theory of a trade-off between equality and efficiency (Okun, 1975). Hence, in the context of education in India, we ask the following question – Does a state with relatively less educational inequality also boast of better education average educational attainment level among its citizens? By applying relevant panel regression methods, we find an evidence of the virtuous equity-efficiency relationship between education (in)equality and educational outcomes. Moreover, this relationship is stronger in the case of high-income states of India. Next, we probe the connection between education expansion and economic inequality. Here, we find that education expansion has an equalizing effect on consumption expenditure inequality through the decrease in educational inequality. However, this effect is offset by the disequalizing impact of the increase in average educational attainment of the population. Given that the consumption expenditure inequality has risen in 27 out of 32 states/UTs during 1993-94 – 2011-12, the net impact of education expansion, keeping everything else constant, has been inequality inducing. This disequalizing impact of rising education levels on economic inequality can be attributed to the increasing returns to schooling at higher levels of education, which in turn is aided by rising skill premium, especially at secondary-tertiary levels. Azam (2010) ascribes this to the mismatch in demand for and supply of tertiary workers during the decades of the 1990s and early 2000s through his study. While the demand shifted outward rapidly on the heels of globalization and the economy liberalizing, the relative supply didn't keep pace and was virtually stagnant during 1993 - 2004. This, in literature, is referred to as 'education race' model where the skill premium rises if the supply of educated workforce does not keep pace with the persistently rising demand for skills (Tinbergen, 1974).

The above findings sit well with Knight and Sabot's (1983) composition effect. Now, to contain the inequality and bring about a threshold from where the compression effect takes over, it is imperative for the government education policies to increase the access of higher levels of education to shore up the skill supply, and more importantly work on reducing the

quality differentials for more equitable education and skill achievements to come through. This is a recurring theme in Autor (2014) wherein he argues that high levels of economic and educational inequality are inimical to economic mobility over time and such inequalities become self-perpetuating. He went on to suggest an overhaul of the entire education system and based on the evidence we have obtained from our study; we prescribe the same. Each level of schooling starting from the pre-school level acts as a feeder to the next level. Hence, for uptake of education and skills to be sound at each successive level, an overall restructuring of the education eco-system (which also includes health systems) is paramount.

Having argued in favour of the above reforms, we, now state a few limitations of our study. First, endogeneity can arise in our specifications as the factors that affect the dependent variables in both parts of our study can affect the independent variables that include education al inequality and average educational attainment. Thus, in future iterations of this work, we shall attempt to find suitable instruments for the endogenous variables and implement IV estimation. Second, we have only worked with the relative measures of inequality. It would be interesting to see how the findings change when absolute measures of inequality are accounted for. Third, in this study, we have explored only the contemporaneous associations between the primary variables. We shall further take up dynamic panel estimation techniques to check the lagged impact of educational inequality on average education achievements and of education expansion on economic inequality and thus associate respective causalities.

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Appendix A

Table A. 1

Educational Inequality-Educational Attainment Relationship (Dependent Variable "ays") – For rounds 50th, 61st, and 68th of NSSO

VARIABLES	Model 1	Model 2	Model 3
leduovl	-4.510**	-4.665**	-4.710**
	(0.216)	(0.238)	(0.321)
State Effects	FE	FE	FE
N	70	70	68

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp'; Model 2 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs'; Model 3 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs', 'flf'

Table A. 2

Classification of High-Income and Low-Income States

High-Income States	Low-Income States
Andaman & Nicobar	Assam
Andhra Pradesh	Bihar, Jharkhand
Arunachal Pradesh	Dadra & Nagar Haveli
Chandigarh	Daman & Diu
Delhi	Jammu & Kashmir
Goa	Lakshadweep
Gujarat	Madhya Pradesh, Chhattisgarh
Haryana	Manipur
Himachal Pradesh	Meghalaya
Karnataka	Mizoram
Kerala	Nagaland
Maharashtra	Odisha
Puducherry	Rajasthan
Punjab	Tripura
Sikkim	UP, Uttarakhand
Tamil Nadu	West Bengal

Source: Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India

Table A. 3

Educational Inequality-Educational Attainment Relationship (Dependent Variable "ays") – For high income states

VARIABLES	Model 1	Model 2	Model 3
leduovl	-5.509***	-5.512***	-5.577***

	(0.317)	(0.295)	(0.315)
State Effects	FE	FE	FE
N	61	61	60

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp'; Model 2 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs'; Model 3 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs', 'flf'

Table A. 4

Educational Inequality-Educational Attainment Relationship (Dependent Variable "ays") – For low income states

VARIABLES	Model 1	Model 2	Model 3
leduovl	-3.917***	-3.987***	-4.136***
	(0.157)	(0.113)	(0.296)
State Effects	FE	FE	FE
N	57	57	53

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp'; Model 2 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs'; Model 3 - 'lgsdppc', 'adr', ptr_mid', 'educ_gsdp', 'hhs', 'flf'

Table A. 5

Education Expansion and Consumption Expenditure Inequality (Dependent Variable "lcegini") – For rounds 50th, 61st, and 68th of NSSO

VARIABLES	Model 1	Model 2	Model 3	Model 4
ays	0.116*	0.102	0.173**	0.169**
	(0.0179)	(0.0255)	(0.0116)	(0.0126)
leduovl	0.467	0.714**	0.943*	0.957**
	(0.187)	(0.0567)	(0.184)	(0.0627)
State Effects	FE	FE	FE	FE
N	81	75	69	68

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'lgsdppc2', 'urb'; Model 2 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'flf'; Model 3 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge'; Model 4 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge', 'os_agri' 'os_hhi'

Table A. 6

Education Expansion and Consumption Expenditure Inequality (Dependent Variable "lcegini") – For high income states

VARIABLES	Model 1	Model 2	Model 3	Model 4
ays	0.0788	0.0869	0.0792	0.0623
	(0.0326)	(0.0453)	(0.0659)	(0.0434)
leduovl	0.261	0.196	0.249	0.160
	(0.251)	(0.375)	(0.483)	(0.384)

State Eff.	FE	FE	FE	FE
N	76	72	61	60

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'lgsdppc2', 'urb'; Model 2 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'flf'; Model 3 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge'; Model 4 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge', 'os_agri' 'os_hhi'

Table A. 7

Education Expansion and Consumption Expenditure Inequality (Dependent Variable "lcegini") – For low income states

	Model 1	Model 2	Model 3	Model 4
ays	0.263*	0.169	0.233	0.244
	(0.0819)	(0.0737)	(0.0940)	(0.111)
leduovl	0.958	0.735	1.041	1.093
	(0.402)	(0.367)	(0.493)	(0.537)
State Effects	FE	FE	FE	FE
N	61	53	55	53

Notes: Driscoll Kraay Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; Control Variables: Model 1 – 'lgsdppc', 'lgsdppc2', 'urb'; Model 2 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'flf'; Model 3 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge'; Model 4 - 'lgsdppc', 'lgsdppc2', 'urb', 'lpop', 'ss_sge', 'os_agri' 'os_hhi'