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Inequality of Opportunity and Growth in India: A Dynamic Panel Estimation by Using New Measurement Methodology

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Inequality of opportunity has a decisive role in determining the shape of relationship between inequality and growth (Barro 2000, Berg et al. 2018). Inequality of opportunity is unfair in a sense that it is originated from circumstances that are beyond individuals' control and it has negative effect on growth (Mejia and St-Pierre 2008, Marrero and Rodríguez 2013). The measurement of unfair inequality has been appealing recently in analysing growth-inequality relationship. But, measuring the sources of inequality is constrained by insufficient information in the household survey data. The conventional measures based on limited information on circumstances underestimate inequality of opportunity and overestimate inequality of effort (Ferreira and Peragine 2016).

This paper proposes a simple alternative method to overcome this limitation in measuring inequality of opportunity and apply it to study the growth-effects of components of inequality. Our approach is parametric and closely related to the methodology used in Ferreira and Gignoux (2011). Our study is motivated by the work of Marrero and Rodríguez (2013) who analysed the PSID database for the U.S. in 1970, 1980 and 1990 to find out the relationship between components of income inequality and growth. No attempt, however, has been made so far in finding out the role of unequal opportunities in analysing the relationship between inequality and growth in a transitional developing economy with household survey data. This study is an attempt in this direction by using household survey data from India. We hypothesise that in a society where unequal opportunities act as binding constraints in getting quality education or quality job, income inequality dampens economic growth.

We use household level survey data collected by the National Sample Survey Office (NSSO) for 1983, 1993, 2004, 2011 and 2017. As there is no income information in this database, per capita consumption expenditure is taken as a proxy for household income. There are 88 regional units in each survey round and by using these units as cross section over 5 time points we form a panel. In this dataset information on social status and parent's education are available and we use them as the observed set of circumstances. Parent's education is categorised into 4 groups: no education, education level up to primary, secondary and higher secondary, and graduate and above. Social status is a categorical variable with 4 groups: Scheduled Tribe, Scheduled Caste, Other Backward Castes and Upper Castes. On the basis of these observed circumstances, the

sample is partitioned into 16 mutually exclusive and exhaustive groups of households.

In our proposed methodology we, first, regress household consumption on a set of effort variables like education ( $x_1$ ) and work experience ( $x_2$ ):

$$\ln c_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + u_i$$

Results from this regression suggest that household consumption is positively related to education and experience. In a second stage, an ordered discrete variable is constructed for circumstances on the basis of the residual,  $\hat{u}_i$ , which measures the component of consumption unexplained by the efforts. This residual based approach incorporates the effects of all observed and unobserved circumstances on inequality. We test its reliability and compare with the conventional nonparametric measure based on the baseline set of circumstances with household level survey data in India. Among the conventional measures we have chosen Theil index of inequality which is additively decomposable into a ‘between group’ and ‘within group’ components. In this approach, inequality ‘between group’ is treated as a proxy for inequality of opportunity, and inequality ‘within group’ as inequality of effort. The inequality between groups is unfair and is measured by using these methods in each region to display the spatial heterogeneity in inequality in India. In our study, Southern region states exhibit lower contribution of unequal of opportunity to overall inequality as compared to the Northern states.

As income inequality of efforts partly depends on inequality due to circumstances, we estimate inequality of opportunity for higher education by applying discrete choice model. Here, we calculate the dissimilarity index, a component of human opportunity index, and use it as a measure of inequality of opportunity for higher education. The dissimilarity index is obtained by taking the weighted absolute differences in average probability of access to higher education among the circumstance groups:

$$I_{IO} = \frac{1}{2\bar{p}} \sum_{m=1}^{16} s_m |\bar{p}_m - \bar{p}|$$

In this approach we need to calculate average probability of access to higher education for each circumstance group,  $\bar{p}_m = \frac{\sum_{i=1}^{n_m} p_i}{n_m}$ , and for the sample as a whole,  $\bar{p} = \frac{\sum_{i=1}^n p_i}{n}$ . Here,  $s^m$  is the population share of circumstance type  $m$ .

The conditional likelihood for access to higher education of a person in the sample is estimated by using logit model.

$$\ln \left( \frac{p_i}{1-p_i} \right) = \gamma_0 + \sum_{j=1}^k \gamma_j x_{ji} + \varepsilon_i$$

To find out the effects of inequality of opportunity on growth we have estimated growth equation in reduced form with the balanced panel data by taking growth of per capita consumption

expenditure ( $c$ ) as dependent variable and lagged values of inequality indices of opportunity ( $y_1$ ) and effort ( $y_2$ ), and the lag dependent variable as explanatory variables along with a set of control variables ( $Z$ ).

$$\Delta c_{it} = \delta_0 + \delta_1 y_{1it-s} + \delta_2 y_{2it-s} + \delta_3 \ln c_{i,t-s} + \delta_4 Z_{it-s} + u_{it}$$

$$u_{it} = \mu_i + \varepsilon_{it}$$

The control variables account for the share of population having education level graduate and above, share of population living in urban location, share of population in non-farm activities, and share of women employment. Total inequality index is not incorporated together with the inequality indices of opportunity and effort to avoid collinearity.

We employ dynamic panel data model for the system-GMM estimator by following the methodology developed in Blundell and Bond (1998) and further extended in Bond et al. (2001). The problem of heteroscedasticity and serial correlation are corrected by considering panel robust standard errors.

Estimated results indicate a negative relationship between inequality of opportunity and growth, while the effect of inequality of effort is significantly positive. Growth is positively correlated with human capital as expected. The coefficient for share of non-firm employment is positive. Negative relation is observed between women participation in labour market and growth. In India, women participation in gainful employment declined since the early 1990s when economic growth shows increasing trend. The empirical results of this study fail to reject our hypothesis that higher the inequality of opportunity, more detrimental would be the impact of income inequality on growth.