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Inequality of Educational Opportunity in India: Changes Over Time and Across States

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Summary. — This paper documents the extent of inequality of educational opportunity in India spanning the period 1983–2004 using National Sample Surveys. We build on recent developments in the literature that have operationalized concepts of inequality of opportunity theory and construct several indices of inequality of educational opportunity for an adult sample. Kerala stands out as the least opportunity-unequal state. Rajasthan, Gujarat, and Uttar Pradesh experienced large-scale falls in the ranking of inequality of opportunities. By contrast, West Bengal and Orissa made significant progress in reducing inequality of opportunity. We also examine the links between progress toward equality of opportunity and a selection of pro-poor policies.

Key words — religion, gender, caste, inequality of opportunity, South Asia, India

1. INTRODUCTION

Between-group economic inequality is a common phenomenon in multi-ethnic societies. Such inequalities often reflect persistent differences in the capacity of individuals from different social groups to seize market opportunities, either due to discrimination or market constraints. A society with unequal opportunities is said to be characterized by a low degree of social mobility, in that individuals' economic success/status is largely predictable in terms of family background such as caste and religion. This immobility leads to intergenerational persistence in poverty, with serious implications for the process of development. What is needed is to promote a distribution of human capital where schooling varies along with individuals' level of effort instead of family background and other characteristics for which they cannot be held responsible (Roemer, 1998).

Recently, attempts were made to measure equality of educational opportunity in terms of schooling mobility using comparable household datasets with information on individuals' family background (Behrman, Birdsall, & Székely, 2001; Dahan & Gaviria, 2001; Schütz, Ursprung, & Wößmann, 2008). However, even if we focus exclusively on the instrumental value of education as productivity enhancer, [1] intergenerational correlations serve as imperfect indices of the inequality of opportunity for at least two reasons.

Firstly, they relate a limited set of circumstances beyond the individual's control (usually a parent's value for a wellbeing outcome) to the individual's wellbeing outcome. Thereby attributing too much of welfare inequality to characteristics for which individuals should be held accountable. The idea in the inequality-of-opportunity literature is to account for as many circumstances beyond the individual's control as possible. [2]

Secondly, consider the distributions of well-being conditioned by circumstances beyond individuals' control. If all distributional dissimilarities are deemed to contribute to inequality of opportunity, then intergenerational correlations are inappropriate to measure inequality of opportunity. This is true even in hypothetical societies where just one single parental attribute constitutes the set of circumstances beyond the individual's control. [3] As Yalonetzky (2009b) shows, several joint distributions of parental and offspring's variables can produce the same intergenerational correlations. By contrast, studies like Gasparini (2002), Checchi and Peragine (2005), Lefranc, Pistolesi, and Trannoy (2008), Ferreira and Gignoux (2011), and Barros, Molinas, and Saavedra (2008) have developed and implemented indices that handle multivariate sets of circumstances, which is a minimum methodological requirement for quantifying inequality of opportunity. In this study, we follow an approach similar to that of Ferreira and Gignoux (2011).

The key challenge in measuring inequality of opportunity is to find data on exogenous circumstances for adults and their parents. One of the most widely considered circumstances is parental education. However, no nationally representative large-scale dataset for India provides this information for

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adults (i.e., individuals for whom schooling data are not censored). In the absence of such data, our study focuses on two other commonly studied circumstances, namely, the gender and religion of the individual [4]. Using data on caste, gender, and religion, the objective of this paper is to document the level of and changes in, educational opportunity in contemporary India. To explore the Indian experience of progress in equalizing educational opportunities, we use National Sample Survey (NSS) data spanning the period 1983–2004.

We use four indices – a Pearson-Cramer index, an Overlap index, and two versions of Reardon's index – in order to measure inequality of educational opportunity across Indian states. These indices are equal to zero *if and only if* conditional distributions of well-being are identical across social groups, which is the benchmark of perfect equality of opportunity in one of Roemer's definitions. However, while the Pearson-Cramer index is sensitive to different group sizes, the Overlap index compares "representative agents" from each and every group, independently of size. Therefore, with these indices, we offer results that are consistent with both approaches to group size. In addition, we estimate a segregation index by Reardon that Silber and Yalonetzky (2011, chap. 4) adapted for the measurement of between-group inequality. This index is sensitive to the relative desirability of the variable's ordinal categories (e.g., educational levels). We estimate two versions of it: one for each approach to group size.

Because the study is based on household datasets, we can describe the trends in inequality of opportunity between states and regions. In addition, we study exchange mobility of Indian states and regions in terms of change in inequality of educational opportunity over time. Irrespective of the index used, Kerala stands out as the least unequal state in terms of educational opportunities. However, even after excluding Kerala, significant inter-state divergence persists. Rank mobility analysis confirms substantial exchange mobility in inequality of opportunity across India states. Rajasthan and Gujarat in the West and Uttar Pradesh and Bihar in the Center experienced large falls in the ranking of inequality of opportunities. However, despite being home to sizable poor populations, West Bengal and Orissa, in the East, made significant progress in reducing inequality of opportunity, in absolute and relative terms. Regionally, the Southern, North-Eastern, and Eastern regions experienced upward mobility in terms of decline in inequality of opportunity, whereas the Central region experienced downward mobility.

The rest of the paper is organized as follows. Section 2 sets the context by providing background information on schooling in India. Section 3 explains the methodology and the data. Section 4 discusses presents and discusses the results from the computation of levels and rankings of educational opportunity in the period 1983–2004. Section 5 is the conclusion.

2. STUDY BACKGROUND

India has made significant progress in increasing enrollment and school completion over the past few decades (Kingdon, 2007). Enrollment in primary schools has increased from 19.2 million in 1950–51 to 113.6 million in 2001. Gross primary school enrollment is nearing 100%. Overall enrollment of children in all stages of education in India has improved over the years. Such increase in school participation has been also associated with a significant jump in the literacy rate which rose from 18% in 1951 to 65% in 2001 (Dougherty & Herd, 2008). The growth in enrollment has taken place amidst the introduction of various centrally sponsored educational interventions. Examples include Sarva Shiksha Abhiyan (SSA), [5] the Nonformal Education Program (1979–1990), Operation Blackboard for small rural schools (1986), Total Literacy Campaigns (1988), District Primary School Education Program (1994–2002), and more recently, the mid-day meal schemes. During 1950–1990, the number of schools increased more than three-fold, outpacing the growth of the school-age population. School participation may have responded to these supply-side changes.

Nonetheless, substantial gaps remain in educational outcomes across gender, caste, religion, and between urban and rural inhabitants (Wu, Goldschmidt, Azam, & Boscardin, 2006). Altogether these explain a large part of educational inequality in India; which is not only one of the highest in the world, but has also not declined much in the last three decades (Thomas, Wang, & Fan, 2000). Recent research using multiple rounds of nationally representative data documents the persistence of gender, caste, and religion gaps in school participation and attainment. Comparing data from the 1980s with that from the 2000s reveals that even the later years of the liberalization, that began in 1991, have not been accompanied by a complete closure of social gaps in schooling, which are an important pre-market factor (Asadullah, Kambhampati, & Lopez-Boo, 2009; Desai & Kulkarni, 2008) [6].

While the country has made sizable progress in bringing children from minority social groups to school, striking contrasts remain in educational achievements at the state level. To this end, state governments have undertaken considerable educational investment in past decades. Examples of state-sponsored schemes include *Lok Jumbish* and *Shiksha Karmi* programs in Rajasthan, [7] Education Guarantee Scheme in Madhya Pradesh, *Balyam* Program of Andhra Pradesh, and Basic Education Program in Uttar Pradesh. Andhra Pradesh also hosts one of the largest *Anganwadi* systems in India, which brought children from poor households into schools. While in some states such initiatives have led to significant growth in school enrollment, large disparities in educational achievement across Indian states remain – about two-thirds of the children who do not attend school are in five of the poorest states: Bihar, Uttar Pradesh, West Bengal, Madhya Pradesh, and Rajasthan (Dougherty & Herd, 2008).

For all the above reasons, it is of policy interest to study the degree of inequality of educational opportunity across Indian states. The country's federal structure and multi-ethnic nature is ideal for investigating this issue. Yet, there is no published study of inequality of educational opportunity for India. In the absence of a statistical measure, past research on this topic has focused on the broader question of between-group inequality. A closely related study is Deshpande (2007), who examines between-group socio-economic inequalities in India, constructing a gender-caste-adjusted Human Development Index (HDI) for Indian states. [8] However, this approach is rather ad-hoc, as it has no explicit link to well-established theories and concepts of inequality of opportunities.

In this paper, we build on recent developments in the literature that have operationalized concepts in the inequality of opportunity theory (including Roemer's) and compute four indices of inequality of educational opportunity using data on an adult sample. To the best of our knowledge, this is the first study that attempts to empirically investigate the extent and correlates of equality of educational opportunity across states in India. Therefore, our study fills an important gap in the otherwise rich literature on the between-region differences in human development in India.

3. METHODOLOGY AND DATA

In this section we introduce the indices used for tracking changes in inequality of opportunity of education in India from 1983 to 2004. We first present the general framework of circumstances and outcomes; and then explain the PC index, followed by the Overlap index, and finally the two Reardon indices.

(a) *General framework*

We assume that societies can be partitioned into a set of individuals' types, following Roemer (1998). Each type is defined by a combination of values taken by a vector of circumstances, that is, factors over which the individual does not exert control, like parental education, ethnicity, or gender. For instance, in a society with two circumstances, gender and parental education ("low" or "high"), type "1" individuals could be males whose parents had "low" education. By combining the different categories of each circumstance, this example yields four types.

Generally there are z circumstances, each one having g_i categories (for $i = 1, 2, ..., z$). By combining all the possible values in the vectors of circumstances a vector of types is defined. The ensuing vector of types, $G = \{1, 2, ..., T\}$, has $T = \prod_{i=1}^{z} g_i$ elements. *All individuals having the same set of circumstances belong to the same type.* The absolute frequency of people belonging to type t, ($t \in G$), is: N^t.

Outcomes or advantages can be considered in a likewise manner, but in this paper we focus on one ordinal variable. [9] The ordinal categories of the outcome variable are in the vector $O = \{1, 2, ..., A\}$. The probability of attaining a given outcome (e.g., $k \in O$) conditional on being of type t is: p_k^t. The absolute frequency of people being of type t and attaining a combination k is N_k^t.

(b) *The Pearson-Cramer (PC) index*

Several definitions of inequality of opportunity use the concepts that Roemer (1998) terms as circumstances, efforts, and advantages. [10] The PC index relates to a literalist definition of Roemer (1998), whereby equality of opportunity is achieved when the conditional distributions of outcomes/advantages are equal across circumstance sets. That is, circumstances should not affect advantage either directly or indirectly through effort or random shocks. An implication of this definition is that, under a situation of equality of opportunity, any measure of between-group inequality of outcomes, sensitive to this definition, should yield minimum inequality (usually zero, depending on normalization). This definition is also related to Fleurbaey (2008)'s concept of *circumstance neutralization*, a situation wherein distributions of well-being are independent from circumstance sets, and therefore expressible only as a function of effort. A between-group inequality index sensitive to this definition should also yield minimum inequality when circumstances are neutral.

The PC index highlights the association between types, in Roemer's terminology, and sets or values of advantages/outcomes. The index achieves its maximum value whenever there is complete, or absolute, association between types and advantage. [11] On the other hand, the index achieves its minimum value when the conditional distributions of outcomes are identical, implying that the conditioning factors are irrelevant in determining the advantages. The index therefore measures a concept of inequality of opportunity based on the degree of dissimilarity of multinomial distributions, as captured by the Pearson statistic, used to test the homogeneity of multinomial distributions (e.g., see Hogg & Tanis, 1997). The index is equal to the test statistic divided by its maximum possible value (derived by Cramer, 1946):

$$PC = \frac{X^2}{X^2_{\max}} = \sum_{t=1}^{T} \sum_{\alpha=1}^{A} w^t \frac{(p_\alpha^t - p_\alpha^*)^2}{\min\{T-1, A-1\} p_\alpha^*} \tag{1}$$

where w^t is the proportion of the population belonging to type t, $w^t = \frac{N^t}{\sum_{k=1}^{T} N^k}$, and p_α^* is the proportion of the population attaining outcome state α:

$$P_a^* = \sum_{t=1}^{T} p_\alpha^t \frac{N^t}{\sum_{t=1}^{T} N^t} = \frac{\sum_{t=1}^{T} N_\alpha^t}{\sum_{t=1}^{T} N^t} \tag{2}$$

This weighted-average probability (2) performs the comparison of the probabilities across the different types. The closer the respective probabilities are across types, the more the weighted-average probability resembles each and every one of its constituent probabilities (in (2)), and therefore, the closer to zero the statistic in (1) is.

The index fulfills several axioms including population replication invariance [12] and scale invariance. [13] It is equal to 0 when the distributions of the compared groups/types are identical. It is equal to 1 when there is complete or absolute association between types and outcomes. The exact meaning of complete or absolute association depends on whether there are more sets of circumstances than outcomes, or vice versa. In either case, complete, or absolute, association requires that for every possible outcome there is at least one type that attains it, and at least one type that does not attain it.

The PC index is also sensitive to the migration, within a type, of an individual from one outcome state to another one. If such migration renders both the departing and receiving states homogeneous (across types), then the index drops in value (i.e., toward less inequality). [14]

(c) *The Overlap index*

The Overlap index was developed by Weitzman (1970) to measure between-group inequality of income distributions. Its original formulation, for two groups and continuous variables, was:

$$OV_W = \int_{y_{\min}}^{y_{\max}} \min\{f(y); g(y)\} dy, \tag{3}$$

where y is a continuous variable with support between a minimum and a maximum value ($y_{\min}$ and $y_{\max}$) and f and g are density functions for two groups. We use a different version of (3), for ordinal variables, T groups, and a different normalization that facilitates comparison with other indices:

$$OV_M = 1 - \sum_{\alpha=1}^{A} \min\{p_\alpha^1; p_\alpha^2; \ldots; p_\alpha^T\}, \tag{4}$$

The Overlap index (4) is equal to zero if and only if the T distributions are identical, thus declaring equality only under circumstance neutralization. The Overlap index is also equal to 1 whenever there is complete or absolute association between types and outcomes. However, for this index, a necessary and sufficient condition to achieve its maximum is: $\forall \alpha \in O,\ \exists (p_\alpha^i, p_\alpha^j) \big| p_\alpha^i = 0 \wedge p_\alpha^j > 0$. The Overlap index also decreases in value when a migration, within a type, from one outcome state to another, renders both departing and receiving states' probabilities homogeneous.

The Overlap index fulfills axioms of population replication invariance and scale invariance; however, unlike the PC index, the Overlap index is insensitive to the relative sizes of types in the population. Therefore the PC index does not fulfill an axiom of subpopulation replication invariance, whereby only a part of the population is replicated without affecting the value of the index. By contrast, the Overlap index fulfills the axiom, since it is not sensitive to the distribution of types within the population. By computing both indices we offer estimations of inequality of opportunity considering both alternatives in accounting for the distribution of types.[15]

(d) *The Reardon indices*

The abovementioned indices are good at capturing the dissimilarity across the conditional distributions of outcomes. However, they are insensitive to the relative desirability of the outcome categories. For instance, consider distributions M1 = (0.1,0.3,0.6), B1 = (0.3,0.4,0.3), M2 = (0.1,0.6,0.3), and B2 = (0.3,0.3,0.4), where the leftmost probability corresponds to the least desirable category. Both PC and Overlap would yield a value of inequality between M1 and B1 equal to that between M2 and B2. Note that the difference between the {M1, B1} pair and the {M2, B2} pair is that the probabilities of the most desirable category have been swapped with those of the second-most desirable category. However, whereas M1 stochastically dominates B1 (i.e., it is a "better lottery"), the cumulative distributions of M2 and B2 cross. In order to account for these forms of dissimilarity, Silber and Yalonetzky (2011) proposed using Reardon's segregation indices as measures of between-group inequality. We compute two of these indices in order to provide results that are sensitive to the relative desirability of the educational categories; one is also sensitive to subpopulation replication invariance, the other one is not.

The first Reardon index is:

$$R_1 = 1 - \frac{1}{\omega}\sum_{t=1}^{T} w^t \omega^t, \tag{5}$$

where: $\omega^t = \frac{1}{A-1}\sum_{\alpha=1}^{A-1} 4F^t(\alpha)[1 - F^t(\alpha)]$ and $F^t(\alpha)$ is the cumulative probability of obtaining outcome α conditional on belonging to type t: $F^t(\alpha) = \sum_{s=1}^{\alpha} p_s^t$. ω is like ω^t, but it depends on the population's cumulative probability: $F(\alpha) = \sum_{t=1}^{T} w^t F^t(\alpha)$.The second Reardon index becomes invariant to subpopulation replication by replacing w^t with $1/T$ in (5):

$$R_2 = 1 - \frac{1}{T\omega^*}\sum_{t=1}^{T} \omega^t, \tag{6}$$

where the difference between ω^* and ω is that the former does not depend on $F(\alpha)$ but rather on: $F^*(\alpha) = \frac{1}{T}\sum_{t=1}^{T} F^t(\alpha)$.

The Reardon indices compute between-type inequality indirectly by subtracting the (weighted or unweighted) sum of within-type inequality (measured by ω^t) from inequality in the whole population (measured by ω or ω^*), and then dividing the difference by the latter. Minimum inequality is obtained when all individuals have the same outcome ($F^t(\alpha) = 0 \vee 1$) and maximum inequality is attained when the individuals are evenly split between the worst and the best outcomes ($F^t(\alpha) = 0.5\ \forall \alpha \in [1, A-1]$). The Reardon indices are equal to zero if and only if the conditional distributions are identical and fulfill a property called exchanges, whereby between-type inequality is reduced whenever the dissimilarity between two distributions, in which one dominates the other, is reduced.[16]

(e) *Data*

The data come from the NSS 1983 and 2004 rounds. Our analysis is based on individuals' school completion.[17] Since these data are censored for children, we focus on adults at least 25 years old. The indices relate data on school completion to a variety of circumstances such as religion and gender.[18] Because for certain states, sample sizes were too small, we further restricted our data to 25 states.[19] This yields a total of four comparable circumstance sets: Hindu male, Hindu female, nonHindu male, nonHindu female. Due to sample size limitations for some states, we did not undertake disaggregate analysis, for instance, dividing the adult sample into age cohorts. Such division would have enabled a cohort analysis of inequality of opportunity that could have controlled for the fact that each type has different cohort compositions, and inequality across the same cohorts of different types may vary by cohort.[20]

4. RESULTS

Figure 1 reports the indices for all Indian adults over age 25. In all cases, the point estimates are surrounded by narrow confidence intervals (not reported), as is to be expected from the large sample size. This confirms the statistically significant difference of our estimates of Inequality of opportunity indices from 1983 to 2004. The plot of the four indices suggests a modest decline in inequality of opportunity.

National averages of the indices can mask important between-state differences in educational opportunities. This is confirmed by Table 1 which reports rankings of states alongside absolute levels of inequality of opportunities. The fractions of population with primary and secondary education are also reported. Several patterns are noteworthy:.

First: In the case of primary and secondary education, significant progress took place during 1983–2004. In 1983, none of the states (except Delhi and Nagaland) had more than 20% of the population with up to or above secondary level education. By 2004, this increased by 2–3 times in all states except Andhra Pradesh, Rajasthan, Orissa, and Tripura. Because of the low base, the fraction of population with secondary education increased by more than 100% in the Northern state of Uttar Pradesh as well as in the Southern state of Kerala. Similarly, the fraction of population with primary education almost doubled in almost all states during 1983–2004. Once again Northern states such as Uttar Pradesh and Bihar saw 100% increases in the percentage of primary educated population. States that had invested heavily in primary education in the past (such as Kerala, Karnataka, and West Bengal) also saw modest growth in their primary educated population.

Second: There is some disagreement between the Overlap index and the other indices over the ranking of states in 1983, but much less disagreement between the other possible comparisons (e.g., PC *versus* Reardon1). However the rank correlation coefficients are never below 0.61 in 1983 and the four indices pair-wise correlate highly for 2004 data (with coefficient values ranging from 0.71 to 0.95). Moreover, the Friedman test of rank independence strongly rejects in both years the null hypothesis that the four rankings are independent from each other.[21] The differences on the indices between the 2 years are statistically significant, which is reasonable considering the sample size. However, the differences may not be large enough to be economically significant. In addition, the opposing trends occasionally espoused by the indices,

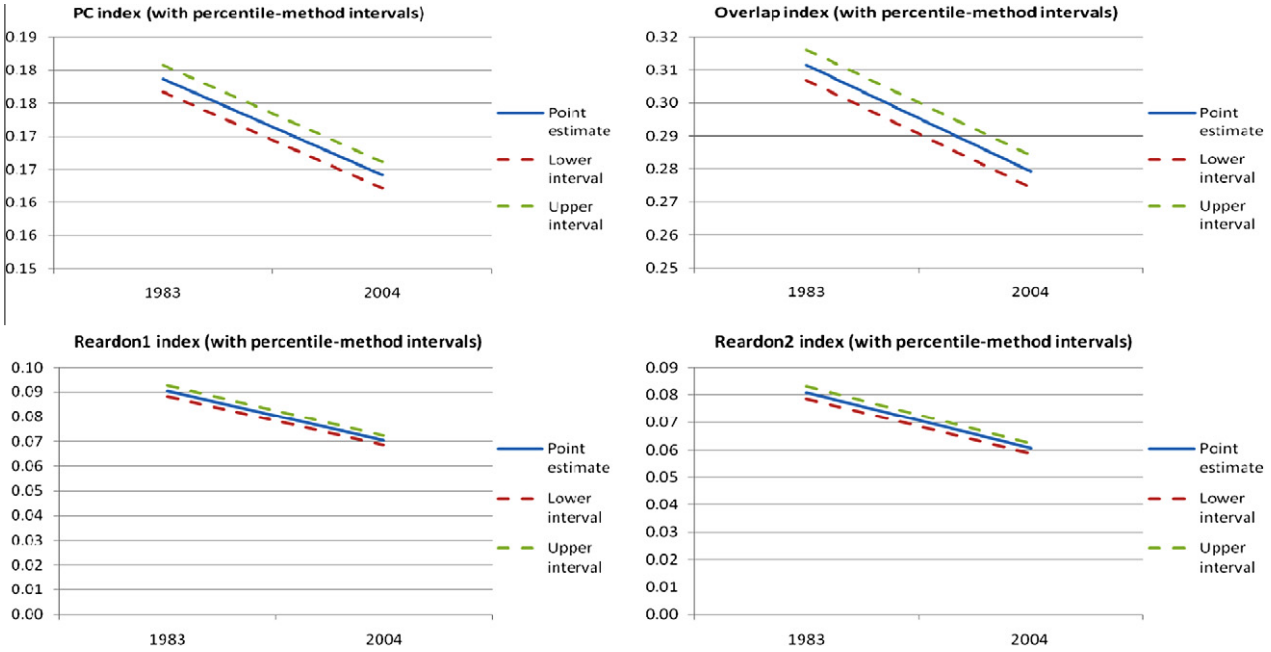

Figure 1. *PC, Overlap and two Reardon indices. India, 1983–2004, Notes: (a) Confidence intervals are at 95% level and obtained following the bootstrapping percentile method. (b) For each sample 500 re-samplings were conducted.*

for some states, are possible since they are not sensitive to the exactly same properties. For instance PC and the overlap indices react differently to subpopulation replication invariance (the same between the two Reardon indices). Also the two Reardon indices are sensitive to the relative desirability of the variable's categories, which is not the case of PC and Overlap.

Third: In 2004, there is also a *negative* link between the level of educational attainment in the population (i.e., mean school primary/secondary completion) and inequality of opportunity. For instance, in that year, 76% of the population completed primary schooling in the least unequal state of Kerala while the figure for Uttar Pradesh, the most unequal state, was 44%. The rank correlation coefficients reported at the right bottom of Table 1 are always positive, highlighting the fact that increases in primary and secondary education, by 2004, were accompanied by reductions in inequality of opportunity across states. However, the correlations are far from perfect.

Fourth: The pace of improvement in inequality of opportunity has been uneven between the Indian states. To highlight the extent and direction of movement of states in terms of inequality of opportunity, we plot state ranks in Figure 2. The Y-axis corresponds to position in 1983 while the X-axis indicates position in 2004. If a state is above and further from the 45 degree line, it indicates increasing *relative* inequality of opportunity. Reassuringly, irrespective of the index used, Haryana, Rajasthan, and Uttar Pradesh are located above the 45 degree line, having experienced significant decline from their rank in 1983.

Fifth: Our key conclusions regarding changes in inequality of opportunity do not change significantly when we use alternative indices, notwithstanding their different properties. The indices rank Kerala as the most equal in 2004[22] and report large gains for West Bengal and Orissa from 1983 to 2004. Estimates for Haryana, Rajasthan, and Uttar Pradesh, on the other hand, show significant deterioration in ranking. Bihar also exhibits mild deterioration. This remarkable similarity in results is also confirmed by high positive association between rank estimates obtained from the four indices (The Kendall–Friedman index of rank concordance is 0.8132 in 1983 and 0.8736 in 2004).

To examine movement in inequality of opportunity, both in terms of rankings and in terms of absolute index variations, we first compute the Spearman rank correlation coefficients for the four indices' values in 1983 and 2004. The results are in Appendix Table 3. Significant rank mobility is evident according to the four indices, particularly PC and Overlap. We then compute a novel adjusted version of one of the mobility indices by Fields and Ok (1996) in order to measure changes in the values of the indices during 1983–2004. We decompose it in order to quantify the percentage of change that is due to reduction in inequality of opportunity. The novel adjusted measure is:

$$AFO \equiv \frac{1}{N}\sum_{n=1}^{N}\frac{|y_n^{2004}-y_n^{1983}|}{|y_n^{2004}+y_n^{1983}|}=\frac{1}{N}\sum_{n=1}^{N}\frac{|y_n^{2004}-y_n^{1983}|}{|y_n^{2004}+y_n^{1983}|}I(y_n^{2004}>y_n^{1983}) + \frac{1}{N}\sum_{n=1}^{N}\frac{|y_n^{2004}-y_n^{1983}|}{|y_n^{2004}+y_n^{1983}|}I(y_n^{2004}<y_n^{1983}), \quad (7)$$

where now N is the number of states and y is the inequality index. I is an indicator function equal to 1 whenever the expression in parenthesis is true. Otherwise it is equal to 0. The second line of (7) shows how AFO can be decomposed into downward and upward mobility changes. Appendix Table 3 shows an interesting, but plausible, result: The Reardon indices exhibit the lowest rank mobility, but at the same time the highest relative cardinal mobility (according to AFO). All indices tell a similar story regarding the source of mobility: a reduction in inequality that accounts for between 78% and 93% of the experienced change according to AFO, depending on the index used.

To better understand the movements in the position of regions across the distribution of inequality of opportunity, we plot region-specific values of the four indices in Appendix Figure 1 by year. It is easy to trace changes in inequality of

Table 1. *Estimates of inequality of educational opportunity indices by state and year (types based on religion and gender)*

State	1983						2004					
	Inequality of opportunity index				% With at least secondary education	% With at least primary education	Inequality of opportunity index				% With at least secondary education	% With at least primary education
	PC	Overlap	Reardon1	Reardon2			PC	Overlap	Reardon1	Reardon2		
Andhra Pradesh	18 (.1848)	10 (.4203)	17 (.0908)	13 (.1079)	0.09	0.25	13 (.1706)	22 (.2922)	12 (.0726)	13 (.0715)	0.18	0.38
Assam	12 (.2054)	6 (.4774)	13 (.1088)	9 (.1248)	0.09	0.36	9 (.1855)	12 (.3897)	10 (.0775)	11 (.0817)	0.22	0.58
Bihar	9 (.2137)	17 (.3708)	5 (.1295)	6 (.1314)	0.07	0.21	3 (.2222)	7 (.4344)	4 (.1203)	5 (.1172)	0.21	0.40
Gujarat	23 (.1765)	15 (.3879)	20 (.0857)	15 (.0944)	0.13	0.33	10 (.1797)	13 (.3718)	8 (.0903)	7 (.0982)	0.27	0.56
Haryana	14 (.2002)	22 (.3415)	12 (.1129)	20 (.0854)	0.12	0.28	8 (.1948	8 (.4284)	6 (.1019)	8 (.0928)	0.27	0.51
Himachal Pradesh	21 (.1791)	20 (.3461)	19 (.0871)	17 (.0912)	0.11	0.28	16 (.1639)	14 (.3525	16 (.0695)	17 (.0688)	0.28	0.55
Jammu and Kashmir	2 (.2350)	5 (.5229)	1 (.1563)	2 (.1658)	0.10	0.22	5 (.2131)	1 (.4929)	3 (.1242)	2 (.1261)	0.23	0.47
Karnataka	20 (.1792)	18 (.3644)	18 (.0905)	22 (.0810)	0.12	0.34	14 (.1671)	20 (.3006)	13 (.0724)	14 (.0711)	0.25	0.50
Kerala	25 (.1301)	25 (.2172)	24 (.0437)	23 (.0450)	0.13	0.56	25 (.0817)	25 (.1573)	25 (.0135)	25 (.0140)	0.30	0.76
Madhya Pradesh	6 (.2169)	1 (.5785)	3 (.1369)	1 (.1737)	0.08	0.24	7 (.2046)	6 (.4365)	5 (.1180)	3 (.1191)	0.21	0.43
Maharashtra	13 (.2013)	16 (.3830)	9 (.1190)	11 (.1178)	0.16	0.42	15 (.1664)	24 (.2561)	14 (.0720)	18 (.0646)	0.31	0.62
Manipur	3 (.2237)	7 (.4727)	8 (.1224)	10 (.1195)	0.12	0.32	4 (.2169)	4 (.4687)	9 (.0791)	12 (.0798)	0.30	0.61
Meghalaya	19 (.1845)	11 (.4150)	25 (.0312)	24 (.0423)	0.14	0.43	24 (.1312)	15 (.3327)	24 (.0146)	24 (.0290)	0.24	0.61
Nagaland	8 (.2157)	24 (.3323)	22 (.0765)	19 (.0858)	0.21	0.81	20 (.1584)	11 (.3919)	23 (.0223)	23 (.0345)	0.35	0.72
Orissa	4 (.2234)	9 (.4230)	2 (.1382)	12 (.1145)	0.06	0.22	18 (.1626)	18 (.3124)	17 (.0691)	20 (.0538)	0.18	0.42
Punjab	22 (.1786)	12 (.3961)	21 (.0827)	21 (.0834)	0.15	0.35	23 (.1317)	21 (.2948)	22 (.0366)	22 (.0393)	0.33	0.57
Rajasthan	17 (.1902)	23 (.3350)	14 (.1059)	14 (.1068)	0.07	0.19	1 (.2341)	5 (.4417)	1 (.1582)	1 (.1424)	0.15	0.34
Sikkim	11 (.2112)	14 (.3941)	11 (.1162)	8 (.1268)	0.11	0.23	22 (.1419)	23 (.2600)	20 (.0541)	19 (.0542)	0.20	0.46
Tamil Nadu	10 (.2128)	8 (.4725)	6 (.1288)	7 (.1303)	0.11	0.38	17 (.1627)	17 (.3188)	15 (.0708)	15 (.0703)	0.26	0.57
Tripura	7 (.2158)	2 (.5727)	10 (.1163)	3 (.1650)	0.14	0.41	21 (.1555)	9 (.4040)	21 (.0533)	9 (.0868	0.19	0.51
Uttar Pradesh	15 (.1946)	21 (.3452)	15 (.1030)	16 (.0915)	0.09	0.22	2 (.2265)	2 (.4825)	2 (.1320)	4 (.1181)	0.22	0.44
West Bengal	5 (.2211)	3 (.5483)	7 (.1284)	4 (.1547)	0.15	0.42	11 (.1791)	10 (.3995)	11 (.0747)	10 (.0820)	0.22	0.54
Arunachal Pradesh	16 (.1908)	13 (.3943)	16 (.1022)	18 (.0907)	0.13	0.36	6 (.2113)	3 (.4738)	7 (.0991)	6 (.1120)	0.21	0.45
Delhi	24 (.1566)	19 (.3517)	23 (.0579)	25 (.0415)	0.40	0.62	19 (.1593)	19 (.3079)	18 (.0621)	16 (.0701)	0.51	0.74
Goa	1 (.2394)	4 (.5341)	4 (.1333)	5 (.1504)	0.17	0.44	12 (.1736)	16 (.3231)	19 (.0616)	21 (.0505)	0.42	0.71
Rank correlations												
PC index	1	0.63*	0.85*	0.79*	0.16	0.16	1	0.77*	0.95*	0.85*	0.30	0.51*
Overlap index	0.63*	1	0.61*	0.72*	0.06	−0.01	0.77*	1	0.71*	0.77*	0.28	0.38*
Reardon index1	0.85*	0.61*	1	0.86*	0.41*	0.42*	0.95*	0.71*	1	0.92*	0.40*	0.62*
Reardon index2	0.79*	0.72*	0.86*	1	0.32**	0.31	0.85*	0.77*	0.92*	1	0.51*	0.65*

Notes: (a) Figures on indices are ranks. (b) Ranks: 1 = most unequal; 25 = least unequal. (c) The level value of inequality of opportunity index is reported in parentheses. (d) The arrows indicate whether the inequality index increased or decreased during 1983–2004.

* Indicate statistical significance at 5% level, respectively (values in parentheses).

** Indicate statistical significance at 10% level, respectively (values in parentheses).

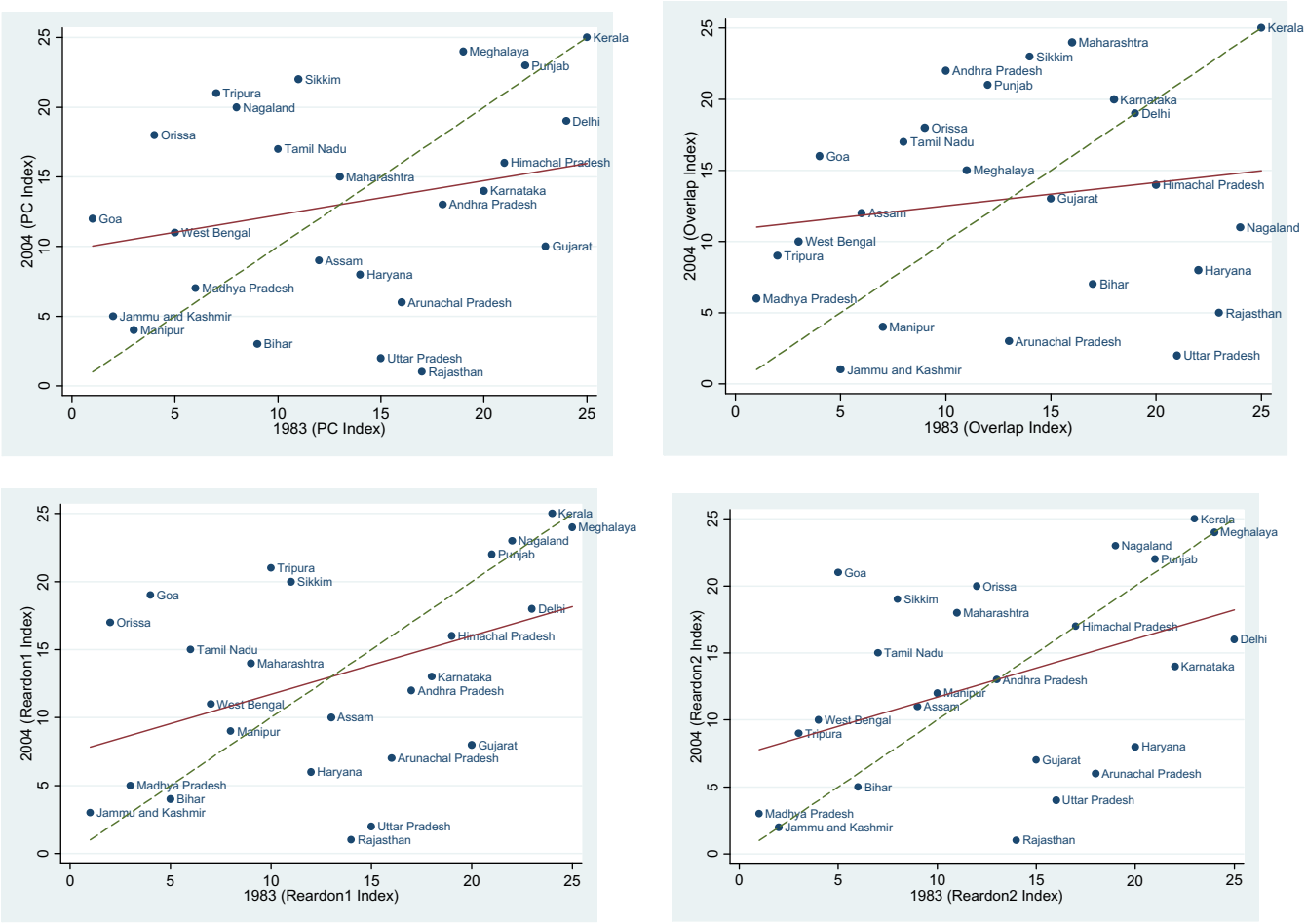

Figure 2. *Scatter plot of ranking of states by Overlap index, PC index and two Reardon indices, 1983–2004. Notes: (a) Dashed line is the 45 degree line. (b) The solid line represents the linear regression trend. (c) Ranks: 1 = most unequal; 25 = least unequal.*

opportunity in education across Indian regions using the graphs. Some patterns are noteworthy: (a) irrespective of the index used, the central region saw a rise in inequality of opportunities; (b) irrespective of the index used, the Southern, Eastern, and North-eastern regions saw a decrease in inequality of opportunities.

(a) *Caste and inequality of opportunity*

A well-known source of social inequality in India is caste identity. Therefore, in this section, we re-examine inequality of opportunity with respect to caste membership of individuals. As pointed out in Section 3, because of the small size of the state-specific samples, we restricted our main analysis to four comparable types: Hindu male, Hindu female, nonHindu male, nonHindu female. Hence we abstracted away from caste as an important circumstance in the Indian context. In this section, we explicitly focus on caste as a circumstance. Two approaches are considered. First, we consider four types: two genders *versus* two castes (one category of scheduled tribes and castes merged, and another category including all the other castes).[23] Second, for regional analysis, we consider eight types: two gender *versus* two castes (same as above) *versus* two religions (Hindu *versus* nonHindu). Results are not reported. Reassuringly, our key results remain unchanged even when individuals' caste membership is taken into account directly as a circumstance. Regionally, Southern and North-Eastern states rank as the two least unequal regions by 2004. This is consistent with Appendix Figure 3. At the state level, the reversal of ranks between Uttar Pradesh and West Bengal is once again confirmed. The state of Rajasthan, widely known for the prevalence of caste-based discrimination, is ranked between the first and second most unequal states in 2004 (in Table 1, the rank varied between 1 and 5). On the other hand, the average rank of West Bengal is higher compared to Table 1 (15 *versus* 11), which is consistent with evidence on less caste discrimination in the state. Similarly, another state with a caste system, Kerala, still ranks among the least unequal states – the rank of Kerala in 1983 ranges between 19 and 25, while the range narrows to 23–25 in 2004. However, Kerala is also accompanied by several North-Eastern states. The North-East, characterized by its tribal societies, emerges as the least unequal region. Three states – UP, Bihar, and Orissa – rank among the top five most unequal states irrespective of the index employed, a finding that is also consistent with the ranking presented in Deshpande (2007) on the basis of her Gender Caste Development Index (GCDI) for 1998–99. Consistent with our results, Despande's GCDI index also assigns the highest value to Kerala.

Lastly, rank mobility is slightly lower than when types are defined according to gender and religion, but cardinal mobility remains strikingly similar. The high share of downward cardinal mobility is confirmed by the caste–gender results. (Results not shown but available from the authors). To examine

Table 2. *Inequality of opportunity rankings vis-à-vis growth, poverty, and policies of Indian states (types based on religion and gender)*

State	% Change in inequality of opportunity index				Progress in growth and poverty			Pro-poor policies			
	PC	Overlap	Reardon1	Reardon2	Poverty reduction	Growth rate	Growth elasticity of poverty*	Voice and accountability	Access to Finance	Human capital investment	Gender (female-to-male workers)
Andhra Pradesh	9	3	9	8	4	5	4	10	9	12	4
Assam	7	9	7	7	16	10	14	15	15	4	2
Bihar	14	13	13	12	14	16	15	14	16	15	12
Gujarat	13	12	14	13	6	6	6	6	6	7	8
Haryana	12	14	12	14	9	1	9	13	7	2	14
Jammu and Kashmir	8	11	8	10	15	13	9	11	10	1	16
Karnataka	10	10	10	11	8	8	10	7	5	8	3
Kerala	1	4	1	1	1	7	1	1	8	5	1
Madhya Pradesh	11	8	11	9	13	9	13	12	11	14	9
Maharashtra	6	1	6	6	11	4	12	2	1	13	7
Orissa	2	6	3	2	7	12	5	16	14	6	6
Punjab	3	7	2	3	3	2	3	5	3	3	15
Rajasthan	16	15	16	16	12	14	11	9	13	9	11
Tamil Nadu	4	2	4	5	5	3	8	3	2	10	5
Uttar Pradesh	15	16	15	15	10	15	7	8	12	16	13
West Bengal	5	5	5	4	2	11	2	4	4	11	10
Rank correlation											
% Changes in PC index	–	–	–	–	0.53 (.04)	0.39 (.13)	0.52 (.04)	0.34 (.20)	0.39 (.13)	0.38 (.14)	0.39 (.14)
% Changes in Overlap index	0.80 (.00)	–	–	–	0.49 (.05)	0.49 (.05)	0.34 (.19)	0.46 (.07)	0.53 (.03)	−0.05 (.85)	0.54 (.03)
% Changes in Reardon1 index	0.99 (.00)	0.79 (.00)	–	–	0.51 (.04)	0.39 (.13)	0.50 (.05)	0.35 (.19)	0.40 (.13)	0.37 (.16)	0.35 (.18)
% Changes in Reardon2 index	0.97 (.00)	0.83 (.00)	0.97 (.00)	–	0.53 (.04)	0.31 (24)	0.50 (.05)	0.31 (23)	0.32 (.23)	0.21 (.42)	0.42 (.10)

Note: (a) Figures of rankings of Growth Elasticities of Poverty, Growth Rates, and Policies of Indian States correspond to the period 1958–2000 and are obtained from Besley, Burgess, and Esteve-Volart (2007). "Voice and accountability" is measured by newspaper circulation per capita. (b) Rankings are based on the average variable of interest over the period (1 = highest). (c) Significance levels for correlations are in parentheses. (d) Ranks in terms of changes in inequality indices are used.

*These ranks were re-converted according to the mid-rank method in order to estimate the rank correlations with the inequality indicators.

movement in inequality of opportunity allowing for caste and gender types, we also computed the Spearman rank correlation coefficients for the four indices' values in 1983 and 2004 (see Appendix Table 5). Compared to Appendix Table 3, rank mobility increased for all four indices. We also computed the AFO index and decomposed it to quantify the percentage of change that is due to reduction in inequality of opportunity. Reassuringly, all indices tell a similar story regarding the source of mobility during 1983–2004: a reduction in inequality that accounts for between 82% and 97% of the experienced change according to AFO, depending on the index used (see Appendix Table 5)

(b) *Policy origin of inequality of opportunity*

In a federal state like India, provision of public goods is the responsibility of individual states. The importance of state-level policy choice is well documented in the literature. Dreze and Sen (1995) demonstrate how differences in entitlement to basic services between Uttar Pradesh and Kerala are related to differences in the scope and quality of public services, such as school facilities, which in Uttar Pradesh are often nonexistent. Relevant factors, among others, are the importance of social movements and public action, and the lack of political power of socially disadvantaged groups (or agency of scheduled tribe/scheduled caste/Muslim population).

In the above setting, between-state differences in policies and institutions can lead to differences in inequality of educational opportunity for a number of reasons. Firstly, certain Indian states display a poor record of gender gaps in the labor market, which can distort household investment decisions in female schooling. For instance, the northern state of Uttar Pradesh has a long history of oppressive gender relations. Other states such as Punjab and Haryana have some of the highest male-to-female sex ratios. On the other hand, women's economic participation has been active in the Southern state of Kerala for a long time, which is arguably responsible for a wide range of social achievements. Kerala and Tamil Nadu also have lower sex ratios.

Secondly, there are significant differences in access to public infrastructure by various social groups in India. According to the Sachar Commission report 2006, Indian Muslims are frequently found in relatively unbanked villages, and lack access to credit matters for human capital acquisition. Therefore, differences in financial provisions across states can influence educational attainment by gender and religious membership.

Thirdly, Indian states differ in terms of overall spending on education as well as educational policies and interventions. Higher spending per se may not be enough to equalize opportunities. Some states have policies targeting disadvantaged and/or difficult-to-reach social groups. These states can be expected to succeed in equalizing educational opportunities. Lastly, more accountable states may have affirmative action policies that attenuate the adverse effect of caste-based discrimination. For all these reasons, it is of policy interest to document why inequality of educational opportunity varies across Indian states.

We go beyond documenting state-rankings in inequality of opportunity by examining possible reasons for the divergence in state-level experience of equalizing educational opportunities. In order to delve a little deeper into state-level experiences with policies, economic growth, and poverty reduction, we build on Besley, Burgess, and Esteve-Volart (2007). Table 2 connects the policy analysis above to the earlier discussion of the link between economic growth and educational opportunity. It ranks 16 large Indian states by percentage change in inequality of opportunity and their growth elasticity of poverty, GDP growth rates, rates of poverty reduction, and performance in four policy areas discussed above: voice and accountability, access to finance, human capital investment, and gender inclusion. All variables relating to economic growth, poverty, and policies are in lagged form.

The table thus allows an informal look at how policy performance such as gains in GDP, growth, and poverty reduction are linked to the changes in inequality of educational opportunity. The first four columns in Table 2 present rankings in terms of percentage changes in inequality of opportunity indices. The next column identifies the states that have been most effective at securing economic growth and reducing poverty. These states have tended to have fast growth rates and high growth elasticities of poverty (rankings are in columns 5 and 6, respectively). Poverty reduction is greatest in states like Kerala, Punjab, and Andhra Pradesh, which experienced significant reduction of inequality of educational opportunity, while it is lowest in states like Bihar, Assam, and Madhya Pradesh (states with a poor record of equality of educational opportunity).

On the whole, there is a statistically significant, positive correlation (rank correlation coefficients of 0.49–0.53) between inequality of opportunity and poverty reduction. States that have been more successful in reducing poverty are also those that have been more successful at reducing inequality of opportunity during 1983–2004. Similar positive correlations also exist with respect to GDP growth rate and growth elasticity of poverty. However, the rank correlation coefficients are smaller in size, suggesting the relative importance of poverty reduction over the other two variables in equalizing educational opportunity.

The remaining columns correlate inequality of opportunity indices with four selected policy indicators. In the column on voice and accountability, a higher newspaper circulation per capita is associated with a higher growth elasticity of poverty, a higher growth rate, a higher overall reduction in poverty, and a higher percentage reduction in inequality of opportunity.[24] A similar pattern is found in the access to finance column, where states are ranked by per capita credit extended by commercial banks. States with greater access to finance have higher ranks in all four indices (although only statistically significant for the Overlap index). In the column on gender, inclusion of women in the labor force, as proxied by the ratio of female-to-male workers, is positively correlated with changes in inequality of opportunity rankings irrespective of the index used.

The pattern of correlations between human capital, proxied by state education expenditures per capita, and changes in inequality of opportunity is recorded in the second-to-last column. The correlation of this variable with changes in inequality of opportunity indices is insignificant, and not always positive. In other words, states that have spent more on education are not always as relatively successful in reducing inequality of opportunity. This finding raises questions about the effectiveness and efficiency of public provision of education in India.[25] Public school accounts for the bulk of educational expenditure in India. However, the quality of these schools remains very poor. According to one study, one-quarter of government primary school teachers were absent from school during random visits. Moreover, only about one-half of the teachers were actually teaching when enumerators arrived at the schools (Chaudhury, Hammer, Kremer, Muralidharan, & Rogers, 2006). Poor quality may have reduced the effectiveness of public expenditure on outcomes in India. The weak link between expenditure and outcome is also corroborated

by studies that have used survey data from India. For instance, Filmer and Pritchett (1999) find that, once per capita income is taken into account, public expenditure on primary education loses explanatory power. [26]

5. CONCLUSION

Our results show that India's record in reducing inequality of educational opportunity in post-liberalization is characterized by considerable variation across states and regions. Kerala stands out as the least unequal state in terms of educational opportunities (third least unequal in its least favorable ranking). In general, Southern states experienced lower inequality in educational opportunity when compared to Northern states. This finding is consistent with the observed North-South divide in social outcomes in India – numerous earlier studies have pointed out how Southern states such as Kerala and Tamil Nadu differ from Uttar Pradesh and Bihar in education and health outcomes (Dyson & Moore, 1983; Dreze & Sen, 1995). In addition, even after excluding the single success story, Kerala, significant inter-state divergence remains among the remaining states. Our findings show that different kinds of problems arise in different parts of India. The incidence of rural poverty is high in the Eastern states of Bihar, Orissa, and West Bengal. Yet both West Bengal and Orissa made significant progress in reducing inequality. On average, states with more accountable governments, greater access to finance, greater reduction in poverty, and greater inclusion of women in economic growth emerged as those that also succeeded in reducing inequality of educational opportunities. In other words, although not causal, significant positive associations were found between policy variables, poverty reduction, GDP growth elasticity of poverty, growth rates, and reduction in inequality of educational opportunities. The policies we have identified may be reducing inequality of opportunity because they positively affect economic growth *and* enhance the poverty effect of such growth. At the same time, we find no link between educational expenditure and inequality of opportunity. This is despite the fact that states that spent more on education had higher poverty elasticities. Future research therefore should revisit this lack of association between inequality of opportunity and educational expenditure.

Because the study period provides both pre- and post-reform data on India, it is tempting to attribute the rising inequality of opportunities in some states, and in some measures of opportunity, to market reforms. The last decade has been a period of unprecedented improvement in living standards, thanks to liberalization. The accelerated progress of primary education in the nineties in some states may have been a response to weakening of credit constraints and increasing market returns to education which followed economic reforms and liberalization in the 1990s. Therefore, the finding of a positive correlation between reduction of inequality of educational opportunity and poverty reduction and growth is reassuring. However, as argued by Dreze and Deaton and Dreze (2002), "Much else than liberalization has happened in the nineties, and while issues of economic reform are of course extremely important, so are other aspects of economic and social policy".

Lastly, future research should use larger and richer datasets to revisit the study and examine the link between inequality of opportunity and policy measures in a parametric modeling (e.g., regression) framework. Likewise, larger datasets should be used to account for the age-cohort dimension of inequality of opportunities, and richer datasets should include better information on circumstances, for example, on caste affiliation and parental background information. Such analyses can help better explain the evolution of inequality of educational opportunity in India. In addition, the emerging availability of between-group inequality indices should be seized upon in order to expand the analysis of inequality of opportunity in India over several dimensions of well-being, including those that are measured as continuous variables and those measured dichotomously (e.g., using the Human Opportunity Index of Barros *et al.* (2008)). Focusing on dichotomous outcomes such as completion of specific levels of education will help better understand inequality of opportunity given nonlinearities in returns to education in India.

NOTES

1. Some normative frameworks, like the capability approach, also provide justification for focusing on educational attainment as an end in itself (in addition to its role in income generation). See for instance Sen (2001).

2. We thank an anonymous referee for emphasizing the importance of age composition.

3. A notion of inequality of opportunity, wherein distributional dissimilarities matter, can be developed based on a benchmark concept of equality of opportunity, whereby the latter is attained if and only if conditional distributions of well-being are identical. Such a concept is considered by Roemer (1998, 2006).

4. According to the 2001 population Census, 13% of the Indian population is Muslim.

5. SSA is being implemented in partnership with all State Governments and covers the entire country. It is the Indian Government's flagship programme for addressing the achievement of the goal of Universal Elementary Education (UEE) – free and compulsory education to children between 6 and14 years of age. The programme includes various components, such as opening new schools in under-provided areas, strengthening existing school infrastructure through the construction of additional classrooms and teachers, and provision of school improvement grants.

6. The statistic is asymptotically distributed chi-square with 24 degrees of freedom. With values of 78.06 for 1983 and 83.87 for 2004, the null hypothesis is rejected with 99% of confidence. See Friedman (1937).

7. See Silber and Yalonetzky (2011) for more details.

8. The concepts of complete and absolute association are discussed in Kendall and Stuart (1973).

9. See Yalonetzky (2010a) for an example of handling multiple variables when measuring inequality of opportunity.

10. In 1983, PC and Overlap declare Kerala the least unequal, Reardon1 and Reardon2 rank it the second-least and third-least unequal, respectively.

11. The concepts of complete and absolute association are discussed in Kendall and Stuart (1973).

12. If every individual in society is replicated n times, the index's value remains unaltered.

13. If the measurements of outcomes are altered proportionately (or additively) in the same way as the boundaries of the partitions of outcomes are altered (i.e., the boundaries that determine whether for one individual $\alpha = k$, then the index's value remains unaffected.

14. The 1983 round of NSS collected information on SC (Scheduled Castes), ST (Scheduled Tribes), and all others. The 2004 round has information on "Other Backward Castes" (OBCs), and thus the erstwhile "Others" category is now divided into OBC and Others. Since the category OBCs is not available in 1983, we have also merged OBCs with the other castes for both years. Merging scheduled tribes with scheduled castes was necessary due to small sample sizes in some states.

15. The PC index and the overlap index also differ in their sensitivity to migrations in general. See Yalonetzky (2010b).

16. If every individual in society is replicated n times, the index's value remains unaltered.

17. NSS defines schooling in the following categories: not literate – 01; literate without formal schooling: EGS/NFEC/AEC – 02, TLC – 03, others – 04; literate: below primary – 05, primary – 06, middle – 07, secondary – 08, higher secondary – 10, diploma/certificate course – 11, graduate – 12, postgraduate and above – 13.

18. Only the rank correlation of the voice and accountability indicator with the Overlap index is statistically significant.

19. NSS defines schooling in the following categories: not literate – 01; literate without formal schooling: EGS/NFEC/AEC −02, TLC −03, others – 04; literate: below primary − 05, primary − 06, middle – 07, secondary − 08, higher secondary − 10, diploma/certificate course − 11, graduate − 12, postgraduate and above − 13.

20. We thank an anonymous referee for emphasizing the importance of age composition.

21. The statistic is asymptotically distributed chi-square with 24 degrees of freedom. With values of 78.06 for 1983 and 83.87 for 2004, the null hypothesis is rejected with 99% of confidence. See Friedman (1937).

22. Similar concern is raised by De and Endow (2008) who find that for the less developed states in India, recent changes in education expenditure have improved access, but retention and learning achievements remain very low.

23. See Yalonetzky (2010a) for an example of handling multiple variables when measuring inequality of opportunity.

24. If the measurements of outcomes are altered proportionately (or additively) in the same way as the boundaries of the partitions of outcomes are altered (i.e., the boundaries that determine whether for one individual $\alpha = k$, then the index's value remains unaffected.

25. Similar concern is raised by De *et al.* (2008) who find that for the less developed states in India, recent changes in education expenditure have improved access, but retention and learning achievements remain very low.

26. We repeated the analysis using types based on caste and gender (instead of religion and gender types; results not reported but available from the authors). Reassuringly we find the association between state expenditure per capita in education and reduction in inequality of opportunity to be insignificant. Between 1983 and 2004, one would have expected a reduction in inequality of opportunity with respect to caste identity given the affirmative action policies directed toward SCs, STs and OBCs. However, the influence of these policies on educational success can be weakened by the growing importance of private schools in educational provision. Indeed, Deshpande (2007) documents significant inter-caste gaps in most Indian states during the 1990s. The gaps prevailed despite economic progress, with richer states exhibiting high caste inequalities.

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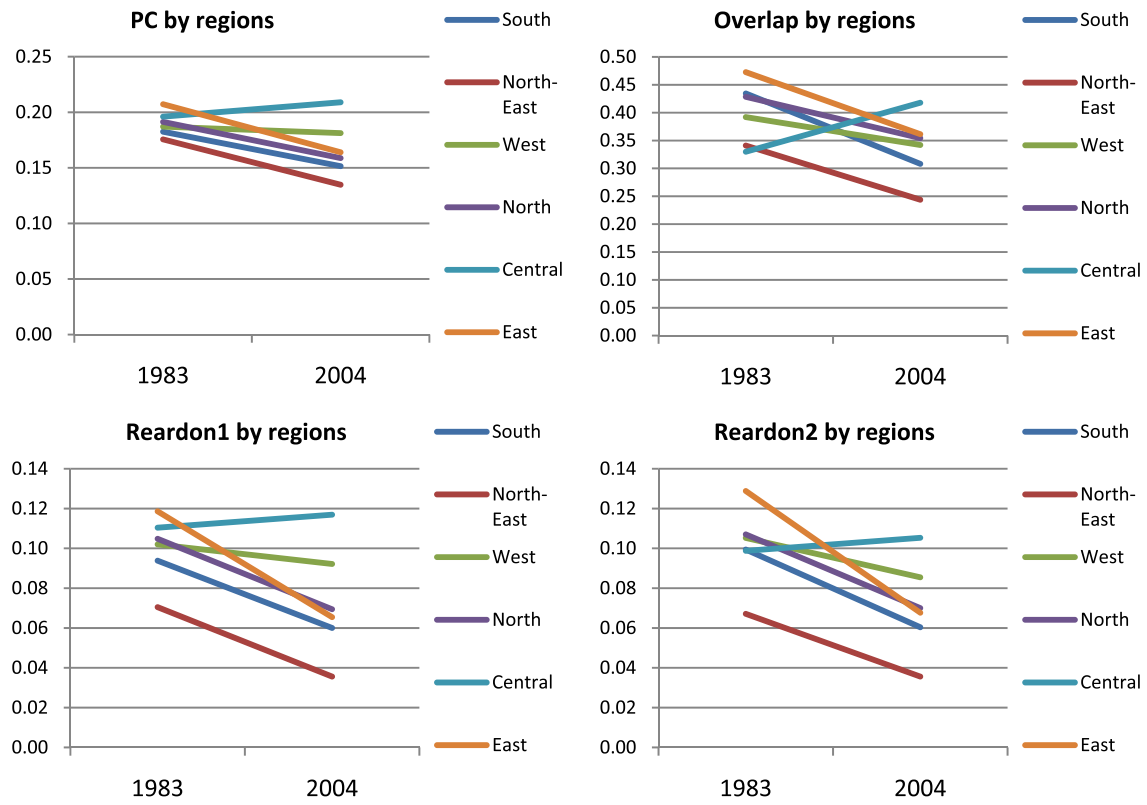
APPENDIX A

See Appendix Figure 1 and Tables 3–5.



Appendix Figure 1. *Changes in inequality of opportunity in education across Indian regions.*

Table 3. *Mobility indices (types based on religion and gender)*

	1983–2004		Percentage of inequality-reduction movement in the AFO index
	Spearman rank correlation(*p*-value)	AFO index(standard error)	
PC index	0.31 (.12)	0.09 (.01)	0.88
Overlap index	0.17 (.43)	0.12 (.01)	0.78
Reardon1	0.43 (.03)	0.22 (.03)	0.93
Reardon2	0.43 (.03)	0.23 (.03)	0.88

Table 4. *Ranking of regions by inequality of educational opportunity indices (types based on religion and gender)*

	1983						2004					
	PC	Overlap	Reardon1	Reardon2	% With secondary + education	% With primary + education	PC	Overlap	Reardon1	Reardon2	% With secondary + education	% With primary + education
South	5	6	6	6	0.11	0.36	5	6	6	6	0.24	0.54
North-East	6	2	5	4	0.10	0.38	6	2	5	4	0.24	0.59
West	4	4	2	2	0.13	0.33	2	5	2	2	0.26	0.53
North	3	3	3	3	0.12	0.28	4	3	3	3	0.29	0.54
Central	2	5	4	5	0.09	0.23	1	1	1	1	0.23	0.44
East	1	1	1	1	0.12	0.35	3	4	4	5	0.20	0.49

Notes: (a) Figures on indices are ranks. (b) Ranks: 1 = most unequal. (c) South: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry; North-East: Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Arunachal Pradesh; West: Gujarat, Maharashtra, Rajasthan, Dadra and Nagar Haveli, Goa; North: Himachal Pradesh, Jammu and Kashmir, Punjab, Chandigarh; Central: Bihar, Haryana, Madhya Pradesh, Uttar Pradesh, Delhi; East: Orissa, West Bengal.

Table 5. *Mobility indices (types based on caste and gender)*

	1983–2004		Percentage of inequality-reduction movement in the AFO index
	Spearman rank correlation(p-value)	AFO index(standard error)	
PC index	0.38 (.06)	0.09 (.01)	0.95
Overlap index	0.42 (.04)	0.11 (.01)	0.82
Reardon1	0.58 (.00)	0.24 (.03)	0.97
Reardon2	0.60 (.00)	0.24 (.03)	0.96