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INEQUALITY OF OPPORTUNITY ACROSS THE SOCIAL GROUPS IN INDIA

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ABSTRACT

Caste is the most meaningful way of classification of Indian population. The family background across the social groups defined by caste is sharply different. The reason behind this disparity is that this way of classification of the society was initially introduced on the basis of occupation. The members of the so called disadvantaged social groups were concentrated at the bottom of occupational hierarchy and the contrary is true for the members of the advantaged social groups. Till this date this type of deprivation is not totally disappeared. This disparity in the family background is having substantial impacts on educational achievement and labour market outcome across the social groups from one to the next generation. This study is an attempt to assess the impact of the disparity in family background on labour market outcome across the samples of the social groups. In other words, it tries to focus on the variability of inequality of opportunity across the social groups in India.

INTRODUCTION

Not all of inequality in the space of outcome is bad (Checchi *et al*., 2010). If this inequality is decomposed into its constituent components according to the factors responsible for it, then components is detected as unfair and other may be considered as fair. The former components of inequality in the outcome or advantage can be attributed to the disparity in the endowment of circumstances, on which individuals are not having any personal choice or preference, and for the latter individuals can be held as responsible. The most important circumstantial variable is family background, such as parental education and occupation, economic status of the household in which an individual is belonged. The component of outcome inequality due to disparity in circumstances is called 'inequality of opportunity' and the component of outcome inequality due to individuals' own preference and choice is designated as 'inequality of effort'. It has been argued that the society should compensate individuals for differences in circumstances, not for bad outcomes due to intentional choices (Dworkin, 1981a and 1981b; Arneson, 1989; Cohen 1989). Roemer (1993, 1996, 1998 and 2006) has made significant contributions in this area and has developed an alternative 'currency' of egalitarian justice. A good number of studies have appeared since Roemer's seminal contribution, which have taken the concept of equality of opportunity further and dealt with the question of how it can be empirically implementable (Bourguignon, *et al*., 2007; Ferreira and Giganoux, 2007; Checchi and Peragine, 2010; Checchi *et al*., 2010). There are broadly two alternative approaches to evaluate inequality of opportunity. These are parametric and non-parametric approaches. Inequality of opportunity can be assessed parametrically by considering an arbitrary functional form on the relationship between outcome, circumstances and efforts. The non-parametric approach does not presuppose any such functional form. In this approach, inequality of opportunity is assessed by using some additive subgroup decomposable measure of inequality after categorizing the population into types and tranches on the basis of the circumstances and efforts. The parametric approach allows us to include any number of circumstance variables in the model, and it enables us to capture the partial effects of individual circumstances, but it confronts the problem of endogeneity in the model. Caste is the most meaningful way of classification of Indian population. The family background across the social groups defined by caste is sharply different. The reason behind this disparity is the origin of this classification of the society, as it was initially introduced on the basis of occupation. The members of the so called disadvantaged social groups were concentrated at the bottom of occupational hierarchy and the contrary is true for the members of the advantaged social groups. For this reason, the members of the successive generations of the disadvantaged social groups are facing obstacles in case of continuing education, which prevents them

to achieve better outcome in the labour market. In contrast the members of the advantaged social groups are systematically in a privilege condition in terms of their family background, especially in terms of parental education and occupation. Till this date the type of deprivation of the members of the disadvantaged social groups in India is not disappeared. This leads to the disparities among the social groups in education, occupation and income. This disparity the outcome space is known as inequality of opportunity as it is due to circumstantial difference. Against this backdrop, this study is an attempt to assess the impact of the disparity in family background on labour market outcome across the samples of the social groups. More specifically we try to focus on the inequality in circumstances on weekly wage earnings or inequality of opportunity in weekly wage earnings across the social groups in India. The rest of this paper is organized as follows. The second section of this paper explains the formalization of the concept of classification of population by circumstances and efforts. Section three describes different approaches to estimate inequality of opportunity. Section four discusses the sources of data source, method used and variables included in the estimation. The fifth section discusses the results of estimation. Section six concludes.

Classification of population circumstances and efforts

In the context of analyzing inequality of opportunity, population of a society can be classified by the categories of circumstances and efforts. If there are 'g' number of circumstance variables and C_i is the number of categories of i-th circumstance variable, then $K (= \prod_{i=1}^{g} C_i)$ is the number types or groups defined from the categories of different circumstances. The individuals within a group have identical circumstance and individuals across the groups have different circumstances. However, effort that an individual exerts to achieve certain outcome cannot be observed, we can deduce the degree of exertion of effort from the variations in outcome within a group, the population within each type can be partitioned into some quantiles or tranches according to the levels of outcome achieved. For this classification to be meaningful, we should assume that 'circumstances' and 'efforts' are independent so that the individuals in a certain class of effort or tranche exert same degree of effort across types. If we partition the population into M quantiles or tranches and K types, then we get M×K tranche-type categories of the population after these classifications. This classified population can be represented by following matrix:

$$[X_{M\times K}] = \begin{bmatrix} X_{11} & X_{12} & \dots & X_{1K} \\ X_{21} & X_{22} & \dots & X_{2K} \\ \dots & \dots & \dots & \dots \\ X_{M1} & X_{M2} & \dots & X_{MK} \end{bmatrix}$$

Where along rows we measure tranches and along columns we measure the types. In each tranche-type cell some observations are included. If there are N_j observations within j-th type, and the distributions across types are partitioned into M tranches, then in the tranche-type cells corresponding to the j-th type, $(\frac{N_j}{M})$ observations are included. We replace the observations within the tranche-type cells by the average values of the attribute of respective tranche-type cells. Therefore, X_{ij} is the average value of the attribute for i-th tranche and j-th type.

Non-parametric approach to inequality of opportunity

We can follow two alternative approaches to assess inequality of opportunity by using the non-parametric method – *ex ante* or 'type' approach and *ex post* or 'tranches' approach. In the 'ex ante' approach, it is assumed that there exists inequality of opportunity if the mean values of the outcome indicator (say, income) for different types are different. Inequality of opportunity can then be assessed simply by computing the differences in the mean values of the outcomes of different types. Therefore, estimated inequality of opportunity according to the *ex ante* approach is nothing but a measure of between-group inequality, where groups are defined by circumstances, and the inequality of efforts is nothing but the within-group inequality. On the contrary, according to the *ex post* approach there exists inequality of opportunity if all those who exerted the same degree of effort are included in a particular 'tranche', but having different circumstances and achieved different levels of outcome. Therefore, irrespective of the approach involved in the process of estimation, the computed value of inequality of opportunity can be explained as the between-group/type inequality, where groups are defined by circumstances. Only the difference between these two approaches is confined to the method of estimation of inequality of opportunity. If an additive subgroup decomposable measure is used to assess inequality of opportunity, then for *ex ante* approach, the inequality of opportunity is estimated as the between-group component of interpersonal inequality in the outcome space, and the inequality of effort is estimated as the within group component of inequality. However, for *ex post* approach, the inequality of opportunity is estimated as the inequality between groups within a tranche.

Data, method and variables

For non-parametric estimation of inequality of opportunity, we use the data collected from the 66th round of household employment and unemployment survey conducted by the National Sample Survey Office (NSSO) of India dating from July, 2009 to June, 2010. We get information on father's education of 205062 individuals in the data set. Out of these 205062 persons, information on weekly wage earnings is available for 22177 persons. Restricting this sample to the individuals aged 25-60 years, the sample size is reduced to 9632 persons. We use this restricted sample to estimate the inequality of opportunity in the distribution of weekly wage earnings. We estimate the weekly wage from the daily wage of the individuals as described in chapter six. We use both *ex post* approach in this study to assess inequality of opportunity. We take father's education as the sole circumstance variable to assess inequality of opportunity in the distribution of weekly wage in India[1]. The family background is measured by the highest educational attainment of father.

[1] In different studies based on the parametric approach (Bourguignon et al., 2007; Ferreira and Giganoux, 2011) father's education has been taken as a circumstance variable along with other variables, such as race, region of birth, etc. However, in the studies based on non-parametric approach (Checchi and Peragine, 2010; Singh, 2011 & 2012) father's education has been taken as the sole circumstance variable as non-parametric analysis suffers from data inadequacy. Moreover, in different studies of intergenerational mobility it is assumed that father's education is an important determinant of child's education.

Table 1. Mean weekly wage in the type-tranche cells (in Rupees)

Tranches	Type one	Type two	Type three	Type four	Type five
Decile 1	160.9 (324)	182.8 (243)	235.5 (233)	321.9 (52)	426.6 (110)
Decile 2	297.5 (324)	326.4 (243)	461.1 (233)	609.7 (52)	952.1 (110)
Decile 3	390.7 (324)	435.2 (243)	615.2 (234)	872.7 (52)	1617.4 (110)
Decile 4	487.8 (324)	534.8 (243)	742 (233)	1261.6 (52)	2300.4 (110)
Decile 5	582.6 (324)	648.2 (243)	920.9 (234)	1816.7 (52)	3118.4 (110)
Decile 6	688.3 (325)	751.5 (243)	1177.1 (233)	2482.3 (53)	3844.9 (111)
Decile 7	758.4 (324)	936.7 (243)	1656.4 (234)	3094.2 (52)	4423 (110)
Decile 8	938.9 (324)	1149.1 (243)	2340.6 (233)	3750.8 (52)	5202.5 (110)
Decile 9	1182.5 (324)	1675.8 (243)	3209 (234)	4667 (52)	6537.5 (110)
Decile 10	2644.8 (325)	3757.4 (244)	5109.3 (234)	6451.4 (53)	11016 (111)

Note: The figures in the parenthesis are the number of observation in the specific type-tranche cell.
Source: NSSO 66thRound, 2009-10.

Table 2. Mean weekly wage in the type-tranche cells across gender groups (in Rupees)

	ST					SC					OBC					Others				
Tranches	Type 1	Type 2	Type 3	Type 4	Type 5	Type 1	Type 2	Type 3	Type 4	Type 5	Type 1	Type 2	Type 3	Type 4	Type 5	Type 1	Type 2	Type 3	Type 4	Type 5
Decile 1	148.1	175.3	242.3	434.6	571.2	154.9	169.3	242.1	205	259.1	171.3	181.4	207.1	405.1	340.6	157.9	206.1	263.5	274.5	478.2
	40	32	23	7	12	93	49	30	6	8	118	101	85	17	28	70	59	93	20	60
Decile 2	275.9	291.9	466	853.6	1158.3	288.3	317.3	424.4	396.2	678.7	300.2	317.9	422.1	654.1	747	316.6	384.7	529	597.5	1085.2
	40	32	23	7	12	94	50	31	6	9	119	102	85	18	28	70	59	94	21	60
Decile 3	363.5	393.5	651	1283.3	1843.1	384.8	403.7	563.7	569	1211.4	386.5	425.1	543.8	923.9	1233.7	442	520.9	687.5	864.7	1886.2
	41	32	24	7	13	94	50	31	7	9	119	102	86	18	29	71	59	94	21	61
Decile 4	456.7	501.5	823.1	1836.6	2514.2	487.3	482.1	697.8	716.8	1682.8	473.6	516.6	672.3	1350	1790.2	545.1	640.8	845.6	1199	2713.7
	40	32	23	7	12	94	50	30	6	9	119	101	85	17	28	70	59	94	21	60
Decile 5	534	657.4	1121.7	2584.1	3275.6	489.9	572.8	810.9	960.8	2374	553.5	633.1	804	1900.1	2380.5	648.8	727.9	1076.3	1726.2	3545.1
	40	32	24	7	12	94	50	31	6	9	119	102	86	18	28	71	59	93	21	60
Decile 6	640.4	754.7	1566.3	3000	3995.5	689.6	652.7	1049.7	1658.3	3239.5	670	737.6	964.9	2386.5	3047.1	735.5	924.2	1420.9	2441.1	4121.7
	41	32	23	7	13	94	50	31	7	9	119	102	85	18	29	70	60	94	21	61
Decile 7	724.6	949.3	2102.1	3438.7	4488.2	749.9	784.1	1512.3	2533.3	3874.3	725.4	904.8	1239.4	2991.6	3840.4	892.3	1128.5	1983.1	3108	4784
	40	32	24	7	12	95	51	30	6	10	120	101	86	17	28	71	59	94	22	60
Decile 8	872.8	1187.2	2708.9	3935.7	5214.5	919.3	964.4	2196.2	3130.4	4897.6	869.7	1112.5	1790.5	3850.4	4500	1083.7	1555.5	2741.9	3741.7	5507.1
	41	32	23	7	13	93	49	31	7	8	118	102	85	18	29	70	59	94	20	61
Decile 9	1103.5	2077.7	3335.4	4271.4	6633.3	1105.1	1208.9	3139.6	4277.3	5700.8	1121.7	1474.8	2703.3	4882.5	5673.7	1519.3	2325.6	3542	4618.9	6897.7
	40	32	24	7	12	95	51	31	6	10	120	102	86	18	28	71	59	94	22	60
Decile 10	3019	3902.5	5066.9	5745.9	8902.1	2356.9	2835.8	5634.1	5842.8	10730.5	2229.7	3242.5	4361.4	6774.5	11753	3364.5	4786.1	5470.3	6500.8	11016.2
	41	33	24	8	13	94	50	31	7	9	119	102	86	18	29	71	60	94	21	61
Total			1213.81					870.13					994.49					1727.26		

Note: First row represents the mean weekly wage and second row represents the number of observations within each type-tranche cell.
So Source: NSSO 66th Round, 2009-10

Table 3. Computed values of 'inequality of opportunity' by caste – *ex post* or *tranche* approach (mean logarithmic deviation)

	Value of IEOP	Value of IEE	Value of I	% of IEOP	% of IEE
ST	0.217	0.32	0.537	40.41	59.59
SC	0.207	0.324	0.531	38.98	61.02
OBC	0.165	0.334	0.499	33.06	66.94
Others	0.136	0.345	0.481	28.27	71.73
India	0.165	0.335	0.501	32.98	67.02

Note: Value of IEOP: Absolute value of Inequality of opportunity; Value of IEE: Absolute Value of Inequality of effort; I: Total Inequality (from mean weekly wages by caste, gender, types and tranches); Percentage contribution of IEOP: % IEOP; and Percentage contribution of IEE: % of IEE.
Source: NSSO 66th Round, 2009-10.

Table 4. Computed values of 'inequality of opportunity' by caste and gender categories – 'Types' approach (mean log deviation)

	Value of IEOP	Value of IEE	Value of I	% of IEOP	% of IEE
ST	0.191	0.346	0.537	35.56	64.44
SC	0.165	0.366	0.531	31.07	68.93
OBC	0.157	0.292	0.499	31.46	68.44
Others	0.131	0.35	0.481	27.23	72.77
India	0.164	0.336	0.501	32.77	67.23

Note: Value of IEOP: Absolute value of Inequality of opportunity; Value of IEE: Absolute value of Inequality of effort; I: Total Inequality (from mean weekly wages by caste, gender, types and tranches);Percentage contribution of IEOP: % IEOP; and Percentage contribution of IEE: % of IEE.
Source: NSSO 66th Round employment and unemployment Survey, 2009-10.

By using the information on education in the NSS data, the population is partitioned into five types/groups according to father's education – (i) illiterate or literate without any formal education (type one), (ii) formally educated upto below primary level or completed primary level (type two), (iii) completed middle or completed secondary level (third type), (iv) completed higher secondary (type four) and (v) graduate, post graduate and other higher degrees including diploma (type five).We partition the distributions across types into ten tranches. We use the additive subgroup decomposable measure *mean logarithmic deviation* to assess inequality of opportunity. It is a Generalized Entropy class of measure (Theil's second measure with $\alpha = 0$). The *mean logarithmic deviation* satisfies four desirable axiomatic properties required in the measurement of inequality, such as anonymity, population replication invariance, scale invariance and transfer principle. In addition, it also satisfies two additional axioms necessary to assess inequality of opportunity: additive subgroup decomposability and path independence. By using this *mean logarithmic deviation*, we assess inequality of opportunity by *ex ante* and *ex post* approach directly or as a residual[2].

Results of non-parametric estimation

Tables 1 and 2 present the mean weekly wage and the number of observations within each type-tranche cell of the distribution of weekly wage. There are five groups/types across all sub-populations defined by caste and gender, as we have categorized fathers according to five categories of education. We again classify within type distributions of weekly wages into ten deciles or ten tranches and assume that the individuals included in a decile across types have exerted the same degree of effort. Table 3 and 4 present the computed values of inequality of opportunity, inequality of efforts and their percentage contributions to total inequality in the distribution of weekly wage, assessed by the *tranche* and *types* approaches.

It is observed from the average weekly wages reported in Tables 1 and 2 that average weekly wages within the tranche-type cells are rising with the rise in father's education, or by moving from the first type to the fifth type across all social and gender groups, as well as at all-India level. This indicates the influences of family background on labour market outcome. According to the *tranche* and *types* approaches, we obtain the absolute values of inequality of opportunity at all-India level, which are equal to 0.165 and 0.164. These results indicate that irrespective of the approach chosen unequal father's education can explain one-third (33%) of total inequality in the distribution of weekly wages[3]. If we take into account the heterogeneity of population and estimate the inequality of opportunity across the social groups and gender groups then the tranche and type approach provide quite different results. It is observed from the computed values of inequality of opportunity that in case of the *tranche* approach the computed values of inequality of opportunity for 'others', OBCs, SCs and STs are 0.136, 0.165, 0.207 and 0.217 respectively. Based on these absolute values, the inequality of opportunity is greater for STs compared to other social groups, especially compared to the disadvantaged social groups OBCs and SCs. The relative contributions of inequality of opportunity to total inequality in the distribution of weekly wages are 28.27%, 33.06%, 39.98% and 40.41% respectively, for 'others', OBCs, SCs and STs. These results also indicate greater contribution of unequal father's education to total inequality in the distribution of weekly wages for STs compared to all other social groups. SC occupies the second highest position accordingly. Moreover, the influence of father's education on labour market outcome is low for 'others' compared to the less privileged groups. The last row of Table 2 shows the average weekly wages of the social groups, which exhibits inequality in the distribution of weekly wages between the social groups. The average weekly wage of 'others' is greater than that of

[2] In Appendix I, we describe the method of computation of inequality of opportunity by using the *mean logarithmic deviation*.

[3]A parametric estimation by using the same data set and by taking some other circumstances along with father's education has also exhibited that the percentage contribution of inequality of opportunity for father's education is around 34%.

other social groups. STs occupy the second top position in the distribution of weekly wage. The inequality in the distribution of weekly wage is the highest for STs and the percentage contribution of the inequality of opportunity is also greater for the ST group compared to 'others', OBCs and SCs. These results indicate that the disparity between the rich and the poor among STs in terms of labour market outcomes is greater than that of OBCs and SCs. Moreover, it can be argued that the inferior outcome of the STs can be attributed to the factors lying beyond their control to a greater extent compared to other social groups, especially compared to other less privileged social groups OBCs and SCs. Therefore, we can say that the inferior labour market outcome is actually inherited by a greater degree for STs compared to the OBCs and SCs. Therefore, members of ST group need more compensation than that of the members of other social groups to achieve better outcome in the labour market. The displayed absolute values of inequality of opportunity and the percentage contribution of inequality of opportunity according to the *types* approach are different from the *tranche* approach. However, the computed values of inequality of opportunity based on the *types* approach also exhibit that inequality of opportunity in the distribution of weekly wages is greater for the less privileged groups compared to 'others', and it is maximum for STs. One important difference between the results of the *types* and *tranche* approach is that according to the latter the percentage contribution of inequality of opportunity is greater for SCs compared to OBCs, but according to the former father's education contributes more to labour market outcome for OBCs compared to SCs.

Conclusion

The results of non-parametric estimation of inequality of opportunity show that inequality in father's education can explain more inequality in the distribution of weekly wages for STs, compared to other social groups, and 'others' occupies the bottom position if the groups are arranged in a descending order according to the inequality of opportunity within a social group. This remains more or less unaltered even if we partition the distributions across the social groups in a finer way by taking gender as another characteristic. Therefore, it can be said that family background measured in terms of father's education can influence 'others' less than OBCs, SCs and STs in terms of labour market outcome. The high contribution of inequality of opportunity at the top of the distribution of weekly wages for OBCs and SCs indicates that OBCs and SCs would experience discrimination more as they move up along the distribution of weekly wages. The STs experience more discrimination in the labour market in terms of inferior father's education nearly at the middle of the distribution of weekly wages, but overall inequality of opportunity for STs is much higher compared to other social groups.

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Appendix I:

i) *Classification of the outcome profile:* Considering a hypothetical society with population N, the original outcome profile has the following form:

$$X = \{x_1, x_2, \dots, x_N\} \in R_+^N \quad (A.1)$$

Partitioning the population by circumstances (K categories of circumstances), the outcome profile (1) becomes:

$$X = \{x_1, x_2, \dots, x_K\} \in R_+^N \quad (A.2a)$$

Income profile after partitioning the population into M tranches can be written as:

$$X = \{x_1, x_2, \dots, x_M\} \in R_+^M \quad (A.2b)$$

ii) *Mean logarithmic deviation* and Inequality of Opportunity according to the e*x ante* or t*ypes* Approach:
From the outcome profile (A.3), the inequality of opportunity can computed in the form of between-type inequality (I_B) by the *ex ante* approach by using the *mean log deviation* in the following way:

I_B (Between type inequality/Inequality of opportunity) = $\sum_{i=1}^{K} \lambda_j \ln\left(\frac{\mu}{\mu_j}\right)$ (A.3)

Where μ, μ_j and λ_j are the population mean of outcome, mean outcome of the j-th type and the population share of the j-th type.

iii) *Mean logarithmic deviation* and Inequality of Opportunity according to the e*x post* or tranche Approach: In the case of *ex post* approach, the between tranche inequality can be computed by using the *mean log deviation* in the following way:

$$I_W \text{ (Between tranche inequality)} = \sum_{i=1}^{M} \theta_i \ln \left(\frac{\mu}{\mu_i}\right) \quad \text{(A.4)}$$

Where θ_i and μ_i are the share of population of the i-th tranche and mean value of outcome of the i-th tranche. The inequality of opportunity can be computed from the smoothed distribution by the residual method in the following way:

$$I_B \text{ (Between type Inequality)} = I - I_W$$

$$= I - \sum_{i=1}^{M} \theta_i \ln \left(\frac{\mu}{\mu_i}\right) \quad \text{(A.5)}$$

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