Working Paper Series

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ECINEQ WP 2015 - 364

ECINEQ 2015 - 364
June 2015

www.ecineq.org

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Abstract

Does the way scholars measure inequality of opportunity correspond to how people perceive it? To answer this question we must first clarify how scholars define and measure inequality of opportunity, we will then discuss the possible mechanisms linking objective measures and subjective perception of the phenomenon, and finally we test our hypothesis by merging data coming from two sources: the European Union Statistics on Income and Living Conditions (2011) and the International Social Survey Programme data (2009). We show that individual perception of unequal opportunity is heterogeneous across countries and among individuals. Moreover, the prevailing perception of the degree of unequal opportunity in a large sample of respondents is only weakly correlated with its objective measure. We estimate a multilevel model considering both individual and country level controls to explain individual perception of unequal opportunity. Our estimates suggest that one of the most adopted measure of inequality of opportunity has no role in explaining its perception. Conversely, other country level variables and personal experiences of intergenerational social mobility are important determinants of how inequality of opportunity is perceived.

Keywords: Inequality of opportunity, inequality perception, intergenerational mobility, attribution theory.

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Introduction

Equality of opportunity is an increasingly considered topic in economics. In 2015 both the Handbook of Income Distribution (Atkinson & Bourguignon, 2015) and the Oxford Handbook of Well-Being and Public Policy (Adler & Fleurbaey, 2015) devote more than one chapter to different aspects of equal opportunity. The starting point of this literature is a definition of the principle of equal opportunity which - implicitly or explicitly - originates from a set of moral norms. The two most commonly proposed norms are the principle of compensation, which states that inequality due to circumstances beyond individual control is inequality of opportunity, and the principle of reward, which states that inequality due to choice and effort is not. Different definitions of equality of opportunity originates from the way the two principles are balanced (Fleurbaey, 2008). Since the seminal contributions by Rawls in the early '70s a vast range of definitions of equal opportunity have been proposed, most of them have been translated into measures of inequality of opportunity, employed in a growing empirical literature. However, whether those definitions correspond to how people understand and perceive inequality of opportunity remains an unanswered question.

A natural starting point for our investigation is the literature on the perception of inequality, after all, inequality of opportunity is a particular type of inequality. Economists are aware that the way they measure inequality lacks intuitive meaning for a broad audience (Shorroks, 2005). However, very few authors have explicitly discussed the relationship between measured inequality and the general perception of inequality. According to Runcinam (1966) inequality is perceived and suffered as relative deprivation: individuals compare their outcome such as income, consumption or wealth, with the outcome of a reference group, their feeling of deprivation is an increasing function of the number of individuals having more than them. If this is the case, as shown by Yitzhaki (1979), the Gini index (multiplied by the average outcome) should correctly aggregate the total perceived deprivation. Therefore, we should expect a strong correlation between perceived inequality and inequality measured by the Gini index. However, a number of recent empirical contributions in psychology and economics have shown that the perception of inequality reported by people in opinions survey does not correspond to income inequality as it is commonly measured (Chambers et al., 2014; Cruces et al., 2013; Gimpelson & Treisman, 2015; Norton & Ariely, 2011; Verme, 2013). Other contributions have shown that a society's structure can be perceived to be considerably less equitable than it really is (Niehues, 2014). Finally, Keller et al. (2010) comparing 27 European countries suggest that the correlation between measures of inequality and perception of inequality is stronger for measures of poverty than for measures of inequality.

It is important to note, however, that the preponderance of the economic literature that has investigated this topic has not focused on the factors explaining the perception of inequality. Perceived inequality has, instead, been generally considered to be an exogenous explanatory variable of the citiziens attitude toward redistribution. Beside the classical median voter theory, in which the voters attitude is determined solely by their position in the income distribution, the "tunnel effect" theory - described by Hirschman and Rothschild (1973) - suggests a role for expectations: inequality in the short run can be positively perceived even by worse off individuals because it could be interpreted as a signal of future general improvement. Similarly the "prospect for upward mobility" hypothesis - theoretically investigated by Benabou and Ok (2001) - suggests that when expecting upward mobility even individuals with an income below the median will oppose progressive redistributive

policies.

In discussing this mechanism these contributions have often introduced the idea that the degree of equal opportunity and social mobility is crucial in determining the acceptability of inequality. According to Piketty (1995) this idea date back to De Tocqueville (1835) who suggested that different rates of social mobility in the United States and Europe could explain the differing attitudes toward redistribution. This point of view is shared by a number of authors that have explained different attitudes toward inequality in the two continents by reference to the difference in popular beliefs about the degree of social mobility (Lipset & Bendix, 1959; Alesina & La Ferrara, 2005; Alesina & Angeletos, 2005). A similar explanation has been proposed by Whyte (2010) and Lu (2012) in discussing the reaction to growing inequality in China, and also by Gimpelson & Monusova (2014) in relation to a large sample of countries. According to these theories, perceived inequality depends on the difference between what individuals feel entitled to obtain and what they have obtained, or expect to obtain in the future.

Again, these contributions have considered the perception of equality of opportunity and social mobility owing to exogenous factors and have included them among the variables explaining peoples attitudes toward inequality and redistributive policies. In what follows we endeavor to take a step back and seek instead to explain how the perception of equality of opportunity is formed and further, to explain the relationship between this perception and the actual degree of equality of opportunity in a given society.

We will assume a that for the public opinion the term equality of opportunity is unambiguous: inequality of opportunity is inequality due to circumstances beyond individual control, while inequality due to choice and effort is not. Under this assumption, how do individuals quantify the degree of equality of opportunity in their country? Are they able to quantify the effect of circumstances beyond individual control on the distribution of outcomes?

The simplest possible approach to answer this question is to impose a further assumption: that individuals are able to quantify the relative role of effort and circumstances in determining success in life. If this is so, we should expect a strong correlation between measured and perceived inequality of opportunity. Of course, individual perceptions may be imprecise because inequality of opportunity is a complex phenomenon. In order to formulate an opinion as to the degree of inequality one must first ascertain the average effect that choices and circumstances have on outcomes. Then, to judge the intensity of the phenomenon, one must compare inequality caused by circumstances in a particular country against some benchmark, for example by making a comparison with the same phenomenon in other countries. Individuals will inevitably make mistakes while undertaking this complicated process of reasoning. However, if the expected value of the error is zero and errors are not correlated within and between individuals, the distribution of perception among a large sample of individuals will be approximately normally distributed around the objective measure of inequality of opportunity.

However, it must also be acknowledged that individual perceptions may be influenced by other factors and their aggregation may be less straightforward where this occurs. A case in point would be where a countrys institutional characteristics, for example, its fiscal system affects public perception. In such cases we will find individuals perception to be downward biased or upward biased depending on the fiscal system in place in their country. Moreover, a plausible hypothesis is that perceptions of the relative importance of exogenous circumstances are shaped by personal experiences. Assuming that people can at least

identify where they stand in respect of income distribution and their exogenous circumstances, we are left with the problem of understanding how individuals quantify the causal contribution of innate characteristics to this outcome.

The economic literature is silent on this issue, but there is extensive literature in field of social psychology considering how individuals explain or attribute causes to outcomes. Since Fritz Heider's seminal contributions, the attribution theory represents the main theoretical framework to explain the processes by which individuals attribute causes to events and behaviours (Weimer, 1974). According to this theory attribution can be internal, if people consider that an event is due to individual characteristics such as traits or feelings, or external if people consider the event occurs as a result of situational factors beyond individual control. According to Weimer, attribution can also be classified by other two causal dimensions: stability and controllability.

In this literature a number of empirical contributions have shown the presence of bias in the perceptual process, especially when individuals make causal inferences with regard to personal outcomes (Miller & Ross, 1975; Russell, 1982). According to these authors, a self-serving bias operates when individuals formulate attributions about the causes of personal successes and failures, distorting the cognitive process in order to maintain self-esteem. When explaining a success individuals tend to emphasise the role of internal causes. Causes of failures instead tend to be perceived as more external and uncontrollable. This point is particularly relevant for our analysis. When asked about the role of circumstances beyond individual control in determining success in life, interviewees may formulate a judgment based on experiences of success and failure familiar to them. In so doing, their own experience may be disproportionately weighted. Therefore, owing to this self-esteem bias, we no longer expect the perception of inequality of opportunity to be distributed around its objective measure. On average, individuals who perceive their life as a story of success will tend to understate the role of external conditions in determining outcomes and by extension they will underestimate the degree of inequality of opportunity in their country. Conversely, individuals who perceive their life experiences to be failures will tend to overemphasise the importance of circumstances beyond individual control, that is to say that they will overestimate the degree of inequality of opportunity.

The remaining of this paper is organised as follows: Section 1 introduces the concept of equality of opportunity and one of the most widely adopted approach to measure it. Section 2 contains a description of the data and presents estimates for inequality of opportunity and its perception in 22 European countries. In Section 3 we empirically investigate two aspects of the inequality of opportunity perception: i) is the prevailing perception of inequality of opportunity in a given country close to its estimate? ii) What other factors influence the individual perception of the degree of equal of opportunity? Section 4 concludes.

1 Inequality of opportunity

A precise definition of what do we mean when we talk about inequality of opportunity is a precondition for our analysis. Inequality of opportunity and social mobility have been at the centre of the research agenda in sociology and economics for at least four decades and a number of definitions, to a large extent overlapping, have been proposed in both disciplines.

Recent economic literature addressing the measurement of inequality of opportunity has grown from early work by van de Gaer (1993) and Roemer (1998). The conceptual basis for the definition of inequality of opportunity is provided by the distinction between individual

efforts and pre-determined circumstances. This approach considers that inequality due to the former is not ethically offensive, whereas it suggests that differences in individual outcome due to the latter represent a violation of the principle of equality of opportunity and should be removed.

Equation (1) is the simplest possible model to study inequality of opportunity: individual desirable outcome (y) is obtained as a function of two sets of traits: circumstances beyond individual control (c) and choice (e).

$$y_{=}f(c,e) \tag{1}$$

In what follows we will refer to income as the measure of success in life and we will follow the simple framework introduced by Checchi and Peragine (2010) to measure inequality of opportunity.

Inequality of opportunity is identified as the inequality owing to circumstances beyond individual control. In the literature, circumstances beyond individual control include all observable exogenous characteristics such as parental education, parental occupation, sex, and race. Because inequality due to choice or effort is generally unobservable it is obtained residually. To assess the degree of inequality of opportunity (the severity of the violation of equality of opportunity) we need a meaningful decomposition of total inequality ($I(y)$) which will allow us to separate inequality due to circumstances ($IOp(y)$) and inequality due to effort ($IOe(y)$))

To obtain such a decomposition of total inequality we first partition the entire population into groups, called types, each type includes all individuals characterised by the same circumstances. For example, a hypothetical country characterised by two circumstances, sex and race, will be partitioned in four types: black men, black women, white men, white women. Then following Roemer (1998) we assume that effort (e) is orthogonal to circumstances (c), that is, any inequality correlated with circumstance is inequality due to opportunity. Under this assumption the degree of effort exerted by an individual can be measured as her position in the type specific distribution of outcome. Individuals sitting at the same quantile of the outcome distribution of different types are assumed to have exerted the same degree of effort. For example, a black woman sitting at the top decile of her type specific income distribution is considered to be exerting the same degree of effort of a white man in the richest 10% of his type specific income distribution. Our original distribution of income is now twice partitioned: in types (individuals affected by different circumstances) and in quantiles (made of individuals that exerted same degree of effort). We can now measure IOp as inequality between types and IOe as inequality between quantiles. To obtain this decomposition there are a number of methods which unfortunately lead to different IOp estimates (Fleurbaey, 2008; Ferreira & Peragine, 2015). Again, here we follow the popular approach proposed by Checchi & Peragine (2010).

We consider inequality between quantiles as legitimate because this is due to effort whereas inequality within quantiles to be inequality of opportunity. Therefore we modify the original distribution of incomes dividing individuals' income by the average income of their quantile (μ^j) multiplied by the populations average income (μ). This transformation removes all inequality between quantiles and leaves intact inequality within quantiles. Inequality in this counterfactual distribution is therefore IOp and the remaining is IOe.

$$IOp = I\left(\frac{y_{i,j}}{\mu^j}\mu\right) \tag{2}$$

However, not all circumstances are observable therefore, IOp is interpreted as a lower bound estimate of inequality due to opportunity in the distribution of y. For our purpose this measure of IOp has two important features: it is a largely adopted in the relevant literature and has an intuitive meaning. The second property is crucial in this context because we aim to precisely compare measures and perceptions of the phenomenon. More sophisticated measures of inequality of opportunity may be much more distant from the intuitive meaning of the term.

2 Inequality of opportunity and perceived inequality of opportunity in 22 European countries

In what follows we will empirically investigate these two issues: i) is the prevailing perception of inequality of opportunity in a given country close to IOp estimate? ii) What other factors influence the individual perception of the degree of equal of opportunity? To achieve an answer we first measure IOp in a sample of countries and we compare these estimates with the prevailing perception of the phenomenon in the public opinion. We then investigate what factors distort the individual perception of IOp estimating a regression model which includes a number of country level and individual level controls.

The data requirements for studying the relationship between IOp and its perception are rather demanding. One requires both information on public opinion and a precise record of incomes and individual circumstances. These two types of information are rarely contained in a unique dataset. We therefore merge information from two sources: the International Social Survey Programme (ISSP 2009) and the European Union Statistics on Income and Living Conditions (EU-SILC 2011). Although the first survey contains opinions recorded in 2009 and the second contains incomes earned in 2010, assuming a certain degree of stickiness in perception, we consider the two surveys as if they were conducted simultaneously. Given the large overlap of the two samples we are able to study a subsample of 22 European countries included both in EU-SILC 2011 and ISSP 2009: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Iceland (IS), Latvia (LT), Norway (NO), Poland (PL), Portugal (PT), Slovak Republic (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), United Kingdom (UK).

To identify the determinants of IOp perception we use opinions recorded in the ISSP 2009. ISSP 2009 contains information about how social mobility and equality of opportunity are experienced and perceived together with a number of individual level covariates. Descriptive statistics of the average values of respondents characteristics in the 22 samples are reported in Table 1.

The data needed to measure IOp is a representative survey of individuals containing information about: income, socioeconomic background, country of origin and possibly all the other circumstances beyond individual control that play a role in determining income. Although ISSP 2009 contains all these variables, because its sampling strategy is constructed to correctly represent opinions it cannot be considered sufficiently reliable to estimate other phenomena such as the income distribution. In particular, comparing the household income variable - the outcome of interest in this analysis - with official estimates we have found systematic inconsistencies. We therefore estimate IOp for the sample of European countries exploiting the Survey on Income and Living Conditions, (EU-SILC). EU-SILC is a reliable

Table 1: ISSP descriptive statistics

country	sample	male	age	degree	student	worker	unemployed	retired	down. mob.	up. mob.
AT	1,019	0.47	46.16	0.2918	0.0719	0.5494	0.0530	0.2811	0.2063	0.3814
BE	1,114	0.49	49.07	0.6196	0.0623	0.5379	0.0371	0.2606	0.2166	0.3552
BG	983	0.48	47.51	0.7379	0.0455	0.5143	0.1173	0.2757	0.1782	0.3594
CH	1,229	0.46	48.49	0.3453	0.0516	0.6270	0.0228	0.1704	0.2266	0.4255
CY	1,000	0.49	42.62	0.7410	0.0820	0.6920	0.0230	0.0970	0.2250	0.3970
CZ	1,204	0.49	45.10	0.3802	0.0961	0.5171	0.0682	0.2263	0.2688	0.2908
DE	1,392	0.50	49.29	0.2888	0.0503	0.5309	0.0568	0.2787	0.2565	0.3534
DK	1,418	0.48	49.96	0.8667	0.0670	0.5987	0.0261	0.2278	0.1777	0.4485
EE	1,004	0.45	46.43	0.7484	0.0652	0.5409	0.0789	0.2015	0.2408	0.3124
ES	1,209	0.49	46.25	0.4530	0.0512	0.4102	0.1822	0.2071	0.1984	0.4319
FI	868	0.50	44.04	0.5703	0.1186	0.5691	0.0593	0.1744	0.2014	0.4335
FR	2,814	0.48	48.04	0.5399	0.0571	0.5735	0.0401	0.2811	0.2471	0.4451
HU	1,010	0.46	47.17	0.4328	0.0508	0.4691	0.0779	0.3288	0.2288	0.2957
IS	945	0.48	46.04	0.4825	0.0899	0.6772	0.0328	0.1164	0.2730	0.2455
LT	1,069	0.39	44.36	0.7755	0.0786	0.5669	0.0702	0.2011	0.2591	0.2806
NO	1,363	0.49	47.55	0.8195	0.0565	0.7102	0.0103	0.1277	0.1959	0.4175
PL	1,256	0.48	44.76	0.5963	0.0797	0.5377	0.0850	0.2491	0.3142	0.4013
PT	1,000	0.47	46.70	0.3504	0.0685	0.6055	0.0713	0.1715	0.2154	0.5009
SE	1,123	0.48	48.33	0.5352	0.0712	0.6794	0.0374	0.1683	0.2297	0.4203
SI	1,058	0.45	46.54	0.5662	0.1115	0.5359	0.0605	0.2543	0.2543	0.3025
SK	1,155	0.48	44.03	0.4549	0.0934	0.4998	0.0881	0.2170	0.2572	0.3589
UK	837	0.48	47.74	0.4491	0.0170	0.5952	0.0610	0.2131	0.2443	0.4056

Descriptive statistics are calculated using sample weights where available.

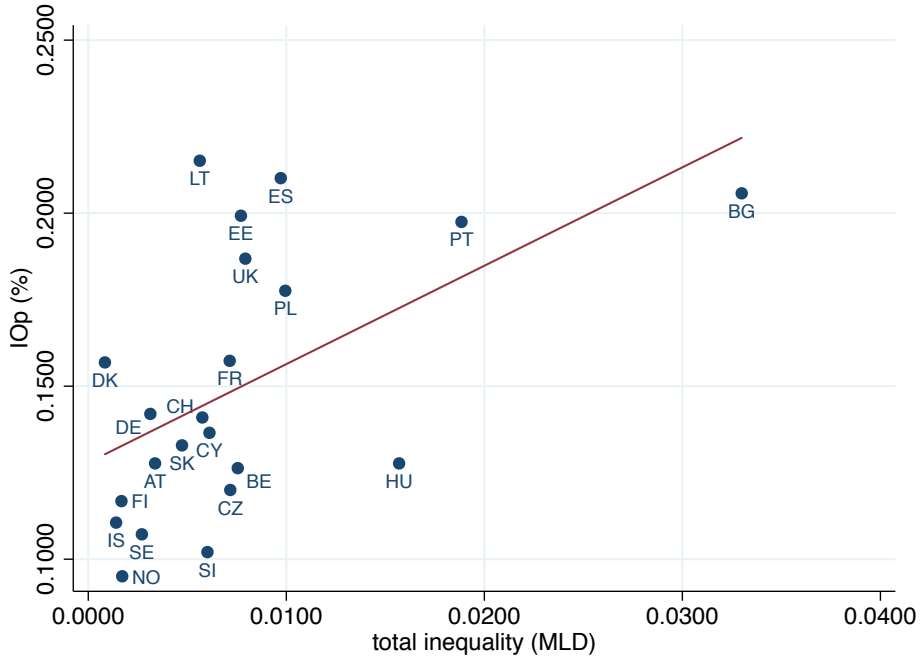
Source: Author' calculation based on ISSP, 2009.

source for the analysis of the income distribution. Moreover, it has been already utilised by a number of authors in the study of equality of opportunity. The wave conducted in 2001 contains a module about intergenerational transmission of disadvantages which includes information about socioeconomic background. We follow other contributions by limiting our analysis to a subsample of respondents: working age adult individuals aged between 25 and 65 (Marrero & Rodrguez, 2012; Checchi et al, 2015). We implement a non-parametric approach to estimate IOp, this implies to identify groups of individuals sharing same circumstances and then to partition each group in income four quantiles. This procedure is demanding in term of sample size and forces us to consider only three circumstances beyond individual control: parental education, parental occupation and gender. IOp is then calculated as the mean logarithmic deviation applied to the counterfactual distribution (eq. 2) where the outcome y is the household income divided by the square root of the number of household components. Table 2 reports the sample size, mean income, total inequality, and IOp (both in levels and as share of total inequality). IOp varies between 0.0008 (0.53% of total inequality) in Denmark and 0.0330 (16.04%) in Bulgaria. Our estimates in Figure 1 show the well known positive relationship between total inequality and inequality of opportunity (Corak, 2013) and a lower level of equality of opportunity for Mediterranean and transition economies.

2.1 Perception of inequality of opportunity

Equality of opportunity combines two principles: the principle of compensation and the principle of reward. According to the principle of compensation, inequality is unfair when arises from circumstances beyond individual control e. g. socioeconomic background, gender, race. The principle of reward states that whenever inequality is the result of choices

Figure 1: Inequality and relative IOp



Inequality of opportunity is the share of total inequality due to exogenous variables (IOp in eq. 2).
Source: EU-SILC (2011)

Table 2: EU-SILC descriptive statistics

country	sample	mean income	inequality (Gini)	IOp (MLD)	IOp (%)
AT	6,686	25,110	0.2667	0.0034	2.64
BE	6,025	22,950	0.2572	0.0076	5.98
BG	7,398	9,963	0.3337	0.0330	16.04
CH	7,322	24,177	0.2794	0.0058	4.09
CY	5,188	27,475	0.2783	0.0061	4.48
CZ	7,220	13,727	0.2607	0.0072	5.98
DE	12,185	24,154	0.2904	0.0031	2.21
DK	2,784	23,155	0.2640	0.0008	0.54
EE	5,485	11,406	0.3224	0.0077	3.87
ES	16,104	18,022	0.3221	0.0097	4.63
FI	5,170	22,796	0.2647	0.0017	1.44
FR	11,536	23,839	0.2989	0.0071	4.54
HU	14,327	11,382	0.2754	0.0157	12.29
IS	1,750	19,228	0.2570	0.0014	1.27
LT	5,384	9,410	0.3319	0.0056	2.62
NO	2,752	29,606	0.2320	0.0017	1.80
PL	15,606	12,151	0.3141	0.0099	5.60
PT	6,331	15,027	0.3380	0.0188	9.55
SE	1,143	20,045	0.2394	0.0027	2.53
SI	5,243	17,026	0.2577	0.0060	5.90
SK	7,562	13,162	0.2646	0.0047	3.56
UK	6,598	21,716	0.3244	0.0079	4.24

Equivalent income is expressed in euro PPP ESA 2010. Average equivalent income and total inequality (Gini) are calculated on the entire sample, *IOp* is calculated on the subsample.

Source: Author' calculation based on EU-SILC, 2011.

and effort it is legitimate. The combination of these two principles is the theory of equal opportunity (see Fleurbaey (2008) for a discussion). In the absence of a survey question such as "what is the degree of equal opportunity in your country?" we combine the answer to a number of questions that we believe capture the perception of the phenomenon. From the ISSP questions about the importance of different individual characteristics for getting ahead in life we select the following:

1. coming from a wealthy family?
2. knowing the right people?
3. a person's race?
4. a person's religion?
5. being born a man or a woman?
6. having ambition?
7. hard work?

Possible answers are: 1=essential, 2=very important, 3=fairly important, 4=not very important, 5=not at all important.

The first five questions measure the perceived violation of the principle of compensation: if the respondent identifies family wealth, religion, race, or gender, as important characteristics for success in life then the degree of equal opportunity she perceives is low. The latter two questions measure to what extent the principle of reward is perceived to be satisfied: the more hard work and ambition are considered important determinants of success the higher the degree of perceived equal opportunity. Table 3 reports the share of respondents that considered each determinant at least very important to get ahead in life. The picture we get is very heterogeneous and contains a number of interesting outliers. A low number of respondents consider family wealth to be at least very important, in transition economies (21% in Bulgaria and Poland) while the highest percentage is interestingly found in Finland, the country with the third lowest IOp in our sample. Connections are considered at least very important by almost 40% of the French interviewees but by less than 6% of the Polish and Slovak respondents. Race is considered to be at least very important by over the 70% of the Estonian and 78% of the Latvian respondents[1]. Race is apparently perceived to be less important in Hungary (40%). Religion appears as an important determinant of success again in Latvia (89%) and Estonia (88%)[2]. Estonia has also the highest percentage of respondents considering gender essential or very important to success in life (77%). As far as the questions regarding the reward principle are concerned Estonia again signals a high degree of perceived IOp with only the 46% of the respondents considering ambition at least very important, the highest percentage is found in Poland (91%). Finally, hard work is viewed as an essential element of success in Iceland (93%) while, at the opposite end of

[1]This may be connected to the problem of access to the labour market for non-native speakers (mainly Russian) more than with the issue of race per se.

[2]Also in this case the religious cleavage overlaps with ethnicity with a minority of Russian-speaking Orthodox followers in both countries.

the scale is Denmark with only the 41% of respondents convinced of its importance. Table 3 shows a large heterogeneity both in the absolute importance and the ranking of different sources of inequality. Religion is on average considered the main source of unequal opportunity, ambition and hard work are also perceived as important factors to succeed in life. Knowing the right people is on average perceived to be the least important of the variables considered.

Table 3: Determinants to get ahead in life: share of respondents answering 'essential' or 'very important'.

country	family wealth	connections	race	religion	gender	ambition	hardwork
AT	0.3008	0.0826	0.5374	0.6835	0.5321	0.7487	0.6696
BE	0.4692	0.0842	0.5560	0.7194	0.6647	0.5458	0.6403
BG	0.2153	0.0708	0.5360	0.6174	0.5233	0.8454	0.8029
CY	0.3480	0.2220	0.6380	0.6900	0.7280	0.8410	0.8800
CZ	0.4613	0.1344	0.5276	0.8038	0.5462	0.6661	0.7447
DK	0.5501	0.2055	0.6653	0.7022	0.6963	0.6001	0.4065
EE	0.3270	0.1155	0.7096	0.8797	0.7676	0.4613	0.6822
FI	0.6670	0.2424	0.6463	0.8064	0.7234	0.5026	0.6239
FR	0.6158	0.3932	0.6466	0.8312	0.6974	0.6066	0.5336
DE	0.3563	0.0674	0.5419	0.7792	0.6122	0.7799	0.6975
HU	0.2520	0.1465	0.4066	0.7568	0.5254	0.7659	0.7077
IS	0.5861	0.1859	0.6536	0.8205	0.6800	0.8933	0.9271
LT	0.2816	0.1328	0.7848	0.8868	0.7212	0.5575	0.7624
NO	0.4966	0.1951	0.4238	0.6827	0.6058	0.8207	0.7589
PL	0.2109	0.0566	0.6938	0.6840	0.5617	0.9132	0.8494
PT	0.2641	0.1344	0.6122	0.7171	0.6475	0.7142	0.8660
SK	0.3046	0.0559	0.5870	0.7022	0.5604	0.7303	0.7521
SI	0.3277	0.0610	0.6535	0.7099	0.5437	0.7174	0.7099
ES	0.3773	0.1190	0.6336	0.7806	0.6393	0.5634	0.6765
SE	0.5057	0.1671	0.6157	0.7001	0.6157	0.8197	0.7353
CH	0.6168	0.1211	0.6394	0.7884	0.6138	0.6285	0.6690
UK	0.5009	0.1885	0.6028	0.6811	0.6321	0.6138	0.7216

Share of answers are obtained using sample weights when available. Possible answers: 1=essential, 2=very important, 3=fairly important, 4=not very important, 5=not at all important.

Source: Author' calculation based on ISSP, 2009.

Even though each answer may be considered a good proxy for the perception of IOp, the weak correlation of the answers distribution across dimensions suggests that we must include all those factors in an aggregated index in order to consistently compare IOp as it is measured and as it is perceived across countries.[3] As shown in Table 3 the channels of transmission of unfair inequality greatly differ from country to country.

Moreover, we are interested in a measure of IOp perception that is sensitive to violations of both the principle compensation and the principle of reward. Indeed, one can imagine a society in which hard work plays a clear role in determining individual success, that is also a society in which the extent of what one can attain is strongly influenced by socioeconomic background (the principle of reward is satisfied but the principle of compensation is not). Similarly, it could be that family wealth has no role in determining success in life but nevertheless the effort one exerts plays no role in determining your success in life, because, for

[3]Table 6 in the Appendix reports correlations between the fraction of answers in Table 3 for each pair of components. The correlations have the expected signs but are on average rather weak.

example individual achievements are entirely determined by luck or other random factors (the principle of compensation is satisfied but the principle of reward is violated).

To explore the link between perception and measured IOp we aggregate the seven components in a scalar measure of IOp perception. As we are dealing with ordinal variables we propose a simple index which both aggregates the seven dimenesions and preserves the ordinal nature of the answers. We first make the five questions about compensation consistent with the other two, that is we recode them so that 1="not at all important" and 5="essential". Individual perception is then determined as the median of the seven answers. In the resultant index of Inequality of Opportunity Perception, IOpP, ranges between one and five. IOpP assumes value one when at least three of the seven factors violating the principle of equal opportunity are judged as "not at all important" and it assumes value five when at least three of the seven violations are perceived as essential. In order to get a sense of how this would operate imagine to ask to someone to rank the sources of unfair inequality from the least important to the most important, pick the median (4th) and ask her how important is that particular source of inequality of opportunity from 1="not at all important" to 5="essential". The answer is her individual IOpP .

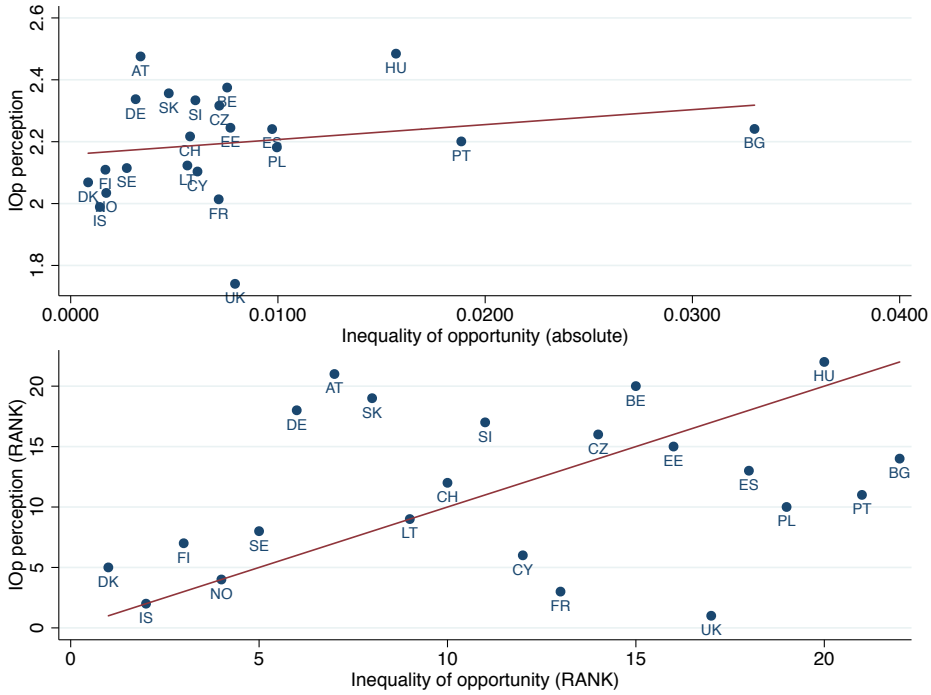
IOpP has some undesirable limitations: it arbitrarily assigns the same weight to each component and - being based on the median of a small sample - may be not the best measure of central tendency. On the other hand, IOpP has the important property of not imposing a cardinal meaning to an ordinal scale. This property will be exploited when assessing the determinants of the individual perception of inequality of opportunity, it is however not preserved when we calculate the average perception in each country.

3 Estimates

Figure 2 reports perceived and measured IOp in the 22 European countries. The top scatterplot presents both IOp and IOpP in absolute terms. The correlation is very weak and not statistically significant. Although, it should be noted that an increase in IOp is associated with a slightly increase in IOpP, many countries with a similar degree of equality of opportunity show very different perceptions of the phenomenon. Belgium and United Kingdom have very similar IOp values but are found at the two extremes in terms of perception. Similarly Bulgaria has four time the IOp of Switzerland but very similar average perception. However, it may be much easier for respondents to assess the relative position of their own countries in terms of IOp rather than the absolute intensity of the phenomenon the bottom scatterplot reports the same correlation looking at the rank of countries. Again average perception is very far from the actual ranking of countries based on the IOp measure. With some countries extremely far from what is expected (the 45 degree line). Such descriptive figures suggest that how individuals perceive IOp very weakly correlates with how scholars measure it. Note also that this conclusion is not driven by the way we have aggregated the seven answers. In the Appendix Figure 4 reports the scatterplots for the rankings of each one of the seven questions separately: all scatterplots show an even lower level of association between IOp and its perception. In the last case, the question about hard work, the correlation of ranks has the unexpected negative sign.

This descriptive figures show that individuals' perceptions do not amount to an unbiased average perception of IOp. We have suggested that IOpP may differ from IOp because in quantifying the role of circumstances on successes and failures individuals may tend to weight their own experience too heavily. If this is the case their evaluation of IOp may

Figure 2: Inequality of opportunity: measure and perception



Source: ISSP (2009) & EU-SILC (2011). Inequality of opportunity is the share of total inequality due to exogenous variables (IOp in eq. 2). Attitude toward inequality is the average $IOpP$ index in each country.

be distorted by a self-esteem bias. In what follows we specify a model able to identify a number of determinants of the individual IOp perception. Because we have aggregated the seven answers, preserving their ordinal nature, IOpP is a multichotomous dependent variable. For individual i in country j we assume that there is a latent continuous metric underlying the ordinal answer to the median of the seven questions ($y^*_{i,j}$). We assume also that the latent variable is a linear combination of a number of independent determinants at individual levels (x), a set of cutpoints (μ), and an unobserved individual effect ϵ assumed normally distributed across observations.

$$y^*_{i,j} = x'_{i,j}\beta + \epsilon_{i,j} \tag{3}$$

Inequality of opportunity varies across countries, it is therefore safe to assume a component of the individual effect is shared by respondents from the same country. If this is the case $\epsilon_{i,j}$ should be written as the sum of an individual and a country unobservable effect:

$$y^*_{i,j} = x'_{i,j}\beta + \nu_j + \epsilon_{i,j} \tag{4}$$

ν_j can be a fixed effect or can be influenced by a number of country level variables, in the latter case can be written as a function of a set of country level variables (z) and an unobserved country specific effect (u).

$$y^*_{i,j} = x'_{i,j}\beta + z'_j\gamma + u_j + \epsilon_{i,j} \tag{5}$$

y^* is not observable, what we observe is:

$$\begin{aligned} y_{i,j} &= \text{not at all important} \ \text{ if } y^*_{i,j} < \mu_1 \\ y_{i,j} &= \text{not very important} \ \text{ if } \mu_1 < y^* \leq \mu_2 \\ &... \\ y_{i,j} &= \text{essential if } \mu_4 \leq y^*_{i,j} \end{aligned} \tag{6}$$

If the mean and variance for ϵ are normalised to be zero and one and assumed independent of u_j we get:

$$\begin{aligned} \text{Prob}(y_{i,j} = \text{not at all important} \,|x,z) &= H(\mu_1 - y_{i,j}) \\ \text{Prob}(y_{i,j} = \text{not very important} \,|x,z) &= H(\mu_2 - y_{i,j}) - H(\mu_1 - y_{i,j}) \\ &... \\ \text{Prob}(y_{i,j} = \text{essential} \,|x,z) &= 1 - H(\mu_4 - y_{i,j}) \end{aligned} \tag{7}$$

Where $y_{i,j}$ can be specified according to equations (3), (4) or (5) and H(.) is the logistic cumulative distribution function. These probabilities and the degree of association with some explanatory variables can be estimated by maximum likelihood with an ordered logit regression model (Green, 2003; Rabe-Hesketh & Skrondal, 2012). We specify three versions of the ordered logistic model. (3) A pooled model with corrections of the standard error to account for data clustered in 22 countries, (4) a pooled model with country fixed effects, (5) a mixed two level model. The latter is a two-level model in which individuals are nested in countries. For the first two models we include among regressors individual controls: the age of the respondent, her sex, her education (whether she at least completed upper secondary level education or not), her employment status (worker, unemployed, retired), and if she is in education. Moreover, in order to test for the presence of a self-esteem bias we add two dummy variables: downward mobility and upward mobility. The former takes value one if the respondent considers the job qualification she has today lower than the job qualification that her father had when she was between 14 and 16 years of age. The latter takes value one if the respondent considers her job qualification higher. The mixed model includes also country level regressors. Because the inclusion of many cluster level controls has been shown to be problematic for similar numbers of clusters (Bryan & Jankins, 2015) we limit the number of country level controls to three: IOp in 2010, GDP per capita in PPP, and the GDP per capita growth in the 2000-2010 decade. Table 4 contains the coefficients for the three specifications of the model.

Estimates are consistent across specifications however, the likelihood-ratio test (χ^2 = 428.66$Prob > \chi^2$ = 0.0000) suggests that there is enough variability between countries to prefer a multilevel ordered logistic model over a standard ordered logistic model. We therefore focus on the interpretation of model (3).

First, the five categories we have constructed aggregating the seven answers prove to perceived as well distinguished by individuals. Threshold parameters are significantly different at a 95% level of confidence. Indeed, thresholds are equally spread out suggesting that the categories we have constructed do not differ much in scope. The interpretation of the coefficients varies depending on the category considered. An increase in one of the regressor with a positive coefficient is equivalent to shifting the distribution to the right. This

Table 4: Individual IOp percetpion: ordered logit estimates

	(1) pooled	(2) pooled (FE)	(3) mixed two level
education	-0.0084	0.0352	0.0561
male	0.0280	0.0326	0.0350
age	0.0051***	0.0070***	0.0070***
upward mover	-0.1225***	-0.1089***	-0.1181***
downward mover	0.1090*	0.1385**	0.1315**
unemployed	0.272***	0.2549**	0.2531**
retired	-0.0256	-0.0553	-0.0643
in education	-0.2340**	-0.2518**	-0.2547**
worker	-0.0702	-0.0632	-0.2547
country effects	no	yes	yes
IOp			-2.8732
GDP p.c.			-0.0028*
growth			-0.1404***
μ_1	-1.5333***	-0.9416***	-1.4672***
μ_2	0.8551***	1.492***	0.9651***
μ_3	3.1445***	3.808***	3.2804***
μ_4	5.1804***	5.8491***	5.3206***
random effects			95% conf. int.
var(intercept)			0.0766
			[0.0573 0.1025]

95% confidence intervals in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author' calculation based on ISSP, 2009; EU-SILC, 2011, Eurostat, 2015.

shift has an unambiguous consequence on the first and last categories (minimum and maximum perceived level of IOp) because it shifts some mass out of the first interval $[-\infty, \mu_1]$ and toward the last interval $[\mu_4, \infty]$. Therefore to be older or unemployed reduces the probability of having the lowest possible perception of IOp. By contrast students have a higher probability of choosing a combination of answers leading to the minimum IOpP. The self-esteem hypothesis is confirmed for the lowest and highest category by the highly significant coefficients for the downward and upward mobility variables. As far as country variables are concerned GDP per capita and GDP growth increase the probability to have the lowest possible perception of IOp. Interestingly enough the the objective measure of IOp seems to have no impact in the perception of IOp itself. However, these interpretation cannot be extended to the three middle categories because the shift of the distribution implies that some mass will move into each of the middle categories but some will also move out.

To evaluate the effect of our control across all the IOpP categories we report the marginal effects for all categories and all variables in Table 5.

As expected the marginal effects for the first category have the opposite sign of the coefficients. A positive coefficient indicates that an increase in the regressor reduces the probability of the lowest category, this implies a negative marginal effect for the probability to be in the first category ($IOpP = 1$). Age, unemployment status and having experienced downward mobility reduce the probability of having a low perception of IOp. Conversely, respondents who are in education and have experienced upward mobility are more likely to perceive a low level of IOp. Country level controls Marginal effects for the probability of being in the second category, where we find the majority of respondents, have all the same

Table 5: Individual *IOp* percetpion: ordered logit marginal effects calculated for model (3)

	category 1	category 2	category 3	category 4	category 5
average probability	0.1509	0.5187	0.2839	0.04011	0.0063
education	-0.0045	-0.0033	0.0062	0.0013	0.0002
male	-0.0042	-0.0030	0.0058	0.0012	0.0002
age	-0.0009 *	-0.0006 *	0.00124 *	0.0002 **	0.00004 *
upward mover	0.0140 ***	0.0101 ***	-0.0192 ***	-0.0041 ***	-0.0007 *
downward mover	-0.0171 **	-0.0141 **	0.0247 **	0.0055 **	0.0009 **
unemployed	-0.0301 **	-0.0283 **	0.0459 **	0.0107 **	0.0017 **
retired	0.0072	-0.0283	-0.0097	-0.0021	-0.0003
in education	0.0348 *	0.0187 *	-0.0434 *	-0.0087 *	-0.0014
worker	0.0080	0.0059	-0.0112	-0.0024	-0.0004
IOp	0.1167	-0.0082	0.1574	0.0351	- 0.0058
GDP p.c. (thousands)	0.0021***	-0.0015	-0.0029	-0.0006***	-0.0001***
growth	0.0132**	0.0092**	-0.0178**	-0.0039***	-0.0006 ***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author' calculation based on ISSP, 2009; EU-SILC, 2011, Eurostat, 2015.

signs but are lower in terms of magnitude. For example, being a downward mover instead of an upward mover reduces the probability of being in the first category by 3%, this difference is reduced to 2.4% in the second category. Marginal effects have the opposite sign for the three highest categories. The country level controls show that, after controlling for all the other observable covariates, GDP per capita and GDP growth in the last decade affect IOpP: the perception of inequality of opportunity decreases in richer and more dynamic countries. However, the most interesting result is that the measure of IOp included among controls does not significantly affect IOpP for any category. Although we are reluctant to conclude that the way economists measure inequality of opportunity has nothing to do with the way it is perceived by people, this estimates suggest that the other country characteristics and individual variables play a much clearer role in determining IOp perception.

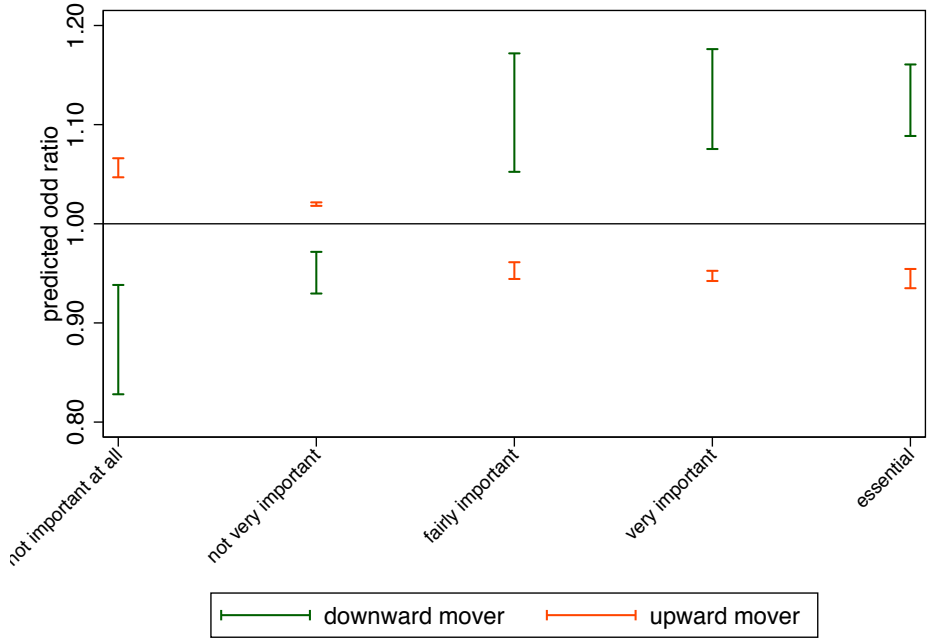
Finally, in Figure 3 we report for each category the 95% confidence interval for predicted odd ratios of the two type of respondents: upward movers and downward movers. Although the precision of the estimates is very different for the two groups (upward movers are about twice as many as downward movers) the distribution of the odd ratios across categories show that, other things held constant, the experience of intergenerational mobility significantly modifies the perception of IOp.

IOpP is constructed aggregating information about seven questions but none of them explicitly refers to occupational mobility. Moreover, questions about personal experiences of social mobility are unlikely to have framed these answers because they are asked later in the questionnaire. Aware that the controls available are limited, leaving a large part of IOpP variability unexplained or explained by country fixed effect, we interpret our results as evidence of the role of individual experience in biasing IOp perception.

4 Conlusion

This paper is the first attempt to empirically explain the individuals perception of inequality of economic opportunity. There are many possible definitions of equal opportunity ranging from definitions prescribing that outcomes should be allocated allocated according to talent

Figure 3: Perception of IOp for upward and downward movers



Intervals correspond to 95% confidence intervals
Source: ISSP(2009) and EU-SILC (2011).

and merit, to fully egalitarian interpretations of the same principle. However, the vast majority of these definition distinguish between fair and unfair source of inequality and list among the latter circumstances beyond individual control such as: race, gender or socioeconomic background. We adopted one of the most popular definition and we estimated a commonly adopted measure of Inequality of opportunity in a sample of 22 European countries. For the same countries we construct an individual ordinal measure of perceived unequal opportunities and merging the two measures we show a weak correlation between prevailing perceived inequality of opportunity and objective measures of the same phenomenon. A weak correlation is found both looking at the absolute perception and at the ranking of countries. Among possible models to explain the individual perception of the phenomenon we opted for a a mixed ordinal logit model. Together with a country random effect, two of the three country level explanatory variables included, GDP per capita and economic growth, are shown to explain a significant share of the total perception variability. In richer and more dynamic countries the perceived inequality of opportunity is lower. Conversely our model suggests that, after controlling for all the other variables, the estimated inequality of opportunity does not play a significant role in determining its perception. Further, we found a number of individual characteristics to have an impact on the degree of perceived inequality of opportunity. Among them, unemployment and experiencing downward intergenerational mobility significantly increase the probability of a person perceiving a lower degree of equal opportunity in her country. We interpret these relationships as signals of the existence of a self-esteem bias in the cognitive process of how people view equality of opportunity: respondents that have good reasons to perceive their experience in the labour market as a failure systematically overemphasise the role of external causes in determin-

ing socioeconomic success. Our results suggest that the popular perception of inequality of opportunity may be very weakly linked to objective measures of the same phenomenon produced by scholars. Conversely, other country characteristics - such as wealth and growth - together with individual experiences play a determining role in shaping our perception of complex phenomena such as inequality of opportunity. These findings suggest an interesting direction for future research; is it possible to construct an index of relative IOp obtained by aggregating individual perceptions? Can Yitzhak's approach to relative deprivation be transferred to inequality of opportunity?

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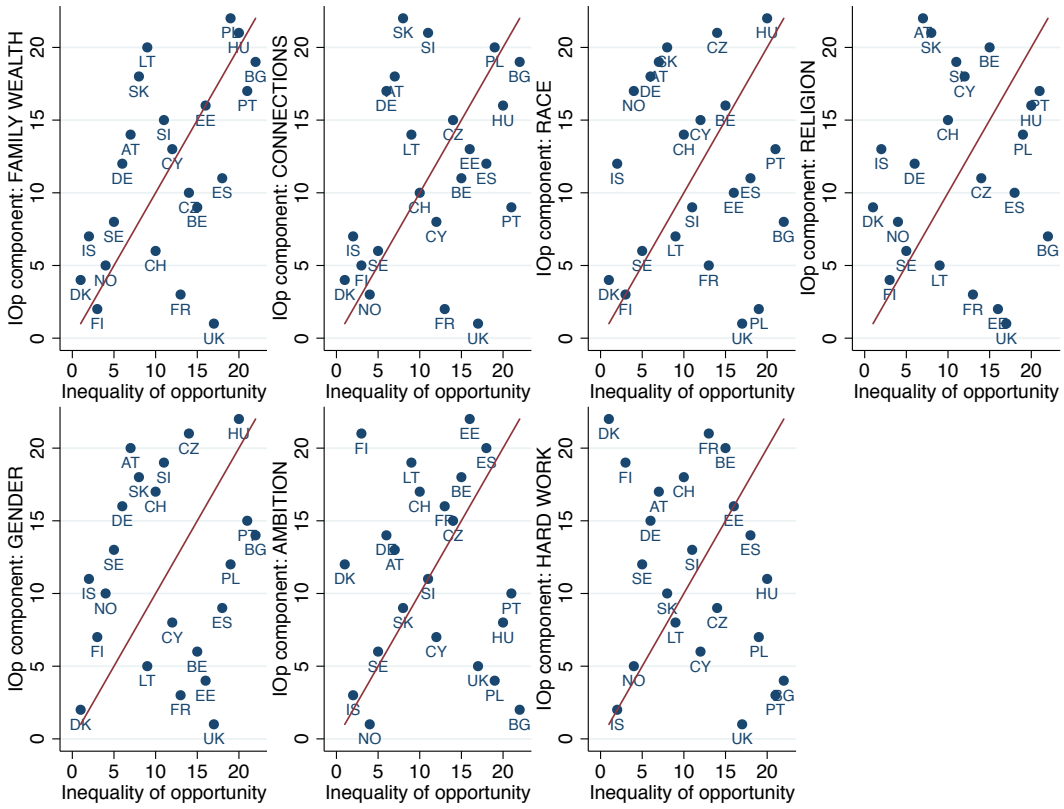
Appendix

Figure 4: Inequality of opportunity components: measure and perception (ranks)



Source: ISSP (2009) & EU-SILC (2011). Inequality of opportunity is inequality due to exogenous variables (IOp in eq. 2). Perception is the average answer to the seven questions considered.

Table 6: Answers correlation across $IOpP$ components

	family wealth	connections	race	religion	gender	ambition	hard work
family welath	1						
connections	0.6560	1					
race	0.0832	0.0970	1				
religion	0.2855	0.2803	0.4373	1			
gender	0.4183	0.5368	0.6075	0.5583	1		
ambition	-0.3234	-0.2030	-0.3474	-0.5543	-0.5288	1	
hard work	-0.4338	-0.3156	-0.0308	-0.1495	-0.1847	0.6295	1

Source: Author' calculation based on ISSP, 2009.