INEQUALITY OF OPPORTUNITY IN EARNINGS AND CONSUMPTION EXPENDITURE: THE CASE OF INDIAN MEN

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The paper associates inequality of opportunities with outcome differences that can be accounted by predetermined circumstances which lie beyond the control of an individual, such as parental education, parental occupation, caste, religion, and place of birth. The non-parametric estimates using parental education as a measure of circumstances reveal that the opportunity share of earnings inequality in 2004–05 was 11–19 percent for urban India and 5–8 percent for rural India. The same figures for consumption expenditure inequality are 10–19 percent for urban India and 5–9 percent for rural India. The overall opportunity share estimates (parametric) of earnings inequality due to circumstances, including caste, religion, region, parental education, and parental occupation, vary from 18 to 26 percent for urban India, and from 16 to 21 percent for rural India. The overall opportunity share estimates for consumption expenditure inequality are close to the earnings inequality figures for both urban and rural areas. The analysis further finds evidence that the parental education specific opportunity share of overall earnings (and consumption expenditure) inequality is largest in urban India, but caste and geographical region also play an equally important role when rural India is considered.

1. INTRODUCTION

Should an individual's achievement depend only upon his choices and efforts or also upon predetermined circumstances beyond his control? This question has occupied the minds of thinkers, philosophers, and policy makers alike. The debate became prominent in the late 1960s and early 1970s, when a number of studies reported that the same level of efforts by individuals with different family backgrounds results in different returns. For instance, Hanoch (1967) found that in the United States, the internal rate of return to increased schooling (except for graduate studies) was considerably lower for African Americans than for Whites. Extending Hanoch's work, Weiss (1970) estimated earnings functions for African American workers having 12 or fewer years of schooling, and found that the monetary return to additional schooling was not statistically significant, except for the workers in the 35–44 years age group. He also concluded that the effect of education on earnings was less for African Americans than for Whites and that

lower than average achievement for African Americans did not account for the difference in the mean earnings of African Americans and Whites. Bowles (1972) concluded that returns to own schooling are substantially overestimated if family background is not taken into account properly. These studies initiated a new agenda where researchers began to examine the role of family background in the overall achievement of an individual, in terms of either earnings or cognitive ability.

As the Indian society is characterized by different caste groups, religions, regions, and languages, similar questions can be raised in the Indian context as well. Studies reveal that Indian society suffers from substantial inequalities based upon caste, religion, and ethnicity, in education, employment, and income (Deshpande, 2001; Government of India, 2006; Kijima, 2006; Gaiha *et al.*, 2007; Gang *et al.*, 2007; Desai and Kulkarni, 2008). The inequalities arising due to differences in level of efforts made by individuals (henceforth referred to as inequality of efforts) are deemed acceptable. But, if the inequalities are due to circumstances beyond the control of an individual (henceforth referred to as inequality of opportunity), such as parental education, parental occupation, caste, religion, region of birth, and gender, then such inequalities may be deemed unacceptable and call for compensation to those who have suffered due to inferior circumstances.

The concepts of inequality due to efforts and inequality due to circumstances (inequality of opportunity) have been developed by a number of scholars.[1] Roemer (1993, 1998, 2006) needs special mention because the formalization of the concept of unequal opportunities, suggesting that one should separate the determinants of a person's advantage (i.e., desirable outcomes, such as income or cognitive ability) into circumstances and efforts was offered by him. The concept is motivated by two basic principles. The first one, also known as the principle of compensation (Checchi and Peragine, 2010, p. 431), states that differences in individual achievements which can be unambiguously attributed to differences in factors beyond individual responsibility are inequitable and have to be compensated by society. An individual's circumstances such as caste, religion, parental education, and parental occupation are outside the control of the individual, for which he should not be held responsible. Inequalities due to differences in circumstances often reflect social exclusion arising from weaknesses of the existing systems of property and civil rights, and thus should be addressed through public policy interventions (Ali and Zhuang, 2007). On the other hand, the second principle, commonly known as the principle of natural reward (Checchi and Peragine, 2010, p. 431), advocates that the differences in achievements, which can be attributed to factors for which an individual can be held responsible, are equitable and need not be compensated.

In the case of India, an enquiry into inequality of opportunity becomes relevant because historically the society has been divided into different caste (or religion or other social) groups, with several groups enjoying privileges more than

[1]See Rawls (1971), Sen (1979), Dworkin (1981), Arneson (1989), Cohen (1989), Roemer (1993, 1998), Van de Gaer (1993), and Fleurbaey (1995, 2008) for theoretical background. Van de Gaer (1993) has also provided an application based on stochastic correspondences between income of parents and children's outcomes. Further, the author has formulated a model of intergenerational transmission based on optimal behavior by altruistically inspired parents.

the other groups only because of their superior social status (Dreze and Sen, 1995; Sharma, 1999; Deshpande, 2001; Government of India, 2006; Kijima, 2006; Shah *et al.*, 2006; Gaiha *et al.*, 2007; Gang *et al.*, 2007). Given this historical divide and the associated consequences, it is important to estimate the contribution of circumstances to observed inequality. This will help in unfolding the root causes of the prevailing inequality and better policy making as well as improved targeting of beneficiaries of policy interventions.

This study therefore estimates inequality of opportunity in earnings and consumption expenditure for different age based cohorts in India. The estimation is carried out separately for urban and rural areas using non-parametric as well as parametric approaches and includes only males. The study finds compelling evidence of substantial inequality of opportunity in both urban and rural areas. Since the study draws on approaches which have been developed by other contributors to the subject, it will be important to discuss these contributions. This will help in comparing the different approaches proposed in earlier literature and bringing out the importance of our study. With this brief background, the next section reviews some important applications of the inequality of opportunity principle in different country settings. It is followed by a formal description of the framework and the data used, which in turn is followed by the findings of the study. The paper finally concludes with a discussion on the findings.

2. Existing Literature on Empirical Applications of Inequality of Opportunity

There are only a few studies which have estimated inequality of opportunity in different country settings. Checchi and Peragine (2010), for instance, used a non-parametric approach to decompose the total inequality in income in Italy into inequality of opportunity and inequality of efforts. They did not use any functional form and developed two alternative non-parametric approaches to measure inequality of opportunity. In the first approach, the population is divided into groups based on circumstances of individuals ("types"), with individuals in each group having similar circumstances. The overall inequality in income is then decomposed into between-group and within-group components, with the between-group component being taken as the inequality of opportunity ("types" or ex-ante approach). Since the ex-ante approach focuses on inequality between "types" and is neutral with respect to inequality within types, it is an expression of a reward focused approach to equality of opportunity (Fleurbaey, 2008, ch. 9; Checchi *et al.*, 2010, p. 6). In the second approach, the population is divided into groups based on the level of efforts made by the individuals, with individuals in each group having exercised the same level of effort; the within-group inequality resulting from the decomposition of overall inequality (into between-group and within-group) is taken as inequality of opportunity ("tranche" or ex-post approach).

On the other hand, Bourguignon *et al.* (2007) used a parametric approach to obtain inequality of opportunity in earnings in urban Brazil by comparing the inequality in actual distribution of earnings in the sample with the inequality in distribution of counterfactual earnings for the same sample. The counterfactual earnings were generated under the counterfactual of the same set of circumstances

for the whole sample. For generating the counterfactual distribution, earnings was assumed to be a linear function of circumstances, effort, and other factors (or luck), and the estimates thus obtained were used to generate the counterfactual earnings for the whole sample simply by replacing individual circumstance values with the sample average of each circumstance variable (the procedure is explained in detail subsequently). The difference in inequality in actual earnings distribution and the inequality in counterfactual earnings distribution is then taken as inequality of opportunity.

Ferreira and Gignoux (2008) used both parametric and non-parametric approaches to estimate inequality of opportunity in earnings as well as consumption expenditure in six Latin American countries. Checchi *et al.* (2010) also used both approaches to estimate inequality of opportunity in earnings in 25 European countries. While the existing literature has used parametric as well as non-parametric approaches, it must be noted that both parametric and non-parametric approaches have advantages as well as limitations. The non-parametric models avoid the arbitrary choice of a specific functional form on the relationship between outcome (earnings or consumption expenditure), circumstances, and effort but suffer from data insufficiency problems once the number of circumstance variables increases. In addition, they fail to capture the partial effects of individual circumstances on outcomes. Parametric models, however, can include a relatively large number of circumstance variables, and thus allow estimation of the partial effects of individual circumstances on outcomes. The parametric approach also allows the decomposition of overall inequality of opportunity into the components due to the direct effect of circumstances on outcomes (direct component) and the effect of circumstances on outcomes through influence on efforts (indirect component). At best the non-parametric and parametric approaches should be seen as complementary (Ferreira and Gignoux, 2008; Checchi *et al.*, 2010).

A few studies have used other approaches to estimate inequality of opportunity. Prominent among this group is the study by Lefranc *et al.* (2008), who used stochastic dominance rankings to compare the distribution of opportunities in nine OECD countries. The use of this approach is rather limited as it fails to provide a quantification of how far the different groups (groups based on circumstances) are from one another. Therefore the ranking of inequality of opportunity across countries is limited to a binary classification, i.e., equal or unequal. The approach also fails to capture the contribution of individual circumstance variables to the overall inequality of opportunity, which is important as far as India with its complex social divide is concerned.

Fleurbaey and Schokkaert (2009) is another noteworthy study, where the authors have analyzed unfair inequalities (similar to inequality of opportunity) in health and health care using the concepts of direct unfairness and fairness gap. Direct unfairness is linked to the variations in medical expenditures and health in the hypothetical distribution in which all legitimate sources of variation are kept constant. The fairness gap is associated with the differences between the actual distribution and the hypothetical distribution in which all illegitimate sources of variation have been removed. Indeed, the concept of fairness gap is very similar to the inequality of opportunity (parametric approach) as proposed by Bourguignon *et al.* (2007), who have associated inequality of opportunity with the differences

between the actual distribution and the hypothetical (counterfactual) distribution in which all illegitimate sources of variation have been removed (that is, the effects of circumstances have been removed). Moreover, the approach adopted by Fleurbaey and Schokkaert (2009) to construct hypothetical distribution is also very similar to that used by Bourguignon *et al.* (2007) for constructing counterfactual distributions.

The third study which needs special mention is Barros *et al.* (2009), whose main focus was on estimation of inequality of opportunity in access to basic services (for example, education) among children of different Latin American and Caribbean countries. The study used inequality of opportunity and human opportunity indices to analyze the inequality of opportunity in access to the aforesaid services. In addition, it also provided non-parametric and parametric estimates of inequality of opportunity in economic outcomes and educational attainment for a number of Latin American countries.

There are a few other papers which have quantified in different contexts the costs and effects of implementing equal opportunity policy as proposed by Roemer (1998). Taking race and parental education as determinants of opportunities in the United States, Betts and Roemer (1999) investigated whether reallocation of educational expenditures would equalize opportunities across individuals in the U.S. In another study, Page and Roemer (2001) examined the extent to which the fiscal system could be seen as an opportunity equalizing device in the United States.

It can be noted that none of the aforementioned studies are based on India. The only study that partially addresses inequality of opportunity in India and deserves mention is by Singh (2010). It used the non-parametric approach proposed by Checchi and Peragine (2010) and estimated inequality of opportunity in wage earnings for males that is attributable to father's education. The sample for the analysis included only urban males who were on wages and were not involved in any other income generating process. The sample size was a little more than 9000, whereas the present study is based on a sample of more than 18,000 (32,000) males in urban (rural) areas. In addition, the present study uses both non-parametric and parametric approaches for estimating inequality of opportunity in the two most commonly used indicators of household welfare: earnings and consumption expenditure. Moreover, the estimation has been carried out separately for different age based cohorts in urban and rural areas. The parametric approach used includes father's occupation, caste, religion, and geographical region along with father's education as circumstance variables. Another important feature of the present analysis that makes it different from the previous analysis is that it provides estimates of inequality of opportunity due to individual circumstances.

The present study is based on the framework (ex-ante) proposed by Ferreira and Gignoux (2008). The non-parametric and parametric analyses are also similar to those of Checchi and Peragine (2010) and Bourguignon *et al.* (2007), respectively. The primary reason for using the ex-ante approach is that by construction it is focused on the inequality between social types (see Checchi *et al.*, 2010, p. 13). The focus on inequality between social types is important given the historical division of Indian society into different caste and religious groups, with some caste and religious groups enjoying better opportunities than the others just because of

their social inheritance. Estimating inequality of opportunity in India in this way not only helps in understanding the genesis of income inequalities but also helps in prioritizing redistribution policies. The next section provides the basic outline of the framework and the details of the data used in the paper.

3. Analytical Framework and Data

The framework starts with the categorization of various factors affecting "outcomes" (also referred as "advantages") into "circumstance" and "effort" variables as defined by Roemer (1998). Following Ferreira and Gignoux (2008, p. 6), a model of outcome of the general form can be defined as follows:[2]

$$(1) \qquad\qquad y = f(C, E, u),$$

where y denotes earnings (or consumption expenditure), f denotes earnings (or consumption expenditure) generating function, C denotes a vector of circumstance variables, E denotes a vector of effort variables, and u stands for pure luck or other random factors. Since effort may itself depend on circumstances, C, as well as other unobserved determinants, v, (1) can be rewritten as:

$$(2) \qquad\qquad y = f[C, E(C, v), u].$$

Going by Roemer's concept of equality of opportunity which requires that $F(y|C) = F(y)$, the following three conditions are implied (Ferreira and Gignoux, 2008, p. 6):

   (i) $\dfrac{\partial f(C, E, u)}{\partial C} = 0$, $\forall\ C$, that is, no circumstance variable should have a direct causal impact on y.

  (ii) $G(E|C) = G(E)$, $\forall\ E$, $\forall\ C$, each effort variable should be distributed independently from all circumstances.

 (iii) $H(u|C) = H(u)$, i.e. random factors and luck are also independent from circumstances. This condition holds by assumption. F, G, and H denote cumulative distributions.

To measure the inequality of opportunity is therefore to measure the extent to which $F(y|C) \neq F(y)$. An obvious first step would be to test for the existence of inequality of opportunity, by examining whether the conditional distribution $F(y|C)$ differs across the elements of C. This has been done by Lefranc et al. (2008), using stochastic dominance concepts and the associated statistical tests to compare the distribution of opportunities across nine OECD countries (Ferreira and Gignoux, 2008, p. 7). In light of the above, the rest of the section is divided into two subsections, one dealing with the non-parametric approach and the other with the parametric approach.

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[2]The present study uses Ferreira and Gignoux's (2008) framework for estimation (which in turn draws from Bourguignon et al., 2007). The notations are retained for coherence and comparison. I do not take any credit for the framework and the paper provides only the basic outline of the framework.

3.1. *Non-Parametric Approach*

The idea here is to construct scalar indices of inequality of opportunity, based on partitioning the population into groups ("types") by circumstance categories. Since the partitioning of the population into subgroups is based on circumstances, the choice of circumstance variables becomes important. For the non-parametric estimation, level of father's education is taken as a measure of circumstances.[3] Once the circumstance variable is identified, any other factors, such as native ability, luck, and so on, are implicitly classified as within the sphere of individual responsibility. Given the agreement on circumstance variables C, define $\{y_i^k\}$ as a partition of the distribution (Ferreira and Gignoux, 2008, p. 7) such that $C_i^k = C^k \Leftrightarrow i \in k, k = 1, \ldots, K$ ($K \leq N$, where N is the size of the population). $\{y_i^k\}$ is then a partition of the population into K groups, such that the individuals of each group are identical with respect to all circumstances in the vector C. Since, in the present case father's education is considered as the sole circumstance variable, vector C comprises only one element. Given the above partition, a scalar measure $\theta : \{y_i^k\} \to R_+$ which captures the degree of inequality of opportunity in the partition is desired.

If $IB(\{y_i^k\})$ denotes the between-group component of inequality over the previously constructed partition of the population, then for any meaningful definition of between-group inequality, stochastic independence implies:

$$(3) \qquad F(y|C) = F(y) \Rightarrow IB(\{y_i^k\}) = 0.$$

The two candidates for $\theta : \{y_i^k\} \to R_+$ could be indices of the form (Ferreira and Gignoux, 2008, p. 8):

$$(4) \qquad \theta(\{y_i^k\}) = IB(\{y_i^k\})$$

or

$$(5) \qquad \theta(\{y_i^k\}) = \frac{IB(\{y_i^k\})}{I(F(y))},$$

where equation (4) defines inequality of opportunity as the absolute level of the between groups inequality in a population, and equation (5) defines it as the same between-group inequality, relative to overall inequality in the outcome in the population. As noted by Ferreira and Gignoux (2008), (5) as a relative measure is actually a mapping $: \{y_i^k\} \to [0, 1]$, for any decomposable inequality index $I\,()$. Subsequently the paper focuses on the relative measure (5) for a more meaningful discussion.

Before partitioning the sample into groups based on father's education for the non-parametric analysis, the samples in urban and rural areas are divided into

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[3]As previous studies on the subject suggest, it will be more desirable to consider the education of both the parents, but the lack of information on mother's education in the dataset leaves us with no choice but to use father's education as the only variable to capture parental education. See Checchi and Peragine (2010), Bowles (1972), and Behrman and Taubman (1976) for a discussion on the possible channels through which parents affect the income earning capacity of the children.

different age based cohorts: 21–30 years, 31–40 years, 41–50 years, and 51–65 years.[4] This allows us not only to measure the role of inequality of opportunities in shaping the inequality of outcomes (earnings or consumption) at a point in time, but also to study how this role may vary across cohorts (Bourguignon *et al.*, 2007). For each cohort, the analysis is performed separately for urban and rural areas. Using the aforementioned framework and father's education as the circumstance variable, the sample of each cohort is partitioned into four groups or cells, that is, individuals whose fathers have no formal schooling (*type 1*), are educated but up to primary school (*type 2*), are educated more than primary but up to a maximum of secondary school (*type 3*), and are educated more than secondary school (*type 4*).[5] Each cell or *type* contains the earnings (consumption expenditure) of the individuals belonging to that *type*. The earnings and the consumption expenditure are the per capita household earnings and the per capita household consumption expenditure, respectively. Once the partition is complete, the analysis uses mean log deviation (MLD; also known as GE (0)) to decompose the inequality in earnings (and consumption expenditure) into within *type* and between *type* components. MLD is chosen because it is the only measure of inequality which satisfies the four standard axioms of (i) anonymity or symmetry, (ii) population replication or replication invariance, (iii) mean independence or scale invariance, and (iv) the Pigou–Dalton principle of transfers, as well as the additional axioms of (v) additive subgroup decomposability and (vi) path independence. The additional properties of additive subgroup decomposability and path independence are particularly important for the present study. The additive subgroup decomposability is important because the study primarily decomposes the total earnings (and consumption expenditure) inequality into within-group and between-group components. Since the interest is in the between-group component, the property of path independence is also required in the sense that the decomposition must yield the same result or the decomposition is invariant to whether within-group inequality is eliminated first and the between-group component computed second, or the reverse.[6]

The non-parametric analysis (and parametric analysis) has been done separately for urban and rural areas because the sources of income and expenditure are very different in these areas. Also, the nature of job market and business environment in urban areas differ considerably from that in rural areas. If urban and rural areas are combined, the results will show a picture which averages the extent of opportunity inequality in the two regions and will fail to capture the contrast between the two regions. For both urban and rural areas, two sets of estimations based on earnings (household per capita) and consumption expenditure (household per capita) have been carried out. This is done to get a clear picture of the

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[4]In line with other studies (see Bourguignon *et al.*, 2007, p. 601), the present study treats cohorts as age homogenous by definition; that is why age (beyond the division of the sample into cohorts based on age) and imputed experience do not appear in the analysis.

[5]The division into four groups has been made considering that these form the major milestones of educational attainment in India. The division is also bounded by sample size. A finer subdivision will increase the number of groups, therefore decreasing the observations in each group and leading to the problem of data insufficiency.

[6]See Checchi and Peragine (2010), Checchi *et al.* (2010), Barros *et al.* (2009), Bourguignon (1979), Shorrocks (1980), Foster and Shneyerov (1999, 2000), and Shorrocks and Wan (2005) for a detailed discussion on the choice of MLD for inequality decomposition and these properties.

opportunity share in two important indicators of household welfare, thus adding completeness to the study and also to have a check on the robustness of the results.

Note that the non-parametric analysis is restricted to father's education as the sole circumstance variable, whereas a combination of it with caste and religion will provide the best picture. Non-parametric analysis based on such a combination suffers from data insufficiency and becomes difficult to interpret. Though caste and religion are not included as circumstances, the non-parametric results are interesting for reasons explained below. First, previous studies (Bourguignon *et al.*, 2007; Ferreira and Gignoux, 2008; Checchi and Peragine, 2010; and the literature on intergenerational mobility) clearly single out parental education as the single most influential circumstance variable as far as inequality of opportunity is concerned. Second, there is a consensus among demographers about the usefulness of parental education as an appropriate variable for capturing family background as far as impact of family circumstances on an individual is concerned (Davis-Kean, 2005; Eccles and Davis-Kean, 2005). Finally, the survey (details provided in Section 3.3) on which the present study is based was conducted in 2004–05 and the individuals included in the sample are more than 20 years of age (i.e., born before 1984). Even if 18 years (as the lower limit) is taken as the age of fathers at the time of the birth of individuals, the fathers would have been born in or before 1966. There is evidence that educational attainment followed caste hierarchy (the same with religion) in that period (Dreze and Sen, 1995; Anitha, 2000; Deshpande, 2001; Desai and Kulkarni, 2008). Therefore, the choice of father's education for non-parametric analysis seems appropriate.

The present study also uses the parametric approach and provides estimates of the overall inequality of opportunity as well as estimates of inequality of opportunity due to individual circumstances. The outline of the framework for the parametric analysis follows.

3.2. *Parametric Approach*

Consider a counterfactual distribution, $\{\tilde{y}_i\}$, corresponding to $F(y|C)$ as the distribution that arises from replacing y_i with $\tilde{y}_i = f[\bar{C}, E(\bar{C}, v_i), u_i]$ in (2), where $\bar{C}$ stands for the vector of sample mean circumstances. To generate this counterfactual distribution, a specific model of (2) needs to be estimated. Following Bourguignon *et al.* (2007) and Ferreira and Gignoux (2008), a log-linear of the form below can be specified:

$$(6) \qquad \ln y = C\alpha + E\beta + u$$

$$(7) \qquad E = BC + v.$$

The reduced form of the structural model (6)–(7) is $\ln y = C(\alpha + \beta B) + v\beta + u$, which can be estimated by OLS as follows (Ferreira and Gignoux, 2008, p. 11):

$$(8) \qquad \ln y = C\varphi + \varepsilon.$$

Under these assumptions regarding the functional form, the counterfactual distribution is given by:

$$(9) \qquad \tilde{y}_i = \exp\left[\bar{C}\hat{\varphi} + \hat{\varepsilon}_i\right].$$

The overall opportunity share of outcome (earnings or consumption expenditure) inequality can now be given as:

$$(10) \qquad \theta_I = \frac{I[\{y_i\}] - I[\{\tilde{y}_i\}]}{I[\{y_i\}]}.$$

It is the difference between the inequality in actual distribution of outcome and the inequality in counterfactual distribution of outcome as a proportion of the inequality in actual distribution of outcome.

The estimation of the partial effects of one (or a subset) of the circumstance variables, controlling for the others, can be obtained by constructing alternative counterfactual distributions, such as:

$$(11) \qquad \tilde{y}_i^J = \exp\left[\bar{C}^J \hat{\varphi}^J + C_i^{j \neq J} \hat{\varphi}^{j \neq J} + \hat{\varepsilon}_i\right].$$

Therefore the circumstance J-specific opportunity inequality share can be given by:

$$(12) \qquad \theta_I^J = \frac{I[\{y_i\}] - I[\{\tilde{y}_i^J\}]}{I[\{y_i\}]}.$$

The next section describes the data (dataset and samples are common for both the non-parametric and the parametric analyses) and the details of the circumstance and the effort variables.

3.3. Data

The data for the present study comes from the India Human Development Survey (IHDS), 2004–05, conducted by the National Council of Applied Economic Research (NCAER), New Delhi, India, in collaboration with the University of Maryland. This is a micro-unit recorded, nationally representative survey based on a stratified, multistage sampling procedure. It covers 26,734 households (143,374 individuals) and 14,820 households (72,380 individuals) in rural and urban areas, respectively. The survey provides information on a person's family background and on other demographic details like sex, religion, parental education, and parental occupation.

The National Sample Survey (NSS) is another nationally representative dataset, which is widely used in studies on poverty and inequality in consumption expenditure in the Indian context. It is not, however, used in the present study for two main reasons. First, the NSS does not provide any information on the earnings for the surveyed households. Second, the NSS fails to provide information on the parental educational status for a large number of individuals in the eligible sample. It only captures the educational status of the members of the household, and does not explicitly collect any information on the educational status (or even occupational status) of the father of the household head. For those individuals

who are household heads but their fathers are not living with them, the survey fails to capture the information on their fathers' educational attainment. This is not the case with the IHDS, because in addition to measuring the educational status of every member of the household, the IHDS explicitly provides information on the educational (and occupational) status of the father of the household head for every surveyed household. The information on the variables like parental education and parental occupational status is especially important because existing studies have found them to be the major contributors to the overall inequality of opportunity in different country settings.

The present study is restricted to males in the age group 21–65 years in both urban and rural areas. It would have been desirable to also include females in the analysis and examine the effect of gender. This could not be done, however, given the lack of information on father's education (and occupation) for most of the adult females included in the survey. Father's education (and father's occupation) was only available for approximately 10 percent of females in the age group 21–65 years in the urban sample, and 6 percent in the rural sample.[7] The main reason for unavailability of father's education (and father's occupation) for the majority of the females is that most of them in the above mentioned age group are either wives or daughters-in-law of the household heads. For this set of females, the information on father's education (and occupation) was not captured in the survey. The IHDS also failed to capture the information on father's education (and occupation) for those females who were household heads.

The urban and rural samples are further restricted to the individuals who are either household heads, or sons or brothers of household heads. These constitute more than 92 percent of the eligible sample (21–65 years) in urban areas, and 93 percent in rural areas. It was done because father's education (and occupation) could be consistently measured only for this set of individuals. Of these, there was an extremely small number of individuals (less than 1 percent in urban areas and less than 2 percent in rural areas) for whom income (or consumption expenditure) was reported as negative. Since negative incomes (consumption expenditure) cannot be included for inequality decomposition using MLD, they were dropped from the sample. This resulted in a final sample of 18,302 and 32,692 males in urban and rural areas, respectively.

For both the non-parametric and the parametric analysis, earnings and consumption expenditures are measured as household per capita earnings and household per capita consumption expenditures. For non-parametric analysis, father's education is measured as the number of completed years of schooling of the father. It is coded into four categories: (i) no formal schooling; (ii) 1–5 years of schooling (educated up to primary or less); (iii) 6–10 years of schooling (more than primary but up to secondary or less); and (iv) more than 10 years of schooling (more than secondary).

For the parametric analysis, the dependent variables are logarithm of earnings (household per capita) and consumption expenditures (household per capita). The circumstance variables include father's education, father's occupation, caste,

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[7]The dataset contains 19,589 females in the age group 21–65 years in urban areas. The corresponding figure for rural areas is 35,467.

religion, and geographical region of residence. The ideal variable for capturing the effect of region would have been the region of birth. But in the absence of information on region of birth, region of residence is taken as a proxy for region of birth. Since the geographical regions of residence are large regions comprising several states, the migration between regions will be low.[8] Father's education is treated as a continuous variable and is measured as the number of years of completed schooling. In urban areas, father's occupation has been categorized into three categories: (i) "higher" status, which includes scientists, engineers, architects, physicians, surgeons, accountants, mathematicians, statisticians, economists, social scientists, teachers, journalists, creative and performing artists, elected and legislative officials, administrative officials (government and local bodies), and managers; (ii) "medium" status, which includes people in clerical jobs, village officials, transport and communication supervisors, and sales professionals like shopkeepers, commercial travelers, insurance, real state, securities and business services, and money lenders; and (iii) "lower" status, which includes farmers, fishermen, agricultural laborers, farm and forestry workers, hunters and related workers, waiters, bartenders and related workers, maids and other housekeeping service workers, sweepers, cleaners and related workers, service workers, and other laborers involved in production, transport equipment and construction. Higher occupation status has been taken as the reference category. For rural areas, "higher" and "medium" occupational categories are combined into one category; "high" and therefore the "lower" category is renamed as "low." This is done because in rural areas a majority (more than 85 percent) of the population falls under the "lower" status category and there are relatively few individuals in the "higher" and "medium" categories.

Caste is categorized into three categories: "General," "Other Backward Castes" (OBC), and "Scheduled Castes and Scheduled Tribes" (SC/ST), with "General" as the reference category. Religion is also grouped into three categories: "Hindu" (who form the majority of population in India), "Muslim," and "Others," with "Hindu" as the reference category.

India is comprised of 29 states and seven Union Territories. The different states of India are at different levels of socio-economic development; most of the eastern and central states of India are economically and demographically lagging behind the other states (Bose, 1991; Bhat and Zavier, 1999). So, any meaningful analysis must take into account the consequence of vast regional diversity present in India. To take care of the effect of geographical region on the outcome measures, parametric analysis also includes geographical region of residence (as a proxy for geographical region of birth) as one of the circumstance variables.

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[8]It may be noted that IHDS provides details about whether an individual has migrated within a state or from another state (but the name of the states is not given). Clearly, within-state migration is not a cause of concern in the present study. In the urban sample, 11.5 percent of the total individuals have migrated from another state; the corresponding figure for the rural sample stands at 1.14 percent. Nothing can be said about inter-region migration, except that the figures for inter-region migration will be lower than the above figures. This is primarily because every region comprises a number of states and therefore many inter-state migration cases will fall into the within-region migration category. When it comes to father's education and father's occupational status, one would naturally like to investigate the extent of correlation between the two. The correlation came out to be low. It was less than 0.45 for the urban cohorts and less than 0.35 for the rural cohorts.

Geographical region is categorized into six categories: North, Central, East, North-East, West, and South. The Northern region comprises the states of Jammu & Kashmir, Himachal Pradesh, Delhi, Uttaranchal, Punjab, Haryana, and Rajasthan. The states of Uttar Pradesh, Madhya Pradesh, and Chattisgarh come under the Central region. The Eastern region comprises the states of Bihar, Jharkhand, West Bengal, and Orissa. The North-Eastern region includes the seven north-eastern sister states, namely Assam, Arunachal Pradesh, Meghalaya, Manipur, Tripura, Nagaland, and Sikkim. The Western region includes the states of Maharashtra, Goa, and Gujarat. Finally, the Southern region comprises the states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Pondicherry. The Northern region has been taken as the reference category.

4. Results

Given the difference between the two approaches and the fact that non-parametric analysis is based only on father's education as the circumstance variable, whereas parametric analysis is based on a set of circumstance variables, the results of the two analyses are presented separately.

4.1. *Non-Parametric Results*

Table 1 reports cohort wise mean earnings (and consumption expenditure) of individuals belonging to different *types* for urban and rural areas. It is easy to note that individual earnings are increasing with the increase in the level of father's education for all the age cohorts in the urban as well as the rural sample. This reinforces the belief that parental education has a high influence on earnings (or consumption).[9]

As expected, the opportunity share of overall inequality (income or consumption) is substantial in urban areas. The results (decomposition of overall inequality into within-*types* and between-*types*) which are summarized in Table 2 (A) indicate that the inequality of opportunity as a percentage of total observed earnings inequality ranges from 11 to 19 percent across different cohorts (simple average across cohorts being 14 percent). The same varies from 10 to 19 percent across different cohorts (simple average across cohorts being 14 percent) when inequality in consumption expenditure is considered. For earnings as well as consumption expenditure inequality, the opportunity share is higher for younger cohorts and is lowest for the oldest cohort.

The inequality of opportunity estimates for rural areas (Table 2 (B)) are lower than that for the urban areas. The opportunity share of overall inequality in earnings ranges from 5 to 8 percent across the cohorts (simple average across cohorts being 6 percent). The same figures vary from 5 to 9 percent with a simple average of 6 percent (across the cohorts) when unit of analysis is the consumption

[9]As noted in Section 3, the first step should be to test the existence of inequality of opportunity, by examining whether conditional distributions $F(y|C)$ differ across the elements of C. This has been tested and confirms the expectation of existence of inequality of opportunity in India. See Appendix 1 for an illustration of distribution of consumption expenditure conditional on father's education for each of the cohorts in urban areas. Since the conditional distribution functions never cross, first order dominance is satisfied in all cases.

TABLE 1

DESCRIPTIVE STATISTICS (EARNINGS AND CONSUMPTION EXPENDITURE): NON-PARAMETRIC ANALYSIS

Cohorts → Father's Education (types) ↓	Earnings					Consumption Expenditure				
	First	Second	Third	Fourth	Total	First	Second	Third	Fourth	Total
(A) Urban										
(Type 1) No formal education	10,464.92	10,788.68	12,954.12	16,119.01	12,402.97	859.24	857.13	1,019.77	1,200.26	972.44
	9,458.19	12,069.69	13,161.43	19,449.59	13,921.92	640.87	585.17	784.64	1,283.14	853.14
	1,596	1,900	1,630	1,416	6,542	1,596	1,900	1,630	1,416	6,542
(Type 2) Educated but up to primary or less	12,780.20	14,271.08	17,425.58	20,215.65	15,835.38	936.55	1,051.78	1,199.36	1,353.33	1,116.93
	11,847.29	15,717.73	18,811.29	21,367.20	17,130.52	720.23	817.86	914.57	1,353.68	965.75
	1,130	1,074	933	833	3,970	1,130	1,074	933	833	3,970
(Type 3) More than primary and up to secondary	17,232.66	18,725.23	21,635.82	28,111.44	20,067.81	1,191.68	1,254.19	1,539.35	1,810.94	1,365.81
	16,714.90	19,475.55	17,920.45	26,691.40	19,761.78	1,001.31	954.20	1,213.46	1,712.04	1,181.70
	2,062	1,445	1,031	767	5,305	2,062	1,445	1,031	767	5,305
(Type 4) More than secondary	29,146.65	27,109.97	34,933.13	41,595.84	30,843.01	1,965.85	1,737.34	2,118.60	2,528.61	1,987.08
	26,173.85	24,462.43	49,461.83	36,786.17	31,957.96	1,955.10	1,513.37	2,111.53	2,374.53	1,932.41
	1,119	710	376	280	2,485	1,119	710	376	280	2,485
Total	16,809.29	16,013.19	18,341.23	22,109.36	17,872.98	1,199.71	1,131.60	1,300.98	1,493.90	1,255.57
	17,918.02	18,029.26	22,576.39	24,797.54	20,507.48	1,199.73	961.30	1,168.53	1,576.39	1,217.77
	5,907	5,129	3,970	3,296	18,302	5,907	5,129	3,970	3,296	18,302
(B) Rural										
(Type 1) No formal education	6,869.16	6,423.44	7,403.46	8,726.70	7,316.70	626.16	609.30	705.21	761.74	672.65
	8,424.20	8,080.01	10,659.03	9,931.82	9,324.67	522.53	483.15	605.99	709.23	585.71
	4,983	5,239	4,691	4,612	19,525	4,983	5,239	4,691	4,612	19,525
(Type 2) Educated but up to primary or less	7,912.72	8,166.78	9,814.90	12,013.74	9,087.68	699.98	700.45	865.80	996.10	785.40
	8,317.11	10,323.43	12,201.29	16,980.47	11,686.79	543.87	619.40	900.35	1,224.11	805.69
	2,490	1,968	1,381	1,276	7,115	2,490	1,968	1,381	1,276	7,115
(Type 3) More than primary and up to secondary	11,112.19	10,753.54	14,116.36	16,890.38	11,952.76	942.87	854.90	1,050.74	1,310.96	968.56
	13,020.38	12,997.10	25,127.00	20,753.01	15,997.87	887.85	751.65	885.07	2,049.53	1,036.37
	2,498	1,309	612	475	4,894	2,498	1,309	612	475	4,894
(Type 4) More than secondary	15,716.69	12,989.52	15,805.61	18,320.32	15,115.84	1,199.60	964.15	1,221.58	1,570.57	1,157.38
	15,654.20	13,942.07	16,160.84	15,711.20	15,303.67	1,434.46	791.95	1,246.54	1,822.97	1,302.91
	655	321	117	65	1,158	655	321	117	65	1,158
Total	8,656.54	7,691.60	8,641.74	10,079.47	8,672.41	753.26	678.87	777.80	857.03	758.66
	10,513.08	9,893.66	13,216.51	12,975.48	11,509.24	733.62	583.65	728.00	1,015.76	764.06
	10,626	8,837	6,801	6,428	32,692	10,626	8,837	6,801	6,428	32,692

Notes: First row: mean; Second row: standard deviation; Third row: number of observations.
Earnings and consumption expenditure are per capita household earnings (annual in Indian rupees) and per capita household consumption expenditure (monthly in Indian rupees).
First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

TABLE 2

INEQUALITY DECOMPOSITION (WITHIN TYPES AND BETWEEN TYPES: NON-PARAMETRIC) BY COHORTS: MEAN LOG DEVIATION (MLD)

	Urban (A)				Rural (B)			
	Opportunity Inequality (Between-Type)	Effort Inequality (Within-Type)	Total Inequality	Opportunity Share of Total Inequality (%)	Opportunity Inequality (Between-Type)	Effort Inequality (Within-Type)	Total Inequality	Opportunity Share of Total Inequality (%)
Panel (1): Earnings								
First	0.068	0.298	0.366	18.5	0.034	0.373	0.407	8.4
Second	0.053	0.341	0.394	13.6	0.025	0.415	0.440	5.6
Third	0.051	0.336	0.387	13.1	0.026	0.434	0.460	5.7
Fourth	0.049	0.398	0.447	11.0	0.024	0.440	0.464	5.2
Panel (2): Consumption expenditure								
First	0.046	0.199	0.245	18.9	0.022	0.216	0.238	9.4
Second	0.030	0.187	0.217	13.8	0.010	0.205	0.215	4.7
Third	0.029	0.207	0.236	12.4	0.011	0.225	0.236	4.6
Fourth	0.030	0.260	0.290	10.2	0.017	0.262	0.279	6.2

Note. First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

expenditure. As in the case of urban India, the estimates of inequality of opportunity based on earnings and consumption expenditure are fairly close in rural areas.

Here it is important to note that the estimates for rural India are substantially lower than that for urban India (almost half). The absence of high paying jobs (i.e., under developed labor markets) in the rural areas, due to which individuals are forced to either pursue their traditional occupation or engage in low paying jobs, might explain this. Also, it is very likely that those who are successful in getting a high paying job or higher income source in urban areas migrate and add to the disparities in urban areas rather than to the disparities in rural areas. Furthermore, infrastructural constraints in rural areas limit the choices available to fathers regarding decisions about their children. For example, if parents take decisions on their children's schooling which may later affect their earning potential, then in the absence of choices in availability of schools, a father with ten years of schooling will be forced to send his child to the same (and only) village school where a father with five years of schooling is sending his child. Therefore, father's better education might not translate into better schooling for their children, which in turn will not translate into better earnings.

4.2. *Parametric Results*

The descriptive statistics for the main variables used in the parametric analysis are presented in Table 3. It can be seen that the mean years of completed schooling of fathers decreases as one moves from younger to older cohorts in urban as well as rural areas. Also, the figures are higher for urban cohorts compared to their rural counterparts. Moreover, fathers of a majority of individuals fall in the "lower" occupational category.[10]

To obtain the overall opportunity share of earnings (and consumption expenditure) inequality, the reduced form equation (8) has been estimated. Table 4 reports the results of the reduced form regression for urban areas. As expected, belonging to "OBC" or "SC/ST" categories is associated with significantly lower earnings (consumption expenditure) compared to those belonging to the "General" category. Similarly, religion also plays an important role; being in the "Muslim" category is associated with significantly lower earnings (consumption expenditure) than being a "Hindu." The above relationships are true for all the cohorts. Regional differences are marked, with individuals from the central and eastern regions having significantly lower earnings than individuals from the northern region. This is true for all the cohorts.

Father's education is always positively associated (significantly so) with earnings (and consumption expenditure). The same is true for father's occupational status. Individuals whose fathers belong to the "medium" or "lower" occupational status categories have significantly lower earnings (and consumption expenditure) than those whose fathers belong to the "higher" occupational category. The findings for rural areas (Table 5) are similar to those obtained for urban areas.

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[10]Mean earnings by caste, religion, region, and father's occupational status are presented in Appendix 2.

TABLE 3
DESCRIPTIVE STATISTICS: PARAMETRIC ANALYSIS

	Urban					Rural				
Cohorts →	First	Second	Third	Fourth	All	First	Second	Third	Fourth	All
Mean earnings (Indian rupees, annual)	16,809.29	16,013.19	18,341.23	22,109.36	17,872.98	8,656.54	7,691.60	8,641.74	10,079.47	8,672.41
Mean consumption expenditure (rupees, monthly)	1,199.71	1,131.60	1,300.98	1,493.90	1,255.569	753.26	678.87	777.80	857.03	758.66
Mean father's number of years of schooling	6.40	5.17	4.47	4.16	5.23	3.69	2.51	1.69	1.43	2.51
Caste (%)										
Others	41.09	42.70	43.98	47.21	43.27	26.86	27.91	28.42	29.22	27.93
OBC	38.80	37.63	37.66	36.35	37.78	40.82	39.72	39.61	40.59	40.23
SC/ST	20.11	19.67	18.36	16.44	18.95	32.32	32.38	31.97	30.20	31.84
Religion (%)										
Hindu	75.11	77.93	79.14	78.91	77.46	82.38	82.63	82.24	82.92	82.52
Muslim	18.45	15.62	13.40	13.56	15.68	10.11	9.25	9.51	8.81	9.49
Others	6.43	6.45	7.46	7.52	6.86	7.51	8.12	8.25	8.28	7.98
Regions (%)										
North	24.97	23.98	23.45	23.00	24.01	24.36	22.27	22.36	22.57	23.03
East	16.64	17.76	18.44	19.84	17.92	14.80	16.30	16.03	15.54	15.61
North-East	4.72	3.86	3.93	4.34	4.24	5.01	5.13	4.87	5.66	5.14
Central	15.30	14.02	13.73	13.68	14.31	22.12	20.87	20.19	20.04	20.97
West	14.54	14.93	14.69	13.65	14.52	12.70	13.75	13.00	12.85	13.07
South	23.82	25.44	25.77	25.49	25.00	21.01	21.69	23.56	23.34	22.18
Father's occupational status (%)										
Higher status	13.44	12.38	10.28	9.89	11.82	12.55	9.03	6.87	6.21	9.17
Medium status	18.67	19.57	20.13	20.18	19.51					
Lower status	67.89	68.04	69.60	69.93	68.67	87.45	90.97	93.13	93.79	90.83
Number of observations	5,907	5,129	3,970	3,296	18,302	10,626	8,837	6,801	6,428	32,692

Notes: Earnings and consumption expenditure are per capita household earnings and per capita household consumption expenditure. First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

TABLE 4

REDUCED-FORM OLS REGRESSIONS OF EARNINGS AND CONSUMPTION EXPENDITURE ON OBSERVED CIRCUMSTANCES BY COHORTS: URBAN

	Earnings				Consumption Expenditure			
	First	Second	Third	Fourth	First	Second	Third	Fourth
Caste (reference: general)								
OBC	-0.239***	-0.242***	-0.272***	-0.286***	-0.192***	-0.185***	-0.194***	-0.210***
	(0.024)	(0.026)	(0.030)	(0.037)	(0.018)	(0.019)	(0.022)	(0.027)
SC/ST	-0.266***	-0.290***	-0.334***	-0.344***	-0.240***	-0.251***	-0.313***	-0.325***
	(0.029)	(0.032)	(0.037)	(0.048)	(0.022)	(0.023)	(0.027)	(0.035)
Religion (reference: Hindu)								
Muslim	-0.306***	-0.371***	-0.466***	-0.451***	-0.191***	-0.260***	-0.335***	-0.318***
	(0.027)	(0.032)	(0.038)	(0.047)	(0.021)	(0.023)	(0.028)	(0.034)
Others	0.125***	0.178***	0.123**	0.107*	0.061*	0.025	0.016	0.018
	(0.042)	(0.046)	(0.049)	(0.061)	(0.031)	(0.033)	(0.036)	(0.044)
Region (reference: North)								
East	-0.214***	-0.132***	-0.199***	-0.185***	-0.260***	-0.240***	-0.307***	-0.216***
	(0.032)	(0.035)	(0.039)	(0.049)	(0.024)	(0.025)	(0.029)	(0.035)
North-East	0.038	0.094	0.050	-0.104	-0.171***	-0.136***	-0.163***	-0.168***
	(0.050)	(0.061)	(0.069)	(0.083)	(0.038)	(0.044)	(0.051)	(0.060)
Central	-0.294***	-0.333***	-0.222***	-0.326***	-0.241***	-0.290***	-0.256***	-0.232***
	(0.033)	(0.038)	(0.043)	(0.054)	(0.025)	(0.027)	(0.032)	(0.039)
West	0.000	0.025	-0.047	-0.106**	-0.116***	-0.100***	-0.172***	-0.125***
	(0.033)	(0.037)	(0.042)	(0.054)	(0.025)	(0.026)	(0.031)	(0.039)
South	-0.020	-0.051	-0.020	-0.161***	-0.032	-0.078***	-0.065***	-0.083**
	(0.029)	(0.033)	(0.037)	(0.046)	(0.022)	(0.023)	(0.027)	(0.034)
Father's years of schooling	0.050***	0.048***	0.051***	0.051***	0.040***	0.034***	0.039***	0.040***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)
Father's occupational status (reference: higher)								
Medium	-0.124***	-0.075*	-0.129***	-0.140**	-0.063**	-0.015	-0.002	-0.118***
	(0.036)	(0.041)	(0.049)	(0.062)	(0.027)	(0.029)	(0.036)	(0.045)
Low	-0.209***	-0.188***	-0.137***	-0.211***	-0.149***	-0.105***	-0.078**	-0.153***
	(0.033)	(0.038)	(0.046)	(0.058)	(0.024)	(0.027)	(0.034)	(0.042)
Constant	9.488***	9.450***	9.618***	9.877***	6.965***	6.989***	7.130***	7.275
	(0.043)	(0.048)	(0.056)	(0.070)	(0.033)	(0.034)	(0.041)	(0.051)
Sample size	5907	5129	3970	3296	5907	5129	3970	3296
Adj R-squared	0.209	0.202	0.194	0.166	0.223	0.204	0.214	0.178

Notes: Dependent variable for earnings (consumption expenditure) is log of annual household per capita earnings (monthly household per capita consumption expenditure).

Figures in parentheses are standard errors.

***Significant at 1%; **significant at 5%; *significant at 10%.

First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

TABLE 5

REDUCED-FORM OLS REGRESSIONS OF EARNINGS AND CONSUMPTION EXPENDITURE ON OBSERVED CIRCUMSTANCES BY COHORTS: RURAL

	Earnings				Consumption Expenditure			
	First	Second	Third	Fourth	First	Second	Third	Fourth
Caste (reference: General)								
OBC	-0.198***	-0.239***	-0.215***	-0.236***	-0.132***	-0.160***	-0.170***	-0.197***
	(0.021)	(0.024)	(0.028)	(0.029)	(0.014)	(0.015)	(0.018)	(0.019)
SC/ST	-0.309***	-0.365***	-0.349***	-0.360***	-0.302***	-0.362***	-0.361***	-0.408***
	(0.023)	(0.026)	(0.030)	(0.032)	(0.015)	(0.016)	(0.020)	(0.021)
Religion (reference: Hindu)								
Muslim	-0.077***	-0.162***	-0.254***	-0.184***	0.003	-0.129***	-0.157***	-0.095***
	(0.028)	(0.034)	(0.039)	(0.042)	(0.019)	(0.021)	(0.025)	(0.028)
Others	0.150***	0.059*	0.105**	0.189***	0.102***	0.036	0.053**	0.169***
	(0.032)	(0.036)	(0.041)	(0.044)	(0.022)	(0.022)	(0.027)	(0.029)
Geographical regions (reference: North)								
East	-0.538***	-0.574***	-0.614***	-0.572***	-0.463***	-0.494***	-0.517***	-0.526***
	(0.027)	(0.031)	(0.036)	(0.038)	(0.018)	(0.019)	(0.023)	(0.025)
North-East	-0.005	0.105**	0.058	0.049	-0.226***	-0.175***	-0.266***	-0.232***
	(0.041)	(0.046)	(0.056)	(0.055)	(0.028)	(0.029)	(0.036)	(0.037)
Central	-0.532***	-0.593***	-0.530***	-0.577***	-0.531***	-0.574***	-0.545***	-0.543***
	(0.024)	(0.029)	(0.034)	(0.036)	(0.016)	(0.018)	(0.022)	(0.024)
West	-0.211***	-0.282***	-0.303***	-0.325***	-0.228***	-0.268***	-0.262***	-0.248***
	(0.028)	(0.032)	(0.038)	(0.040)	(0.019)	(0.020)	(0.025)	(0.027)
South	-0.189***	-0.259***	-0.213***	-0.240***	-0.123***	-0.178***	-0.148***	-0.111***
	(0.025)	(0.028)	(0.033)	(0.035)	(0.017)	(0.018)	(0.021)	(0.023)
Father's years of schooling	0.039***	0.039***	0.046***	0.049***	0.034***	0.026***	0.033***	0.043***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.001)	(0.002)	(0.003)	(0.003)
Father's occupational status (reference: high)								
Low	-0.229***	-0.158***	-0.156***	-0.157***	-0.103***	-0.100***	-0.080***	-0.135***
	(0.026)	(0.034)	(0.046)	(0.050)	(0.018)	(0.021)	(0.030)	(0.033)
Constant	9.155***	9.085***	9.175***	9.336***	6.746***	6.804***	6.908***	7.000***
	(0.034)	(0.042)	(0.054)	(0.057)	(0.023)	(0.026)	(0.035)	(0.038)
Sample size	10,626	8,837	6,801	6,428	10,626	8,837	6,801	6,428
Adj R-squared	0.158	0.143	0.130	0.127	0.234	0.232	0.213	0.230

Notes: Dependent variable for earnings (consumption expenditure) is log of annual household per capita earnings (monthly household per capita consumption expenditure).

Figures in parentheses are standard errors.

***Significant at 1%; **significant at 5%; *significant at 10%.

First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

Using the coefficients estimates from the reduced form equation (8), reported in Table 4 (urban) and Table 5 (rural), counterfactual distributions corresponding to equation (9) have been obtained for urban and rural areas. This helps to decompose earnings (and consumption expenditure) inequality for each cohort in the urban and rural samples into a component due to unequal circumstances (inequality of opportunity) and a residual component due to all factors other than the observed circumstances which may be "efforts," random elements, or any other unaccounted factor. Table 6 presents the MLD coefficients for factual and counterfactual earnings (and consumption expenditure) distributions for all cohorts in the urban and rural areas. It also reports the corresponding estimates of overall inequality of opportunity.

In urban areas (Table 6 (A)), the overall opportunity share in total observed earnings inequality ranges from 26 to 18 percent across the youngest to oldest cohorts, the simple average across cohorts being 21 percent. The corresponding figures for consumption expenditure inequality are 25 and 16 percent, respectively, with a simple average of 21 percent across cohorts. In rural areas (Table 6 (B)), the overall opportunity share in total observed earnings inequality ranges from 21 to 16 percent across different cohorts, the simple average across cohorts being 18 percent. The opportunity share is highest for the youngest cohort and lowest for the two oldest cohorts. The corresponding figures for consumption expenditure inequality are 23 and 20 percent, respectively, with a simple average across cohorts being 22 percent. A noteworthy finding is that the opportunity share estimates for urban and rural areas are comparable when multiple circumstances are used. The opportunity share estimates (every cohort) for rural areas using father's education alone as a circumstance variable (non-parametric analysis) were almost half of the estimates for the urban areas. This can happen only if circumstances other than father's education have a greater influence on earnings (and consumption expenditure) in rural areas compared to the urban areas.

Table 7 presents the MLD coefficients for factual earnings (and consumption expenditure) and counterfactual earnings (and consumption expenditure), obtained by equalizing each individual circumstance variable in turn, while controlling for all others (using equation (11)). Each circumstance specific opportunity shares of total observed inequality are also reported. It is important to mention that the estimates of circumstance specific opportunity shares of total inequality should be best interpreted as descriptive evidence, because if any unobserved circumstance variable is correlated with the individual (observed) circumstance variables, then the estimates are likely to be biased.

In urban areas (Table 7 (A)), it is the father's education which seems to have the maximum opportunity share in earnings inequality (Panel 1, column 10). The opportunity share in total observed earnings inequality due to father's education varies from 18 to 11 percent across the youngest to oldest cohort. The figures are almost equal to those obtained using non-parametric analysis. The second largest opportunity share in earnings inequality results from caste (column 4) and is about 4–5 percent. Similar patterns are observed in the case of consumption expenditure inequality (Panel 2).

In the case of rural areas (Table 7 (B)), the estimates of opportunity shares of total observed earnings (and consumption expenditure) inequality due to father's

TABLE 6

THE CONTRIBUTION OF UNEQUAL OPPORTUNITIES TO EARNINGS AND CONSUMPTION EXPENDITURE INEQUALITY, BY COHORTS: MEAN LOG DEVIATION AND RATIOS

	Urban (A)				Rural (B)			
	Total Observed (factual) Inequality (1)	Inequality in Counterfactual Distribution (2)	Inequality of Opportunity (level) [(1) – (2)]	Overall Opportunity Share in Total Observed Inequality [(1) – (2)]/(1)	Total Observed (factual) Inequality (1)	Inequality in Counterfactual Distribution (2)	Inequality of Opportunity (level) [(1) – (2)]	Overall Opportunity Share in Total Observed Inequality [(1) – (2)]/(1)
Panel (1): Earnings								
First	0.366	0.272	0.094	0.256	0.407	0.323	0.084	0.208
Second	0.394	0.310	0.084	0.213	0.440	0.359	0.091	0.184
Third	0.386	0.310	0.076	0.199	0.460	0.387	0.073	0.158
Fourth	0.447	0.365	0.082	0.183	0.464	0.390	0.074	0.160
Panel (2): Consumption expenditure								
First	0.245	0.185	0.060	0.245	0.238	0.182	0.056	0.232
Second	0.217	0.170	0.047	0.218	0.215	0.167	0.048	0.224
Third	0.236	0.186	0.050	0.211	0.236	0.190	0.046	0.197
Fourth	0.290	0.244	0.046	0.160	0.269	0.213	0.056	0.208

Note: First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

TABLE 7

THE CONTRIBUTION OF INDIVIDUAL CIRCUMSTANCE VARIABLES TO EARNINGS AND CONSUMPTION EXPENDITURE INEQUALITY, BY COHORTS: MEAN LOG DEVIATION (AND RATIOS)

	Total Observed Inequality (MLD, factual) (1)	Equalizing Caste		Equalizing Religion		Equalizing Region		Equalizing Father's Education		Equalizing Father's Occupation	
		MLD Estimate (CFD) (2)	Share in Total Observed Inequality [(1) – (2)]/(1)	MLD Estimate (CFD) (3)	Share in Total Observed Inequality [(1) – (3)]/(1)	MLD Estimate (CFD) (4)	Share in Total Observed Inequality [(1) – (4)]/(1)	MLD Estimate (CFD) (5)	Share in Total Observed Inequality [(1) – (5)]/(1)	MLD Estimate (CFD) (6)	Share in Total Observed Inequality [(1) – (6)]/(1)
(A) Urban											
Panel (1): Earnings											
First	0.366	0.349	0.044	0.354	0.033	0.358	0.022	0.300	0.180	0.349	0.044
Second	0.394	0.378	0.041	0.379	0.039	0.386	0.021	0.341	0.136	0.380	0.036
Third	0.386	0.366	0.053	0.370	0.042	0.386	0.000	0.335	0.132	0.380	0.017
Fourth	0.447	0.424	0.051	0.430	0.037	0.441	0.013	0.397	0.111	0.434	0.027
Panel (2): Consumption expenditure											
First	0.245	0.235	0.043	0.240	0.022	0.240	0.021	0.201	0.180	0.236	0.039
Second	0.217	0.206	0.052	0.211	0.026	0.212	0.024	0.187	0.138	0.210	0.031
Third	0.236	0.223	0.057	0.228	0.036	0.232	0.015	0.207	0.124	0.231	0.019
Fourth	0.290	0.276	0.047	0.284	0.020	0.286	0.012	0.260	0.102	0.284	0.019
(B) Rural											
Panel (1): Earnings											
First	0.407	0.390	0.043	0.404	0.009	0.369	0.094	0.375	0.079	0.397	0.026
Second	0.440	0.416	0.054	0.439	0.002	0.400	0.090	0.416	0.054	0.436	0.010
Third	0.460	0.439	0.045	0.457	0.007	0.428	0.070	0.436	0.053	0.456	0.008
Fourth	0.464	0.440	0.052	0.457	0.016	0.432	0.071	0.441	0.050	0.461	0.007
Panel (2): Consumption expenditure											
First	0.238	0.224	0.057	0.236	0.005	0.213	0.106	0.216	0.091	0.235	0.013
Second	0.215	0.200	0.074	0.215	0.000	0.189	0.124	0.205	0.047	0.213	0.010
Third	0.236	0.220	0.067	0.235	0.004	0.212	0.102	0.225	0.047	0.235	0.006
Fourth	0.279	0.255	0.087	0.275	0.013	0.248	0.111	0.262	0.061	0.276	0.009

Notes: MLD, mean log deviation; CFD, counterfactual distribution.
First cohort: 21–30 years; Second cohort: 31–40 years; Third cohort: 41–50 years; Fourth cohort: 51–65 years.

education do not seem to be as dominating as in the case of urban India. If earnings inequality is considered, then for the youngest cohort the opportunity share due to caste (4 percent) is lower than that of father's education (8 percent). But for the oldest cohort it is marginally higher (5.2 and 5 percent, respectively). In case of inequality in consumption expenditure, barring the exception of the youngest cohort, the opportunity shares due to caste are higher than that of father's education. But whether it is earnings inequality (Panel 1) or consumption expenditure inequality (Panel 2), the highest opportunity share in every cohort is due to geographical region of residence (column 8).

There is evidence that the opportunity shares of circumstances other than father's education are relatively larger in rural areas as compared to urban areas. The opportunity share estimates of total observed earnings (and consumption expenditure) inequality due to father's education as the circumstance variable in rural areas, which was nearly half of the estimated share in urban areas, appears to be compensated by the increased role of other circumstance variables (caste and geographical region) in rural areas. Some additional discussion on the above findings is presented in the next section.

5. Discussion and Conclusion

This paper presents the estimates of overall inequality of opportunity in earning (and consumption expenditure), both as level and as share of total observed earnings (and consumption expenditure) inequality for India. In addition it provides evidence on the circumstance specific shares of overall earnings and consumption expenditure inequality in India. The paper utilizes both non-parametric and parametric approaches to obtain the estimates of inequality of opportunity in India to get a comprehensive picture. Since the present paper is a first attempt in this direction in India, it is worthwhile to compare the inequality of opportunity levels in India (based on the estimates of this paper) to the corresponding levels presented in earlier studies for other countries. The findings of the present analysis can be compared with those for the other countries because the frameworks used are similar. It is also important to mention that the comparisons are based on the absolute levels of inequality of opportunity (MLD estimates).

The non-parametric results based on father's education as the sole circumstance variable can be compared with Checchi and Peragine (2010), whose estimates of inequality of opportunity for Italy are also based on the non-parametric approach with parental education as the sole circumstance variable. Their estimate of absolute inequality of opportunity in earnings (ex-ante), which is 0.009 for males for the whole of Italy, is substantially lower than the absolute inequality of opportunity in both the urban (0.055; simple average across cohorts) and rural areas (0.027; simple average across cohorts) of India. In fact the inequality of opportunity among Italian men is considerably lower than the inequality of opportunity for any of the age cohorts considered in the present analysis.

It is not appropriate to compare the non-parametric estimates of the present paper with the non-parametric estimates of earlier papers such as Checchi *et al.* (2010) and Ferreira and Gignoux (2008), because the non-parametric analysis used in these papers is based on a broader set of circumstances whereas the present

paper uses only father's education as the circumstance variable for the non-parametric analysis. But the parametric estimates of the overall inequality of opportunity in earnings and consumption expenditure presented in Checchi *et al.* (2010) and Ferreira and Gignoux (2008) are compared with the parametric estimates of the overall inequality of opportunity in earnings and consumption expenditure presented in this study. Of note is the fact that, when the set of circumstances used in non-parametric and parametric analyses are same and the parametric analysis uses a linear specification, then the estimates of the overall opportunity share of earnings (and consumption expenditure) inequality obtained from the non-parametric and the parametric analysis will be very close (Checchi *et al.*, 2010).

A comparison of the parametric estimates of overall inequality of opportunity in earnings (per capita household) and consumption expenditure (per capita household) for India with corresponding estimates for a set of Latin American countries (Ferreira and Gignoux, forthcoming),[11] reveals that the total inequality of opportunity in earnings as well as consumption expenditure in India is lower than that in the Latin American countries, including Colombia, Peru, Panama, Ecuador, Guatemala, and Brazil. The overall inequality of opportunity in earnings ranges from 0.133 for Columbia to 0.223 for Brazil. The corresponding figures for consumption expenditure are 0.114 for Columbia and 0.213 for Guatemala. The estimate of overall inequality of opportunity in earnings is 0.084 (simple average across cohorts) for urban India and 0.081 (simple average across cohorts) for rural India. The corresponding figures for consumption expenditure are 0.051 (simple average across cohorts) for urban India and 0.052 (simple average across cohorts) for rural India.

The parametric estimates of overall inequality of opportunity in earnings can also be compared with the estimates (parametric, ex-ante) of inequality of opportunity in earnings provided in Checchi *et al.* (2010).[12] They have reported the estimates for 25 European countries (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom). It is interesting to note that the overall inequality of opportunity in earnings (parametric, ex-ante) in all these countries, ranging from 0.0037 in Norway to 0.060 in Cyprus, is lower than that of India, with inequality in the most unequal European country (Cyprus, among the 25 countries) being well below the level of inequality of opportunity in earnings observed in urban as well as rural India.

Though the closeness between the estimates of overall opportunity shares of inequality in earnings and consumption expenditure can be interpreted as suggesting that the estimation is robust, some caution needs to be observed while

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[11]The framework of Ferreira and Gignoux (forthcoming) is similar to that of Ferreira and Gignoux (2008), but since former is a more recent study we are comparing our results with it.

[12]Since Checchi *et al.* (2010) provide the level of inequality of opportunity as two components—the direct one which captures the direct influence of circumstances on earnings independent of influence through efforts, and the indirect one which captures the influence of circumstances on earnings through "efforts"—the two components are added to obtain the overall level of inequality opportunity in earnings. This overall level has then been used for comparison with the estimates obtained in this paper which are also the estimates of overall inequality of opportunity in earnings.

interpreting the results. Importantly, the subdivision of samples (urban and rural) in cohorts may not be neutral to the inequality of opportunity measurement because individuals do not have constant earnings and consumption during their lifetime. So the estimates stand for the particular cohorts in the year 2004–05. However, this is a limitation of any study (for example, Bourguignon *et al.*, 2007) which analyses inequality in earnings among individuals belonging to different age groups (separate analysis for each group) at a given point of time. Also, the variation of inequality of opportunity estimates across cohorts should not be interpreted as variation over time. This is because, in the words of Bourguignon *et al.* (2007, p. 613), "they are measured at the same point in time, and it is impossible to disentangle period, age and cohort effects."

Further, the non-parametric estimation may be affected by number of groups or *types* as there is evidence in the existing literature that between-group inequality increases with the number of groups. Therefore, the non-parametric analysis based solely on father's education as circumstance variable identifies the lower bound estimates of inequality of opportunity. This is because including any additional circumstances (or dividing existing circumstance variables into finer categories) would cause each group to be further subdivided, which cannot lower the between-group inequality share and, unless the additional element is orthogonal to the measure of advantage, will in fact, raise it (Barros *et al.*, 2009, p. 127). Similarly, in parametric analysis, the overall estimates are lower bound because (though multiple circumstance variables have been taken) the possibility of existence of other circumstance variables, which are not observed, cannot be ruled out. Adding another circumstance variable to the right-hand side of the reduced regression equation used for generating the counterfactual distribution will reduce the variance of the residuals and increase the variance of the observed circumstances, therefore increasing the inequality of opportunity share (Barros *et al.*, 2009, p. 127).[13]

Even with the above cautions, the results of the present study are important in so far as they give a clear picture about the extent to which circumstances affect the earning ability of an individual. Whether it is urban India or rural India, a substantial part (nearly 20 percent) of total earnings (or consumption) inequality is accounted by unequal circumstances. One of the findings of this study, that parental education has a significant influence on an individual's earnings, along with similar findings for other countries (Bourguignon *et al.*, 2007; Ferreira and Gignoux, 2008), suggests that government should pay increased attention to the education of children of uneducated parents.

Whether the government has been effective in taking education to individuals born to uneducated parents can be checked by calculating the percentage of uneducated individuals born to uneducated fathers as a proportion of total individuals born to uneducated fathers (Table 8). The figure varies from 32 percent (fourth cohort) to 23 percent (first cohort) in urban areas and from 52 percent (fourth cohort) to 29 percent (first cohort) in rural areas. These figures suggest that a large number of individuals born to uneducated parents remain uneducated

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[13]See also Ferreira and Gignoux (2008, p. 13), Checchi *et al.* (2010, p. 12), and Shorrocks and Wan (2005) for further discussion on this point.

TABLE 8

UNEDUCATED INDIVIDUALS BORN TO UNEDUCATED FATHERS AS A
PROPORTION OF TOTAL INDIVIDUALS BORN TO UNEDUCATED
FATHERS BY COHORTS

Cohorts	Urban		Rural	
	P1	P2	P1	P2
Fourth (51–65 years)	32	16	53	41
Third (41–50 years)	27	14	47	36
Second (31–40 years)	28	13	42	30
First (21–30 years)	25	9	32	18

Notes: P1: Proportion of uneducated individuals born to uneducated fathers as a fraction of total individuals born to uneducated fathers; P2: Proportion of uneducated individuals as a fraction of total individuals.

themselves. Also note that the figures are systematically higher than the corresponding figures of percentage of total uneducated individuals in each cohort in both urban and rural areas.

The importance of caste as a factor contributing to the difference between earnings of individuals is in line with many past studies (Deshpande, 2001; Kijima, 2006; Gaiha *et al.*, 2007; Gang *et al.*, 2007; Desai and Kulkarni, 2008). These studies have found that a substantial portion of difference between the achievements (educational attainment or earnings) can be explained by the difference in caste backgrounds of the individuals. The findings of the present study become important if seen in the light of the affirmative action (in terms of reservation of seats in educational institutions and governmental jobs) for individuals belonging to lower caste categories. The study offers some support for the affirmative action.

Moreover, the analysis presented in this paper is a diversion from the conventional studies where the authors try to estimate earnings inequality for different sections and regions of the country. Though their results are useful, by using them one cannot actually get to the roots of the earnings inequality. The present study also goes one step ahead of the studies (Duraisamy, 2002; Kingdon and Theopold, 2006) which have estimated returns to schooling for people of different family backgrounds in India and shown that the returns to schooling for some sections of the society have been more than for other sections, by exploring the possible reasons behind this observation. If returns to schooling depend not only on an individual's education but also on his family background, then it is obvious that the returns to education for individuals belonging to different family backgrounds will be different.

To conclude, inequality of opportunity in outcomes (e.g., earnings) for individuals results from a number of factors, such as, discrimination including preference for individuals of a particular family background over others, social connections of parents and role of family background in formation of aspirations, beliefs and attitudes during childhood, which later influence their earnings (Roemer, 1998; Bourguignon *et al.*, 2007; Checchi and Peragine, 2010). If the influence of these factors on earnings of individuals is to be reduced, thereby reducing inequality of opportunities in society, then two kinds of policies are

desirable. First, policies focused on zero discrimination in opportunities should be encouraged. Second, policies that reduce the effect of family background on a child's chances of acquiring skills and abilities should also be supported. Since inequality of opportunity forms a substantial part of total earnings (consumption expenditure) inequality in India, policies targeting the underlying problems are likely to reduce the overall earnings inequality.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix 1: The Distribution of Per Capita Household Consumption Expenditure (COPC) Conditional on Father's Education (Urban India)

Appendix 2: Cohort Wise Mean Annual Earnings (in Indian Rupees) by Caste, Religion, Region, and Father's Occupation

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