Income inequality and opportunity inequality in Europe

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EXTENDED ABSTRACT

1   Introduction

This paper builds on previous work on the subject (Checchi and Peragine 2005, 2009, Peragine 2002, 2004, Peragine and Serlenga 2008) and provides a methodology to both measure opportunity inequality and decompose overall income inequality into two components: one component due to variables beyond the individuals' control and for which they should not be held responsible (circumstances), and another component due to variables which belong to the sphere of individuals' responsibility (effort). We apply this methodology with the aim of measuring opportunity inequality in 26 European countries.

The existing literature (see, among others, Bourguignon et al. 2003, Checchi and Peragine 2005, 2009, Dardanoni et al. 2006, Ferreira and Guignoux 2008, Lefranc et al. 2006a,b, Peragine 2002, 2004, Peragine and Serlenga 2008) has explored two main approaches to measuring opportunity inequality, namely the ex-ante and the ex-post approach. According to the ex-ante approach, there is equality of opportunity (EOp) if the set of opportunities is the same for all individuals, regardless of their circumstances. This approach partitions the population in circumstance classes (types), where each class is formed by individuals endowed with the same set of circumstances: the income distribution within a circumstance class is interpreted as the opportunity set open to individuals in that class. Hence, in order to measure opportunity inequality, one focus on the between types inequality.

On the other side, according to the ex-post approach, there is EOp if and only if all those who exert the same level of effort end out with the same outcome. This means that opportunity inequality within this approach is

measured as inequality within responsibility classes, i.e. set of individuals at the same effort level (tranches). The ex-ante approach and the ex-post approaches may originate different and in some cases conflicting rankings (for a discussion of this see Checchi and Peragine, 2009 and Fleurbaey, 2008).

It is also possible to further distinguish, within these two main branches, the existing literature according to the methods used in the measurement of EOp. In some cases the existence of EOp in a a given distribution is tested by using the concept of stochastic dominance, as in the studies by Lefranc et al. (2006a; 2006b) and Peragine and Serlenga (2008) both based on an ex-ante approach. Other studies propose opportunity-egalitarian social welfare functions to obtain partial rankings of income distributions (see Van de Gaer, 2003 and Peragine, 1998, 2004 on the theoretical side and Peragine and Serlenga 2008 for an empirical application).

Finally, some authors use inequality indices by which it is possible to obtain complete rankings of income distributions (see Bourguignon et al. 2003; Checchi e Peragine, 2009; Dardanoni et al, 2005; Ferreira e Gignoux, 2008; Pistolesi, 2007).

Besides the approach used in the definition of EOp, studies which use this third methodology can be distinguished depending on the empirical tools they use. Bourguingon et al. (2003), Dardanoni et al.(2005) and Pistolesi (2007) estimate EOp by using parametric models, while Checchi and Peragine (2009) use a non parametric method for their estimations. In a non parametric analysis, when the ex-ante approach is used , overall inequality is decomposed into two parts, inequality between types, intended as opportunity inequality, and inequality within types, intended as effort inequality. When the ex-post approach used instead, overall inequality is again divided into two components, the within tranche, intended as opportunity inequality, and the between tranches, intended as effort inequality (Checchi and Peragine, 2009). Recently, Ferreira and Gignoux (2008) compare those two methodologies, parametric and non parametric ones, following the model proposed by Bourguingon et al. (2007). Each approach has its own advantage, non parametric models allow not to impose any functional form on the relationship between outcome, circumstances and effort. On the other hand, parametric models allow to study partial effects of circumstances on outcome, *ceteris paribus*.

In this paper we explore both the ex ante and the ex post approaches in order to measure opportunity inequality in Europe. Following Checchi and Peragine (2009) we use a non parametric approach. Furthermore, once an estimation of EOp measures is derived, we employ a parametric approach to study the effect of different circumstances for the countries under consideration.

The empirical application is divided in two parts. First, along with the standard measures of inequality, we provide estimates of income inequality and opportunity inequality in the 26 European countries available in the EU-SILC database. The purpose here is to rank European countries with respect to EOp using both the ex ante and the ex post approach. Second, we focus on individual and household characteristics that might influence the degree of opportunity inequality in each country under analysis. By using quantile regression, we investigate the persistence of EOp across the outcome distribution and we quantify the effect of explanatory variables across income distributions in each country considered.

More in details, we identify as circumstances parental background (mother and father education) and gender, and begin measuring opportunity inequality in the countries under analysis by using both the ex ante and the ex post approach. According to the first methodology, once defined the types we calculate the between types inequality using the counterfactual distribution in which the types distributions have been smoothed. In particular, we notice that this smoothing operation corresponds to assume that everybody exercised the same effort and therefore the residual inequality is due to circumstances. Inequality is therefore measured by Gini and MLD between types. Secondly, following the ex post approach, we use Roemer's solution: two individuals are assumed to have exercised the same degree of effort if they are at the same rank of their respective type income distributions. Hence, we divide each type population in deciles and we obtain the tranche distributions. By introducing a scaling transformation which eliminates between tranche inequality we are left with a counterfactual distribution which only contains inequality due to circumstances. Therefore we measure opportunity inequality by Gini or MLD applied to such a distribution. Moreover, by using the mean log deviation we obtain a decomposition of overall inequality into opportunity inequality and effort inequality.

In the second step of our empirical analysis we aim to analyze the effect of characteristics on income inequalities. In order to do so we consider a typical outcome function

$$
\begin{aligned}
y_i &= f(C_i, E(C_i, v_i), u_i) \\
y_i &= \alpha C_i + \beta E_i + u_i \\
E_i &= B C_i + v_i
\end{aligned}
$$

where y_i is the outcome (earnings, income, etc.) C_i are circumstances and E_i is effort. As widely acknowledged in the literature, an important issue here is the endogeneity of the effort variable, see Bourguignon et al (2003) among others. The correlation between u_i and E introduces bias in the estimation

of the coefficients α, β.

Our analysis is based on a ex-post framework to avoid dealing with the endogeneity issue. Noticing that according to the ex-post approach all individuals in the same tranche have made the same degree of effort, we simply regress the outcome variable on circumstances within tranches. This methodology allows us to test the effects of characteristics across the income distribution in the countries under analysis.

1.1 Data Description

The Survey on Income and Living Conditions (SILC) is conducted by the Central Statistics Office (CSO) to obtain information on the income and living conditions of different types of households. The survey also obtains information on poverty and social exclusion. Representative random samples of households throughout 26 European countries are approached to provide the required information. In the 2005 wave the countries involved in the survey are Austria, Belgium , Cyprus, Czech Republic, Germany, Denmark, Estonia, Greece, Spain, Finland, France , Hungary Ireland, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Poland, Portugal, Sweden, Slovenia, United Kingdom, Iceland and Norway.

This comparative study has become possible because the 2005 EU-SILC has included one special data module, which provides us with data for attributes of each respondent's parents during his/her childhood period of the age 14-16. The module reports on the educational attainment and occupational as well as labour market activity status of each respondent's mother and father.

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