Equality of opportunity and fiscal policies:

Where are we?
Where do we need to be?

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ABSTRACT

This paper evaluates to what extent equality of opportunity for income acquisition is achieved through tax-and-redistribution systems in the case of nine European countries, plus Japan, using the 2011 PIAAC survey. For the purposes of this paper, equality of opportunity for income acquisition is realized when the effect of people's circumstances on their income is neutralized through the tax-and-redistribution system, while the effect of choices remains untouched. Circumstances are seen as being arbitrary, so that people should not be held responsible for them, while the opposite is true for choices. Results show that continental European countries perform better than United Kingdom (UK) and Japan in terms of the degree to which equality of opportunity is achieved. Moreover, within Europe, Nordic countries outperform Southern ones when considering different labour supply elasticities.

INTRODUCTION

Since the publication of "Capital in the 21st Century" (Piketty, 2013), the problems of wealth and income inequality have been back on the (political) agenda. These issues are not new to social scientists, but the importance of the topic of inequality has re-emerged for academics and policy makers alike. In the last thirty years, income inequality has increased, most worryingly in the US and UK, but also in the welfare states of continental Europe (Piketty, 2013). However, the debate is far from over. There are important questions that remain to be answered, namely: What are the effects of inequality for any society? To what extent is inequality unjust or just? To what extent is it possible for welfare states to promote equality without ignoring other goals?

This paper explores the question of how much inequality, if any, would be acceptable in a given society, both theoretically and empirically, and to what extent developed states have achieved a desirable level of equality. In line with Cohen (1989) and Roemer (1998), it is argued that equality of opportunity (EOp) is an attractive version of equality because it corrects the effects of circumstances on people's outcomes in life, while also leaving room for individual effort and choices. Thus, EOp is distinct from equality of outcomes because it also cares about the process by which an outcome, in this case a particular level of income, is achieved, not just the outcome itself. This paper tries to measure whether or not EOp for income is achieved, even if in an involuntary fashion, through tax and redistribution systems in the case of nine European states, plus Japan. Among the different approaches to EOp, this paper considers only EOp for income acquisition as it is the one that can be directly addressed by tax and redistribution systems.

Hence, the main question this paper aims to answer is: to what extent do fiscal regimes achieve EOp for income acquisition? This question was first asked by Roemer *et al.* (2003), which

is the model that the present paper follows. EOp captures the idea that the effects of people's circumstances in life should be compensated through a redistribution scheme, leaving inequalities due to differential effort untouched. The distinction of what constitutes a circumstance in life and what constitutes a choice is an issue that is far from settled (see Cohen, 1989; Dworkin, 1989a; Nozik, 2013; Rawls, 2009) For the purposes of this paper, I only consider people's socio-economic background as a circumstance.

Using a new data set, Survey of Adult Skills (PIAAC)[1], this paper adds to the empirical literature on EOp by investigating whether the initial results of Roemer *et al.* (2003), which used data from the early 1990s, but also of later studies (Dardanoni *et al.*,2006; Checchi & Peragine, 2010; Björklund, Jäntti & Roemer, 2012) are confirmed. Moreover, it evaluates the situation of Japan from the point of view of EOp for income acquisition, which, to my knowledge, has received no attention in the literature. The case of Japan deserves particular attention because it is an OECD country that has experienced late but fast economic development. I show that continental European countries perform better than UK and Japan in terms of the degree to which equality of opportunity is realized. Furthermore, within continental Europe, Nordic countries outperform Southern ones in two scenarios. The first one considers parent's level of education as the only circumstance leading to income inequality, while the second one adds parents' immigrant background.

The paper is structured in four sections. First, I set the stage for EOp and say why this might be a desirable policy. This argumentation ignores a great deal of detail, but it clarifies to the reader the choices this paper makes with respect to the version of EOp that it considers, namely EOp for income acquisition. Likewise, in the first section I present the theoretical framework first derived in Roemer (1998) and then revisited in Roemer *et al.* (2003) and other subsequent papers (section 2.2). Second, a brief literature review that shows the empirical results of other studies.

1. The data set was first used in Jerrim and Macmillan (2014) for exploring a different topic.

Then, the paper measures to what extent redistribution systems correct the effects of circumstances, while the result of effort untouched. A redistribution system is proposed, in line with EOp and then this system is compared with the observed policies of the states here under analysis. Finally, the paper discusses and evaluates the consequences of implementing EOp in terms of efficiency losses/gains.

THEORETICAL FRAMEWORK

The theoretical framework of this paper closely follows Roemer *et al.* (2003). However, the paper goes beyond this model when defining and analysing the different theoretical issues that belong to the realm of political philosophy. Hence, the present framework has two parts: i) a philosophical one, in which I make the case for EOp and draw the differences between this approach and others, like equality of outcomes or equality of resources; and ii) an empirical (mathematical-economic) one, in which I present and discuss the tools that this paper aims to use in order to describe the EOp ideal.

1.1 Equality of opportunity, a philosophical defence

In political philosophy, there have been contended several conceptions regarding equality in last decades. A very useful starting point for this explanation is the assumption that people should be equal in something (Cohen, 1989). The subsequent question is: under what dimension should people be equal? I am going to start by discussing equality of outcomes, as this is one of the most intuitive forms of equality, but also it is the one which, because it was refuted, generated other proposals regarding the appropriate dimension which should be equalized or equalisandum ("that which ought to be equalized" (Cohen, 1989, p.908)). Many claims have been raised against this conception of equality.

197

Equality of outcomes entails making everyone equal with respect to a particular outcome regardless of their individual effort. One of the problems with equality of outcomes is that of "expensive tastes" (Keller, 2002). Equality of outcomes would entail giving more resources to people with expensive tastes than to those with less expensive tastes in order to satisfy their tastes and thus make them equally happy with those with those that can be satisfied with less expensive resources (goods, services etc.). Thus, people with expensive tastes would use a lot of resources for an arbitrary reason, namely that they have other tastes. In other words, equality of outcomes destroys the role of incentives in people's lives, as it treats people in the same way irrespective of their actions.[2]

2. For a more detailed argument, see Cohen (1989) and Dworkin (1981a).

However, "expensive tastes" are not enough to defeat any compensation for unfavourable outcomes. If people with expensive tastes have these tastes through no fault of their own, then holding them responsible for these would seem unfair (Cohen, 1989). Even if he attacks equality of outcomes on the valid ground of expensive tastes, Dworkin (1981b) makes the unfortunate assumption that people "choose" their tastes and puts forward an alternative type of equality, namely equality of resources. The latter basically proposes to give equal endowments of resources to people, after which they are free to exchange them for goods according to their preferences/tastes. But Dworkin's critique of equality of outcomes and his substitute are valid only in so far as people are responsible for their tastes. And there are multiple situations in life when people's tastes are a result of upbringing and social environment, for example.[3]

3. A similar critique can be made with respect to innate ability. People with more innate ability would require fewer resources than people with less innate ability in order to achieve a certain outcome. However, one cannot hold people responsible for their talents/handicaps (Cohen, 1989).

Hence, in choosing an appropriate equalisandum, one should look at whether people are in a particular situation because of their choice or because of luck. A short digression is needed here in order to clarify what kind of luck egalitarians care about. An important distinction regarding luck was introduced by Dworkin (1981b) between "brute luck" and "option luck". The former is the

type of luck over which the individual has no influence. Dworkin (1981b) uses the example of a person struck by lightning while on a trip, where he could not possibly have known about that (all weather forecasts predicted very good weather). The latter is a situation that has an uncertain outcome, but in which the individual chose to enter. To illustrate it, Dworkin (1981b) uses gambling, where a person chooses to be in a situation that has a certain probability of failure and the person is aware of that probability. Hence, the aim of egalitarians is to compensate for the effects of brute luck, which is seen as unfair and exploitative, on outcomes, but not for the effects of option luck.

This is when EOp must be introduced. EOp is concerned not just with the outcomes that individuals achieve in some realm of life, but also with the process of achieving them. This theory aims to separate the factors that led to a certain outcome into choice-related and circumstance-related ones (Roemer, 1998). The latter category is the one for which we cannot hold someone responsible, and the former represents the part of an individual's outcome for which we hold that person responsible. Hence, EOp could allow for equality of outcomes if we come to the conclusion that everything in one's life is a matter of circumstance, but if that is not the case, it also permits some inequalities to exist, namely those that are a result of "choice/effort".

There are two major conceptions on EOp. The first one establishes that there should be no discrimination when it comes to the chance of achieving a certain outcome. This view entails a very formal kind of EOp and it is, from a philosophical standpoint, the least demanding one. For example, university admission should be open to all people, regardless of their gender, race, religion etc.

The second conception goes a step further. It entails not just formal EOp between people, but it also considers social, economic and natural circumstances that might actually unjustly prevent someone from achieving a desired outcome. People from

disadvantaged social backgrounds, for example, might not have the opportunity of going to university even if higher education is formally accessible to them because they do not have the resources, skills, or they are discouraged to do so due to their social background (for instance, none of their parents went to university, their social environment does not appreciate the returns to higher education.). In this paper, I focus on the second approach to EOp. I consider social and economic background as being something that individuals have no control over, and hence they cannot be held responsible for.

The inclusion of the social and economic background in "circumstances" rather than "choices" can be criticized on both egalitarian and non-egalitarian grounds (Cohen, 1989). From an egalitarian point of view, one might say that the social and economic status of a person is not so much of a circumstance, but it is also choice related (for example people could work less than others and thus, they could have lower incomes), so the compensation would be unfair. The non-egalitarian rebuttal would say, for example, that compensating for the effect of one's disadvantaged social position represents a high burden for any society. For the purposes of this paper, I consider as "circumstances" the following dimensions: the level of education and the immigrant status of the surveyed individuals' parents. I suggest most of the critiques to the inclusion of these two dimensions would be made from a non-egalitarian perspective. Critics could argue that the efficiency losses involved in an EOp policy are too large and hence we should not implement this policy. An example of such efficiency losses is a lower labour supply as a result of income redistribution.

Finally, I need to mention what this paper is going to use as equalisandum. Even if it is not entirely accurate from a philosophical standpoint, my empirical approach will concern "opportunity for income". Not even "opportunity for welfare" would be the right equalisandum, as it fails to take into account many

aspects that influence one's outcomes in life. Cohen (1989) proposes the use of "access to advantage", which is much broader than opportunity for welfare or income, although it includes both. However, he does not give a proper account of what "advantage" should contain. In line with Roemer *et al.* (2003), I do not take "opportunity for welfare" to be the desired equalisandum because that would entail interpersonal utility comparisons. Additionally, if "opportunity for welfare" cannot be considered as equalisandum, then certainly "access to advantage" cannot either as advantage is not just immeasurable and ambiguous, but it also requires us to compare utilities between people. So, even if very imperfect, for the purposes of this paper, "opportunity for income" strikes a balance between philosophy, economics and policy making. Not only is income measurable, clear and does not ask for inter-personal utility comparisons, but also most other advantages observable in today's society depend on income.

1.2 A formalized approach to EOp

In order to formalize the approach to EOp that this paper takes, there are five concepts to define: objectives, circumstances, type, effort and instrument (Roemer *et al.*, 2003).

The objective (denoted by v) is defined as the desired outcome for which EOp needs to be achieved. Circumstances are these factors that influence a certain outcome which are not chosen by individuals and thus, they are not to be held responsible for. Effort is the set of factors that influence an outcome that are due to individual choice and for which people are to be held responsible. An instrument is the policy tool that can be used to achieve EOp as described above. It is denoted by $\varphi \epsilon \Phi$, where Φ is the set of instruments available. All individuals that have the same circumstances are taken as a type, denoted as $t \epsilon T$, where T is the set of types and t a specific type within the set. Hence, $v^t(\pi, \varphi)$ will be "the value of the objective at the πth quantile (where π

ϵ [0,1]) of the distribution of the objective in type t, at the policy φ" (Roemer *et al.*, 2003, p. 542).

The aim of this method is to determine the "value of the instrument which equalizes the value of the objective across types at any degree of effort" (Roemer *et al.*, 2003, p. 542). Hence, if a person is at the πth quantile of the effort distribution of her type, she expanded the same amount of effort as someone who is also at the πth quantile of the effort distribution of another type and should hence be equally rewarded. In my paper, the type considered is initially the level of education achieved by one's parents, and the instrument is a tax and transfer policy that should seek to redistribute income, which is taken as the objective. The policy chosen should make the distributions of income for different types as equal as possible. According to Roemer *et al.* (2003, p. 543), the following function should be solved:

$$\text{Max}_{\varphi \in \Phi} \int_0^1 \text{Min}_t v^t(\pi, \varphi) d\pi \qquad (1)$$

The formula intends "to find that policy φ that maximizes the minimum level of advantage (v), across all types (t), of individuals who expend the πth degree of effort for their type" (Roemer, 1998, p. 27). This policy is Rawlsian with respect to circumstance-related outcomes, as it maximizes the circumstance-related outcome of those worse off and it is utilitarian with respect to effort-related outcomes because it leaves untouched outcomes dependent on the level of effort invested by each individual.

The individual income after taxes and redistribution (henceforth, post-fisc income) is described by the following function: $y=(1-a)x+c$, where x is the pre-fisc income (income before taxes and redistribution), c is a universal grant and a is the tax rate. In this model, everyone is taxed at the same rate, which is an important simplifying assumption. If $G_\varphi^t(y)$ is the cumulative dis-

tribution function of post-fisc income, y, corresponding to type t and policy φ, then by inverting $\pi = G_\varphi^t(v^t(\pi,\varphi))$ (distribution of effort) and plugging the result into equation 1, we obtain:

$$\text{Max}_{\varphi \in \Phi} \int_0^1 \text{Min}_t (G_\varphi^t)^{-1}(\pi) d\pi \qquad (2)$$

The formula above maximizes "the average post-fisc income of the most disadvantaged type" (Roemer *et al.*, 2003, p. 546) using a given redistribution policy. Next, by ascribing a somehow well-known quasi-linear utility function $(u(y,L) = y - \alpha L^{1+1/\alpha})$ and substituting into it the income function $(y=(1-a)x+c)$, the optimal labour supply can be found after differentiation (Roemer *et al.*, 2003, p.547):

$$L(w, a, c) = [(1-\alpha)w/\hat{\alpha}]^\eta) \qquad (3)$$

Where $\hat{\alpha} = \alpha(1+1/\eta)$ and η is the wage elasticity of labour supply. By assumption, the median worker works one unit of time. Hence, the function for pre-fisc income $x = wL = [(1-a)/\hat{\alpha}]^\eta w^{1+\eta}$ can be obtained.

Government revenues all come from taxation of pre-fisc income $x = wL$ at flat rate a, and government expenditures are c+g per capita, with g non-transfer (education, health, infrastructure etc.) and c transfer payments per capita, so a balanced budget requires:

$$a \int_0^\infty [(1-\alpha)/\hat{\alpha}]^\eta w^{1+\eta} f(w) dw = c+g \qquad (4)$$

On the left hand side of equation (4) there are the per capita tax revenues and on the right hand side, there are the per capita expenditures. We can now solve for c:

$$c = a[(1-\alpha)/\hat{\alpha}]^\eta B - g \quad B= \int w^{1+\eta} dF \qquad (5)$$

Assume type 1 is the most disadvantaged and let $A=w^{1+\eta}dF^1$. Now, we can substitute both x and c into the post-fisc income equation $y=(1-a)x+c$. Hence, the average post-fisc income of the worst type is given by:

$$(1-a) [(1-\alpha)/\hat{\alpha}]^\eta A+a[(1-\alpha)/\hat{\alpha}]^\eta B-g \qquad (6)$$

Maximizing the above mentioned equation, the tax rate corresponding to equality of opportunity is then (Roemer *et al*, 2003, p. 548):

$$a^{EOp}=Max[1-\eta B/((1+\eta)(B-A)), 0] \qquad (7)$$

If there is a significantly large difference between B and A, then the tax rate corresponding to EOp would be the first term in the above parenthesis. If $B/A\leq1+\eta$, then the optimal tax rate would be 0. In that case, the only tax that citizens pay should be the one for covering the per capita government expenditures, g. a_{bench} is defined as the tax rate that would allow the government to have a per-capita spending of g, without any transfer payments (c=0).

Next, the following index is defined (Roemer *et al.*, 2003, p. 548):

$$\nu = (V_2 - V_1) / (V_3 - V_1) \qquad (8)$$

V_1 is the average post-fisc income of the worst-type individual at the no-transfer policy, V_2 is the average post-fisc income of the worst type at the observed policy and V_3 is the same figure corresponding to the EOp policy. Hence, $\nu=0$ if the observed policy is the no-transfer policy and $\nu=1$ if the observed policy is the EOp transfer policy.

To measure the deadweight loss, Roemer *et al.* (2003, p. 549) define the following index:

$$\varepsilon = \frac{\int x(w; \varphi^{EOp})dF(w)}{\int x(w; \hat{\varphi})dF(w)} \qquad (9)$$

Where the numerator is the average income under the EOp policy and the denominator is the average income under the observed policy. If $\varepsilon<1$, then there is a deadweight loss involved under the EOp policy.

LITERATURE REVIEW

Although the literature on EOp is quite extensive, this review is limited to the empirical applications of the theory and their findings. Reviewing all the theoretical conceptualizations and the different empirical approaches is beyond the scope of this paper. I intend here to give an overview of the empirical results in the literature in order to provide some information

about the level of EOp that different countries around the world have achieved.

Roemer *et al.* (2003) compared the degree to which EOp for income was achieved in eleven countries[4] through a tax and redistribution system for which period of time. When taking just the level of education achieved by parents as a circumstance, the author found that the Scandinavian countries, the Netherlands, West and East Germany taxed even more than EOp would have required. Belgium taxed just about enough to achieve EOp and other countries underperformed. Similar results on France were obtained by Lefranc, Pistolesi and Tranoy (2009). Dardanoni *et al.* (2006) used the method of quantile regression to test the extent to which EOp for pre-fiscal income was achieved in the UK and the US. Using survey data collected between 1957 and 1992, they found that neither of the two countries went so far as to correct for the influence of native ability or years of education on income. However, including these two factors under circumstances means taking a rather extreme/strong view on EOp. Nonetheless, even when considering just parents' level of education as a circumstance (a factor that presumably more people would see as being something for which one cannot be held responsible), the UK underperformed and the results for the US were ambiguous after performing some robustness checks.

Checchi and Peragine (2010) analysed the case of Italy and after accounting for a relatively limited set of circumstances (region, parents' education and sex) found out that about 20 per cent of income inequality in the 90s is due to inequality of opportunity. Likewise, focusing on Italy, Peragine and Serlenga (2008) found that the social background (family) of an individual is very important in determining the educational outcomes, inequality of opportunity having a stronger effect in the South (the less developed part of Italy) than in the North (the more developed part).

4. Belgium, France, Germany (East and West), Denmark, Great Britain, Italy, the Netherlands, Norway, Spain, Sweden, and the USA.

Björklund, Jäntti and Roemer (2012) studied EOp for income in Sweden and found that the great majority of inequality there is due to effort, even after accounting for a very complex and detailed set of circumstances, decomposing the population into 1,152 types.

Ferreira and Gignoux (2011) analysed a sample of Latin American countries. The study found that indeed there are vast inequalities between citizens that can be explained by uneven circumstances. Also regarding less developed countries, Cogneau and Mesplé-Somps (2008) studied inequality of opportunity for income for a sample of five African countries: Ivory Coast, Ghana, Guinea, Madagascar and Uganda, which are all located in the Sub-Saharan region. They concluded that inequality of opportunity is highly correlated with inequality of income and that the former British colonies from the sample (Ghana and Uganda) have "a much higher intergenerational educational and occupational mobility than the three former French colonies" (Cogneau & Mesplé-Somps, 2008, p. 1).

DATA AND METHODOLOGY

This paper uses data from the PIAAC survey, which is an OECD wide survey that collected data on 24 countries between 1 August 2011 and 24 March 2012 (in the majority of cases). A representative sample of 166,000 people aged between 16 and 65 participated in the survey. Because of data incompleteness in both the PIAAC survey and the data set regarding taxation (see next paragraph), I only use the data for ten countries (Belgium, France, UK, Italy, Norway, Japan, Denmark, Ireland, Finland and Spain) and exclude individuals below 24 years old, as their income is usually nil probably because most of them are still living with their parents and/or not working.

Moreover, as it is mentioned in the theoretical framework, combinations of the observed tax rate and grant (a^{obs},c^{obs}) are

needed in order to compare these with the tax and grant values that EOp would require. As PIAAC does not contain data on post-fisc income, the pairs of (a^{obs},c^{obs}) cannot be estimated by simply regressing post-fisc income on pre-fisc income. I therefore use the values for a^{obs} derived by Van der Linde and Groot (2015), who use the data on pre-fiscal and post-fiscal Gini coefficients from the Standardized World Income Inequality Database (SWIID). The assumption behind this exercise is that both PIAAC and the SWIID contain a sufficiently large sample and therefore the values for a^{obs} from Van der Linde and Groot (2015) can be safely combined with the PIAAC data set.

The assumption regarding the redistribution system is that everyone is taxed at a flat rate and then the proceeds are distributed equally to everyone, in the form of a universal fixed grant. The value of the universal grant, c^{obs}, is calculated by multiplying the tax rate with the value of the mean income and then subtracting g. I use "General government final consumption expenditure (per cent GDP)" from the World Bank database (World Bank, 2015) as a proxy for a_{bench} and then determine the value of g.

The variables used from PIAAC are the pre-fisc income (monthly earnings including bonuses for wage and salary earners and self-employed) and the education level of parents (see table 1). Individuals are initially grouped in three types depending on their parents' education (the circumstance).

Looking at Table 1, for all countries standard deviations are quite large for each variable. However, the within-type large standard deviations might be explained by the fact that only parents' education is taken as a circumstance. When extending the set of circumstances, the within type variation significantly reduces. This paper considers such an extension by taking as an additional circumstance the immigration status of the parents in addition to their level of after obtaining the results from the simple framework. The values indicated in the table are close to the national averages for gross earnings as indicated by Eurostat

(Eurostat, 2015). The sizes of the samples also differ. In the case of Italy, there are 2,143 individuals, while the sample for Denmark contains 4,410 observations. The size of the sample is a constraint on the number of circumstances that can be taken into account and consequently on the number of types that can be considered. Unlike Roemer *et al.* (2003), I cannot only consider the male subsample in the data set, as such a restriction would considerably reduce the sample. Such a restriction based on male/female would have been desirable because the elasticity of labour supply is quite different between genders (Evers, De Mooij & Van Vuuren, 2008). The main reason for this is that women are more involved in household work than men (Borjas, 2013).

The EOp pairs of tax and grant (a^{EOp}, c^{EOp}) are calculated as described in the theoretical framework. Afterwards, the indicator for the degree of closeness to the EOp ideal (ν) and the efficiency index (ε) are computed in order to be able to formally compare the degree to which EOp is achieved and to see whether there are welfare losses attached to the EOp policy. Basically, after taxing people at an a^{EOp} flat rate and then giving everyone a fixed grant c^{EOp} the continuous distribution functions (CDFs) of income of different types should get very close to one another.

RESULTS

This section presents the results of the methodology presented in the theoretical framework. With respect to the values for η, I used in turn 0.06, 0.09 and 0.21. The first two were also used by Roemer at al.(2003). The first two are usually more appropriate for men, while the latter appears as representative for men and women taken together (Evers, De Mooij & Van Vuuren, 2008). As is discussed in the previous sections, the higher the value we use for η, the lower a^{EOp} is.

Table 2 shows that when $\eta=0.06$ and just parents' level of education is taken as a circumstance, the Nordic countries from

Table 1 Summary statistics pre-fiscal income					
Country	Sample size	Pre-fisc income-per type			Mean pre-fisc income
		ED1	ED2	ED3	
BEL	2,630	3,282.5 (5,417.2)	3,325.7 (3,877.7)	3,661.7 (2,711.7)	3,394.8 (4,308.20)
UK	4,233	1,921.9 (2,876.3)	2,286.2 (3,034.8)	2,935.2 (3,516.6)	2,319.3 (3,127)
FR	3,204	2,213 (2,381.5)	2,423.3 (1,846.9)	2,994.1 (3,115.1)	2,433.7 (2,393.3)
NOR	3,268	369,145 (34,598)	37,817 (20,210)	41,529 (31,306)	38,779 (28,626)
IT	2,143	2,077.3 (3,281.6)	2,488.4 (2,257.6)	3,281.3 (4,260.7)	2,256.2 (3,169)
JAP	3,102	288,143 (228,879)	342,278 (452,870)	370,757 (312,841)	336,852 (365,618)
DK	4,410	31,810 (31,474)	3,4561 (44,569)	40,379 (63,178)	35,281 (47,210)
IRL	2,944	2,851.6 (4,636.3)	3,429.9 (4,800.2)	4,096.3 (8,288.2)	3,305.4 (5,738.2)
FIN	3,275	3,085.7 (2,032.3)	3,153.7 (1,665.2)	3,386.5 (1,845.1)	3,164.5 (1,861.4)
ESP	2,550	1,629 (1,147.7)	1,955.4 (1,395.5)	3,637.1 (19,696.3)	1,945.2 (7,299.5)

Source: Author.

Notes: The income refers to monthly earnings including bonuses for wage and salary earners and self-employed -expressed in local currency-, and pre-fisc income for three groups that differ depending on the level of education achieved by their parents -expressed on a scale of 1-3, with "1" meaning that neither parent has upper secondary education, "2" meaning that at least one parent has attained upper secondary or post-secondary-non-tertiary education and "3" meaning that at least one parent has attained tertiary education- and pre-fisc income per group- St. dev. for each variable is in parenthesis. So variables that end with "1", for example, give the level of income for those whose parents are in group 1 according to the scale explained above. Standard deviations are included in parentheses.

the sample overtax. Moreover, in the case of Norway, Finland and Belgium, EOp would indicate just a lump-sum tax for paying for the non-transfer expenditure of the government. Spain, Japan and the UK are the worst performers in our sample, signalling that there is quite a low level of socio-economic mobility. In the case of these three countries the dead-weight loss

Table 2 EOp policy, η=0.06								
Country	Observed tax rate (aobs)	Observed grant (cobs)	EOp tax rate (aEOp)	EOp grant (cEOp)	No-transfer tax rate (abench)	EOp Closeness Indicator (v)	Efficiency Index (ε)
BEL	0.56	1089.73	0	-814.75	0.24	OT	1.05
UK	0.51	691.15	0.67	1066.13	0.21	0.65	0.98
FR	0.52	683.88	0.38	330.54	0.24	OT	1.02
NOR	0.57	13378.78	0	-8531.40	0.22	OT	1.05
IT	0.46	584.35	0.29	194.32	0.20	OT	1.02
JAP	0.46	85897.18	0.61	137620.64	0.20	0.62	0.98
DK	0.60	11466.35	0.42	5457.72	0.27	OT	1.02
IRL	0.64	1530.40	0.59	1347.64	0.18	OT	1.01
FIN	0.58	1066.45	0	-759.49	0.24	OT	1.05
ESP	0.49	556.34	0.65	878.96	0.20	0.63	0.98

Source: Author.

Notes: Parents' level of education considered as the only circumstance (3 types, OT-overtax).

from implementing EOp policy would not be too large, as the values of ε indicate.

When η=0.09[5] and again the only circumstance considered is parents' level of education, then the only countries underperforming are UK and Spain, although they are very close to the EOp ideal. The same is true for Japan. As I said above, the fact that more countries are overtaxing when η=0.09 than when η=0.06 was expected. Thus, when η more than triples (i.e. η=0.21), all the countries in the sample appear as overtaxing, as indicated in Table 3.

As considering just a single circumstance as influencing one's income is a limited approach, I present below the results of a more complex situation. Tables 4 and 5 show the results of the same methodology that has been applied so far, with the difference being that parents' immigration status is also taken as a cir-

5. The corresponding table not reported in the paper.

Table 3 EOp policy, η =0.21							
Country	Observed tax rate (aobs)	Observed grant (cobs)	EOp tax rate (aEOp)	EOp grant (cEOp)	No-transfer tax rate (abench)	EOp Closeness Indicator (v)	Efficiency Index (ε)
BEL	0.56	1089.73	0	-814.75	0.24	OT	1.19
UK	0.51	691.15	0	-487.05	0.21	OT	1.16
FR	0.52	683.88	0	-584.10	0.24	OT	1.17
NOR	0.57	13378.78	0	-8531.40	0.22	OT	1.19
IT	0.46	584.35	0	-451.24	0.20	OT	1.14
JAP	0.46	85897.18	0	-67370.34	0.20	OT	1.14
DK	0.60	11466.35	0	-9525.89	0.27	OT	1.21
IRL	0.64	1530.40	0	-594.97	0.18	OT	1.24
FIN	0.58	1066.45	0	-759.49	0.24	OT	1.20
ESP	0.49	556.34	0	-389.05	0.20	OT	1.15

Source: Author.

Notes: Parents' level of education considered as the only circumstance (3 types, OT-overtax).

cumstance considered worthwhile for compensation under the EOp policy. Individuals are grouped into two categories: i) those that have at least one immigrant parent and ii) those with neither parent being an immigrant. Thus, if so far this paper has worked with three types (basic model), corresponding to the three levels of education achieved by parents, and now it considers six types (three education levels of parents x two immigrant statuses of parents, extended model). I excluded Japan and Finland from the sample of countries considered for the extended model because less than 6 per cent of the PIAAC survey respondents from these two countries had immigrant parents.

In the extended model, all countries are quite far away from the EOp ideal, with values of v between 0.4 and 0.74, when η=0.06 (see table 4). The findings for France and UK, as they stem from the PIAAC data set, cannot be reported in the ex-

Table 4 EOp policy, η =0.06							
Country	Observed tax rate (aobs)	Observed grant (cobs)	EOp tax rate (aEOp)	EOp grant (cEOp)	No-transfer tax rate (abench)	EOp Closeness Indicator (v)	Efficiency Index (ε)
BEL	0.56	1089.73	0.80	1904.47	0.24	0.57	0.95
UK	0.51	691.13	SVC	SVC	0.21	NA	NA
FR	0.52	683.79	SVC	SVC	0.24	NA	NA
NOR	0.57	13378.78	0.75	20706.17	0.22	0.65	0.97
IT	0.46	584.35	0.85	1457.12	0.20	0.40	0.93
DK	0.60	11466.35	0.80	18839.12	0.27	0.61	0.96
IRL	0.64	1530.40	0.81	2074.67	0.18	0.74	0.96
ESP	0.49	556.34	0.83	1230.96	0.20	0.45	0.93
FIN	0.58	1066.45	0	-759.49	0.24	OT	1.20
ESP	0.49	556.34	0	-389.05	0.20	OT	1.15

Notes: Parents' level of education and their immigrant status considered as circumstances (6 types). SVC-severe crossing between the CDF of the most disadvantaged type and the rest, the methodology cannot be applied.

| Table 5 EOp policy, η =0.21							
Country	Observed tax rate (aobs)	Observed grant (cobs)	EOp tax rate (aEOp)	EOp grant (cEOp)	No-transfer tax rate (abench)	EOp Closeness Indicator (v)	Efficiency Index (ε)
BEL	0.56	1054.47	0.38	454.41	0.24	OT	1.08
UK	0.51	691.13	SVC	SVC	0.21	NA	NA
FR	0.52	683.79	SVC	SVC	0.24	NA	NA
NOR	0.57	13378.78	0.25	992.32	0.22	OT	1.12
IT	0.46	584.35	0.53	738.45	0.20	0.79	0.97
DK	0.60	11466.35	0.40	4549.72	0.27	OT	1.09
IRL	0.64	1530.40	0.41	761.12	0.18	OT	1.11
ESP	0.49	556.34	0.49	558.98	0.20	1.00	1.00
FIN	0.58	1066.45	0	-759.49	0.24	OT	1.20
ESP	0.49	556.34	0	-389.05	0.20	OT	1.15

Tables 4 and 5 Source: Author.

Notes: Parents' level of education and their immigrant status considered as circumstances (6 types).

tended model, as there is severe crossing between the CDF of the worst-off type and the rest of the CDFs.

Looking at Table 5, Italy seems to underachieve with respect to EOp even when η=0.21 (ν=0.79), which is in line with Roemer at al. (2003) and Checchi and Peragine (2010), although both studies considered a different set of circumstances. Under this rather high-elasticity scenario, Spain seems to be the closest to EOp.

If countries are clustered with respect to their performance in terms of EOp, then it can be observed that in the basic model, when η=0.06 (see table 2), a division line can be drawn between

FIGURE 1 PRE-FISCAL CDFS OF INCOME FOR 3 TYPES, DENMARK
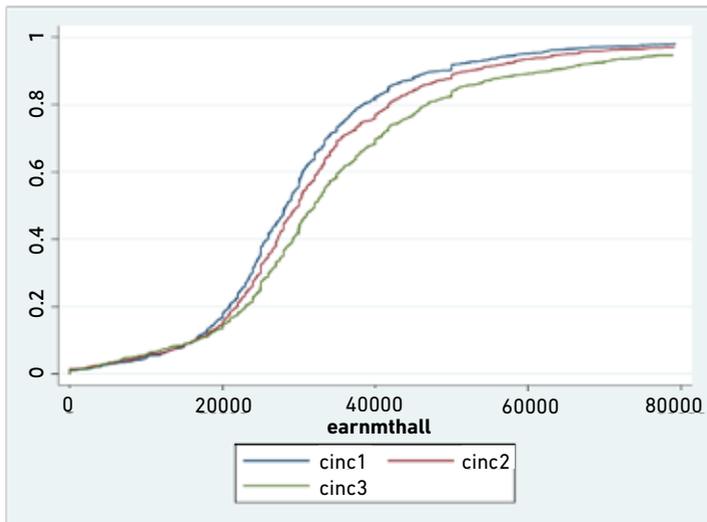
Source: Author.

Notes: Parents' level of education taken as a circumstance. "cinc1"-cumulative distribution of pre-fisc incomes of those whose parents did not finish secondary school (type1), "cinc2" "cinc3"-the same variable for types 2 and 3, respectively, monthly earnings -"earnmthall"- on the x-axis.

FIGURE 2 PRE-FISCAL CDFS OF INCOME FOR 3 TYPES, ITALY
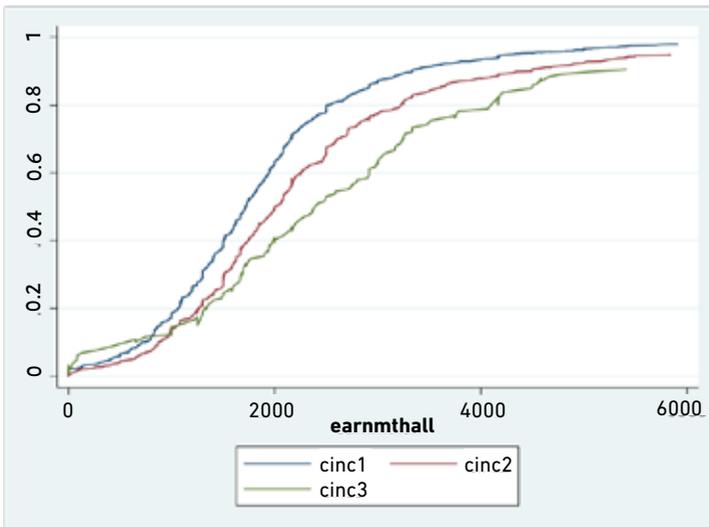
Source: Author.

the more social democratic continental Europe, with the exception of Spain ($v=0.63$), and the more liberal UK ($v=0.65$) together with Japan ($v=0.62$). When considering the extended model (6 types), there is a North-South division line within Europe, with Spain[6] and especially Italy at the bottom of the ranking. That is seen from the systematically lower value of v that these two countries from the "South" have compared to the countries from the "North" (Norway, Denmark, Ireland, and Belgium). Unfortunately, the relatively limited sample of respondents from each country did not allow to divide them into even more types, as in the case of Italy and other countries the regional factor (for example) could have played an important role (see Checchi & Peragine, 2010).

Italy, Spain and the UK underperform in most of the settings described above. This situation can be explained by the higher pre-fisc inequality between types compared to the case of the

6. When $\eta = 0.21$, Spain can with some approximation be seen as taxing at the level of EOp.

FIGURE 3. PRE-FISC VS. EOP POST-FISC CDFS, UK, 3-TYPES, =0.06
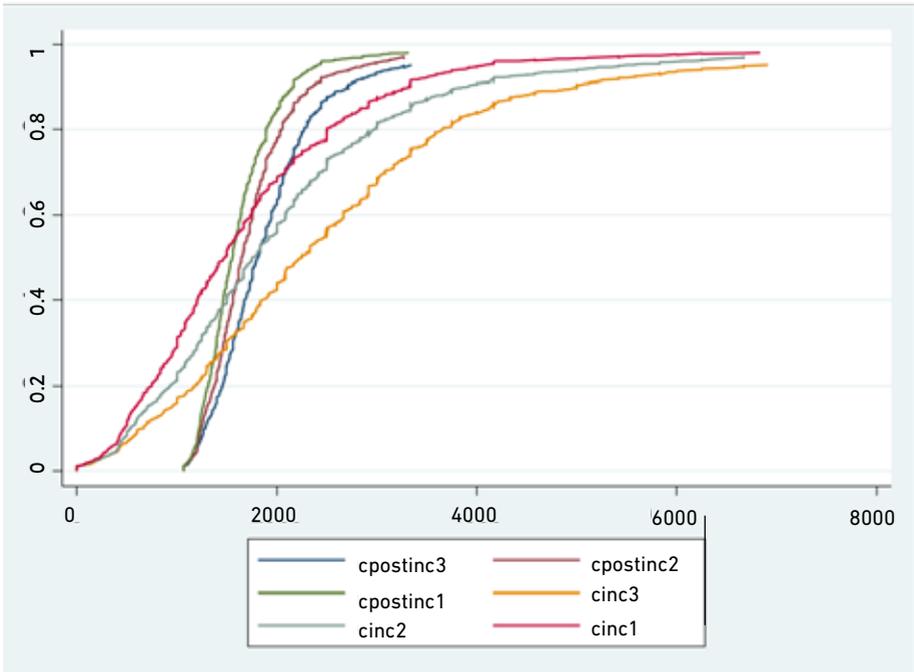
Source: Author.

Notes: "cinc1"-CDF of pre-fisc incomes of those whose parents did not finish secondary school (type 1), "cpostinc1"- CDF of EOp post-fisc incomes of those whose parents did not finish secondary school (type 1), etc.

Scandinavian countries, for example. For a visual inspection of the above mentioned aspect, Figures 1 and 2 plot the pre-fiscal CDFs of Denmark and Italy for the 3-type case.

To illustrate what the EOp redistribution system involves in a more intuitive manner, Figure 3 plots both the pre-fisc and the EOp post-fisc CDFs of incomes for the 3-type scenario in the case of UK. The effect is similar for the other countries in the sample. One can see that the distance between the distributions is

reduced, so that every type faces an almost identical distribution of income after EOp is implemented.

CONCLUSION AND POLICY RECOMMENDATIONS

This paper aims to study to what extent EOp for income acquisition is achieved in ten countries: all of them situated in Europe, except for Japan. It uses the methodology of Roemer *et al.* (2003) in order to separate the effect of "circumstances" from the effect of "effort/choices" on individual incomes. Unlike Roemer *et al.* (2003), this paper also includes women in the sample considered. This is done mainly due to data restriction. I also consider a higher elasticity of labour supply than the above mentioned paper, namely η=0.21. This value is better for mixed samples (Evers, De Mooij & Van Vuuren, 2008).

The circumstances included in this study are basic socio-economic conditions that could influence one's outcomes in life, namely: parents' level of education and their immigrant status. I first calculate the conditions that the redistribution system must comply with in the situation when only the first circumstance, parents' level of education, is considered (basic model, three types) and then I include the second one, parents' immigration status (extended model, six types) and repeat the procedure for six countries.

I use a set of relatively strong assumptions that everyone is taxed at a flat rate and receives a universal grant from the governments. Because of this, I cannot say anything about the distribution of the tax burden between social groups. However, according to Roemer *et al.* (2003), the results do not change too much when progressive tax rates are used, while the methodology is far more complicated.

The continental European countries in the sample overtax in the basic model, i.e. they tax more than EOp requires, even when considering very low estimates for the labour supply elasticity, except for Spain. Hence, the traditional division line between more social-democratic continental countries and more liberal ones is reinforced. In the extended model, the picture changes, in the sense that there is a North-South division within Europe, with the two Mediterranean countries in the sample (Spain and Italy) underperforming, even when using the higher estimate for labour supply elasticity.

This paper presents some country results that differ from other studies or for whom the framework of Roemer at al. (2003) has never been used. In particular, France seems to overtax in all scenarios of the basic model, which is different from the conclusions of Roemer *et al.* (2003) and Lefranc, Pistolesi and Tranoy (2009). Japan, which has not been studied so far, appears as underachieving in the basic model. However, the number of circumstances considered in this paper is limited, so the reader should take these results with a grain of salt.

From the countries analysed here, I suggest that Italy, Spain, UK and Japan could be taxing more for egalitarian reasons. However, the extent to which they have escaped the 2008 economic crisis might severely impact their ability to tax more for redistributive motives. Furthermore, it is fundamental that they redistribute the taxes so collected in a way that reduces inequality of opportunity. More specifically, they need to redistribute the tax revenues such that the incomes of the most disadvantaged types of citizens increase.

This paper indirectly underlines the important role that the education of parents plays in creating opportunities for income acquisition for children. Hence, public investment in education is crucial for achieving EOp. Moreover, this paper also points out that, in order to achieve the EOp ideal defended in this paper,

Spain and Italy need to redistribute more money to those individuals whose parents have a migrant background. Nonetheless, it all fundamentally depends on whether policy makers adopt the egalitarian goals presented here.

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