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Inequality of opportunity in Europe

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INEQUALITY OF OPPORTUNITY IN EUROPE

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Abstract

Using the EU-SILC database, we estimate and compare the Inequality of Opportunity (IO) of 23 European countries in 2005. IO is estimated as the between-type (*ex-ante*) inequality component following the parametric procedure of Ferreira and Gignoux (2011), which allows for the inclusion of the large set of circumstances in the database. As a modest attempt to understand some reasons behind IO differences, we also measure the degree of correlation between IO estimates and a set of past and contemporaneous economic factors related to the degree of development, labor market performance, investment in human capital and social protection spending.

JEL Classification: D63, E24, O15, O40.

Key Words: Inequality of Opportunity; EU-SILC database; circumstances; Europe.

1. Introduction

Equality of opportunity has traditionally been understood as the absence of barriers to access positions, education and jobs. In line with this conception, hiring should be meritocratic and characteristics like economic class, gender and race should have no bearing on the merit of the individual (Lucas, 1995). Rawls (1971) and Sen (1980; 1985), among others, invoked a more general notion of equality of opportunity. They argued that equality of opportunity would require compensating persons for a variety of *circumstances* (i.e., socioeconomic background, ethnicity, place of birth, etc.) whose distribution is morally arbitrary.[1]

Roemer (1993, 1996 and 1998) brings that philosophical debate into economics and formalizes a precise definition of equality of opportunity.[2] He emphasizes that an individual's outcome (income, welfare, health, etc.) is a function of variables *within* and *beyond* the individual's control, called effort (occupational choice, number of hours worked or investment in human capital) and circumstances (socioeconomic and cultural background or race), respectively. As a consequence, total inequality can be seen, in reality, as a combination of inequality of effort (IE) and inequality of opportunity (IO). Thus, an equal-opportunity policy must guarantee that those who exert an equal degree of effort, regardless of their circumstances, are able to achieve equal levels of outcome (i.e., the policy should *level the playing field*).

Recent contributions by the World Bank (2006), Bourguignon et al. (2007a) and Marrero and Rodríguez (2010) have noted that IO, in addition to being the one type of

[1] Dworkin (1981a and 1981b) took the issue a little further. This author argued that people should be held responsible for their preferences but not their resources. However, some philosophers (e.g., Arneson, 1989; Cohen, 1989) have criticized the separating line between those aspects for which a person should be held accountable (preferences) and those for which he should not (resources).
[2] See also Van de Gaer (1993).

inequality that is truly important from the standpoint of social justice, could exert a different effect (i.e., negative) on growth than IE, whose impact would be positive.[3] Thus, correcting a country's IO would not only result in a fairer society in terms of social equality, but it would also spur economic efficiency and growth.

Given the importance of IO, the main goal of this paper is to measure and compare IO estimates among European countries using a homogenous database. In particular, we compute total income inequality and IO for 23 European countries in 2005 using the Survey on Income, Social Inclusion and Living Conditions in Europe (EU-SILC) database. Data requirements for comparing IO across countries in a homogenous way are severe (Lefranc et al., 2008). In this regard, the EU-SILC is an exception that gives information on individual disposable income and a rich set of circumstances (for its 2005 wave). This paper thus contributes to the existing literature by using a homogeneous database that combines a rich set of comparable circumstance variables for a large number of countries. IO is estimated as the between-type (*ex-ante*) inequality component following the parametric procedure of Ferreira and Gignoux (2011). This approach allows for the inclusion of the large set of circumstances in the EU-SILC even in the presence of small sample sizes and, consequently, avoids the lack of accuracy of alternative non-parametric estimates under these conditions.

In general, we find that Nordic (Denmark, Finland, Norway and Sweden), Western continental (Germany, Netherlands, Austria, Belgium and France) and some among the richer Eastern EU (Slovakia, Czech Republic, Slovenia and Hungary) countries are within the low-IO group. The high-IO group basically consists of Mediterranean (Italy, Greece and Spain), Atlantic (Portugal, Ireland and the UK) and poorer Eastern EU

[3] See Galor (2000, 2009) for an overview of the modern perspective on the relationship between inequality and economic development.

(Estonia, Latvia, Poland and Lithuania) countries. Moreover, although the IO and total inequality rankings are highly correlated, we note that some countries' ranks change significantly depending on whether IO or overall inequality is considered. For example, Sweden, Slovenia, Belgium, France, Ireland and Portugal rank worse in terms of IO than total inequality, while the opposite is true for Finland, Germany, Latvia and Slovakia.

In addition to these IO estimates, we would like to know which specific national characteristics have a causal effect on IO. But addressing these questions is quite challenging because, among other things, a sufficiently large and rich panel of data would be required. Unfortunately, our database (the EU-SILC) consists only of a cross-section of 26 countries for just one year (2005). Nevertheless, we conduct a more modest analysis and measure the degree of correlation between income inequality in 2005 (our IO and total inequality estimates) and a set of past and contemporaneous economic factors related to the degree of development, labor market performance, investment in human capital and social protection spending. Given the increasing importance of the topic, the current state of the art and the limited availability of data, we believe that a better understanding of cross-country differences in IO deserves this attempt.

The paper is structured as follows. Section 2 reviews the previous literature on IO. Section 3 presents the methodology employed, while Section 4 introduces the database used to measure IO in Europe. Section 5 shows the estimates found for IO in Europe. Section 6 shows results for correlations between IO and factors related with development, labor market, human capital investment and social policy. Finally, Section 7 offers some public policy recommendations based on our findings.

2. Revision of the literature

The modern theories of justice recognize that an individual's income is a function of variables *beyond* and *within* the individual's control, called circumstances and effort, respectively.[4] As a consequence, overall inequality is the result of heterogeneous circumstances (IO), which represent individual initial conditions, and efforts (IE), which represent individual decisions.

There exist many procedures to estimate IO and this Section reviews the most relevant. A first distinction is made between the pioneering approaches of Roemer (1993) and Van de Gaer (1993). Roemer's procedure states that there is equality of opportunity if all individuals who exert the same degree of effort obtain the same level of outcome. For this task, he proposes to compute, across types, the minimum outcome level of individuals who exert the same degree of effort (i.e. individuals in the same *tranche*) and then maximize the average. Alternatively, Van de Gaer focuses on the set of outcomes available to individuals sharing similar circumstances (the opportunity set). Then, there is equality of opportunity if the opportunity set available to every individual does not depend on one's initial circumstances. As an equality-of-opportunity criterion, he proposes first averaging outcomes across tranches, and then maximizing the minimum of those averages across types.[5]

These two alternative approaches have given rise to the so-called *ex-post* and *ex-ante* procedures, respectively (Fleurbaey, 2008). In sum, for the *ex-post* approach there is equality of opportunity if all individuals who exert the same effort obtain the same outcome, while for the *ex-ante* approach there is equality of opportunity if all

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[4] Talent could be considered a circumstance, however, this variable is controversial as it might reflect past effort of a person (while being a child) and hence is not obviously something for which a person should not be held accountable. Lefranc et al. (2009) also considers luck as an additional source of income.

[5] Note that intergenerational mobility is a closed related concept to equality of opportunity if parental income is considered as the relevant circumstance (O'Neill et al., 2000; Van de Gaer et al., 2001).

individuals face the same set of opportunities regardless of their circumstances. We focus our attention in this paper only on the *ex-ante* approach.[6]

Roemer and Van de Gaer use the minimum function to comply with the Rawlsian *maximin* principle. However, other authors have followed alternative routes. On one hand, partial equality-of-opportunity orderings have been proposed. For example, Peragine (2002 and 2004) proposed the use of the Generalized Lorenz Curve to make ordinal welfare comparisons for income distributions according to equality of opportunity; Rodríguez (2008) proposed an equality-of-opportunity partial ordering based on the TIP's dominance criteria;[7] Lefranc *et al.* (2009) considered a mechanism to contrast equality of opportunity based on the first and second stochastic dominance criterions in a model that considers circumstances, effort and also luck (see also Peragine and Serlenga, 2008). On the other hand, complete equality-of-opportunity orderings based on inequality indices have also been proposed. For example, Moreno-Ternero (2007) proposed to minimize the average of outcome inequality (across types) at each relative effort level;[8] Lefranc et al. (2008) considered an index to measure inequality of opportunity based on the Gini index; Rodríguez (2008) provided a class of inequality-of-opportunity measures based on the Foster–Greer–Thorbecke family of poverty measures (Foster et al., 1984);[9] Pistolesi (2009) used counterfactual distributions built on duration models to measure equality of opportunity.

In line with the last set of approaches, and given the importance of assessing the magnitude of IO in terms of overall inequality, the procedure of decomposing total

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[6] See Ooghe et al. (2007) and Fleurbaey and Peragine (2009) for a theoretical comparison between the ex post and ex-ante approaches.
[7] The TIP curve is applied in the poverty literature, see for example Jenkins and Lambert (1997).
[8] He also proposed to minimize the maximum inequality throughout the different levels of relative effort and the inequality between the average outcome of each type of individual.
[9] It is worth noting that the first two mechanisms developed by Moreno-Ternero (2007) are particular cases of the class of measures proposed by Rodríguez (2008).

inequality into IO and IE components has gained great popularity in recent years. First proposed by Ruiz-Castillo (2003) and subsequently improved by Checchi and Peragine (2005 and 2010) and Ferreira and Gignoux (2011), overall inequality can be decomposed into two components, one due to IO and the other due to IE.[10] Using an ex-ante criterion, population is partitioned according to individuals' circumstances and IO is evaluated in terms of differences *between* individuals endowed with the same circumstances, so that IO is represented by the between-group component of overall inequality.[11]

Among the alternative estimation procedures, a last distinction is made based on how IO and IE are finally estimated: non-parametrically (Checchi and Peragine, 2005 and 2010) or parametrically (Bourguignon et al., 2007b and Ferreira and Gignoux, 2011). In contrast to the standard non-parametric approach, the parametric method is a regression-based approach for computing the share of IO.[12] Nevertheless, the suitability of both estimation methods (parametric and non-parametric) depends mainly on the characteristics, the sample size and the observed circumstances of the database. When the number of observed circumstances is high and the sample size is not large enough, some group types may present a small number of observations and, as a result, the non-parametric estimates may be inaccurate. Meanwhile, the parametric approach assumes a particular specification, and the possible existence of relevant unobserved circumstances

[10] A somewhat related decomposition is proposed in Cogneau and Mesplé-Somps (2009).
[11] Using an ex-post procedure, population is firstly partitioned into types, according to individuals' circumstances, and then each type is further subdivided according to personal effort. Correspondingly, IO is evaluated in terms of outcomes of individuals who have exerted the same effort, so that IO is represented by the *within-group* component of overall inequality.
[12] The main difference between the approaches in Ferreira and Gignoux (2011) and Bourguignon et al. (2007) is that the former seeks to estimate a lower-bound of the true IO because all individual circumstances certainly cannot be observed, while the latter seeks to estimate the effect of a specific (observed) set of circumstances by using Monte-Carlo simulations in order to estimate bounds around the possible biases in specific coefficients.

–correlated with the observed ones– may cause the residuals of the parametric regressions not to be orthogonal to the regressors.

In this paper we estimate the IO of 23 European countries in 2005 by using the EU-SILC database. Because this database contains a considerable number of circumstances, we apply the parametric (ex-ante) approach proposed in Ferreira and Gignoux (2011). In this manner, we can take advantage of all the circumstances included in the EU-SILC database and avoid the lack of accuracy in the non-parametric estimates. In the next section, we explain the method and in Section 4 we present the data and the set of circumstances that are used in the empirical analysis.

3. A Methodology for computing IO

Based on Ferreira and Gignoux (2011), this Section presents the method used for computing IO. Consider a finite population of discrete individuals indexed by $i \in \{1,\ldots,N\}$, the individual income, y_i, is assumed to be a function of the amount of effort, e_i, and the set of circumstances, C_i, that the individual faces, such that $y_i = f(C_i, e_i)$. Effort is treated as a continuous variable, while, for each individual i, C_i is a vector of J elements, each element corresponding to a particular circumstance. While circumstances are exogenous because they cannot be affected by individual decisions, effort is assumed to be influenced, among other factors, by circumstances. Consequently, individual income can be rewritten as $y_i = f\left[C_i, e_i(C_i)\right]$.

Population then is divided into M mutually exclusive and exhaustive groups (or types), $\Gamma = \{H_1, \ldots, H_M\}$, where all the individuals in the same group m have the same circumstances: $H_1 \cup H_2 \cup \ldots \cup H_M = \{1, \ldots, N\}$, $H_r \cap H_s = \varnothing$, $\forall$ r and s, and $C_i = C_k$,

$\forall$ i and k $|i \in H_m$ and $k \in H_m$, $\forall$ m. Effort distribution for individuals of type m is denoted by F^m, and $e^m(\pi)$ represents the level of effort exerted by an individual in the π^{th} quintile of that effort distribution, with $\pi \in [0,1]$. Given type m, the income level attained by the individual in the π^{th} quintile is denoted by $v^m(\pi) = y^m(e^m(\pi))$. In this manner, the order of incomes and efforts within each type coincide since, for a particular type, the income will be determined exclusively by the effort.[13] Thus, there is equality of opportunity when individual's income is independent of his social origins (Bourguignon et al., 2007b and Lefranc et al., 2008). Strictly speaking, this would translate into the following condition:

$$FF^m(y) = F^k(y), \forall m,k \big| H_m \in \Gamma, H_k \in \Gamma^m(y) = F^k(y), \forall m,k \big| H_m \in \Gamma, H_k \in \Gamma . \quad (1)$$

Given income distributions by types, first and second order stochastic dominance by types could be contrast. The stochastic dominance criterion, however, is partial and incomplete, since the distribution functions can cross (Atkinson, 1970). What is more, when the number of circumstances is large, the number of observations per type will be small, which, in practice, precludes an accuracy estimation of the distribution functions. An alternative is to consider a particular moment of said distributions, such as the average. Thus, given $\pi \in [0,1]$, let us define

$$\mu = \left(\mu^1, ..., \mu^M\right) = \left(\int_0^1 v^1(\pi)\, d\pi, ..., \int_0^1 v^M(\pi)\, d\pi\right), \quad (2)$$

the M-dimensional vector of average incomes for the various types. A necessary (though not sufficient) condition to be equality of opportunity is that the elements of vector μ be equal, that is:

[13] This property is equivalent to the *strictly increasing* axiom in the literature on IO (see O'Neill et al., 2000).

$$\mu^m(y)=\mu^k(y), \forall m,k \mid H_m \in \Gamma, H_k \in \Gamma. \tag{3}$$

As commented in the previous section, while Van de Gaer (1993) proposed maximizing the minimum average income, $Min\,(\mu)=\min_m \left\{\int_0^1 v^m(\pi)\,d\pi\right\}$, many other authors have proposed using an inequality index, such as the Gini or the Theil 0. In our context, one advantage of the latter proposal is that, by taking into account every element in the average vector μ and not just its minimum element, the calculation would be less subject to extreme values. Accordingly, IO can be defined as $I(\mu)$, where I is a specific inequality index.[14]

Of all the possible inequality indices that fulfill the basic principles found in the literature on inequality,[15] Ferreira and Gignoux (2011) select the mean logarithmic deviation or Theil 0, T_0, since it belongs to the Generalized Entropy class of inequality indices and, therefore, is additively decomposable (Bourguignon, 1979; Shorrocks, 1980; Cowell, 1980), has a path-independent decomposition (Foster and Shneyerov, 2000) and uses weights based on the groups' population shares. The decomposition of this index into between-group and within-group inequality components is

$$T_0(Y)=T_0(\mu)+\sum_{m=1}^{M}\frac{n^m}{N}T_0(y^m) \tag{4}$$

where n^m represents the population of type m. The between-group inequality index would be the IO index (actually, a *lower bound* of the IO –see below–), since the groups would be determined just by the observed individual circumstances. As for the within-

[14] Note that whenever total inequality can be additively decomposed by population groups according to a set of circumstances, the IO term will be the *between-group* inequality component, while the *within-group* inequality component could be interpreted as the IE term.

[15] The principle of progressive transfers, symmetry, invariance to changes in scale and replication of the population (Cowell, 1995; Sen and Foster, 1997).

group inequality, this could be considered as that due to effort. However, this term may contain other elements arising from non-observed circumstances and/or luck. That is why our analysis focuses on aggregate inequality and on IO estimates.

As discussed in the previous Section, the between-group component can be non-parametrically estimated, but this approach presents serious problems of accuracy when the number of circumstances is high, as in our case. Therefore, parametric techniques should be used to yield reliable estimates. Following Bourguignon et al. (2007b) and Ferreira and Gignoux (2011), the parametric specifications rest on the assumption that the income of individual i is $y_i = f(C_i, e_i(C_i, u), v)$, where u and v represent random variables, like luck, as well as possible non-observed factors. If we now consider the reduced form of the above expression, $y = \Phi(C, \varepsilon)$, we can estimate the log-linear equation using ordinary least squares (OLS):

$$\ln y = C\lambda + \varepsilon \ . \tag{5}$$

Thus, once the within-group dispersion is accounted for, the OLS estimate would yield an approximation $\hat{\mu}_i = \exp[C_i \hat{\lambda}]$ for the individual incomes. Based on these estimated individual incomes, we can directly obtain the vector $\hat{\mu} = \left(\hat{\mu}^1, ..., \hat{\mu}^M \right)$, which is a parametric version of the vector μ. Lastly, we compute IO as $IO = T_0(\hat{\mu})$.

4. The EU-SILC European database

The availability of suitable data is crucial to a rigorous study of IO. An empirical analysis of IO requires not only comparable measures of individual disposable income, but also for individual circumstances or social origins to be measured in a comparable and homogeneous way. Unfortunately, there are few databases with this information, and even then, the number of circumstances tends to be limited.[16]

The database used in this paper is the EU Survey on Income, Social Inclusion and Living Conditions, or EU-SILC. This survey was recently implemented (in 2004), and only the data for 2005 is of use for our purposes, since this is the only year for which information is available on the parents' occupation and level of education, which are the most widely used variables to measure the individual social background in the related inequality-of-opportunity literature.[17] Annual incomes always include transitory variations and measurement errors, and as a result, income averages for a given number of years could be useful in neutralizing these erratic components (Pistolesi, 2009). Unfortunately, we cannot average incomes because the EU-SILC is only available for our purposes in 2005, which is clearly the main disadvantage of this database.[18]

On the contrary, an initial benefit of this survey is that it offers information for a large number of countries (26 total), which gives its database sufficient heterogeneity in terms of economic features and public policies. The countries we use are: Austria (AT), Belgium (BE), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Latvia (LV), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Sweden (SE), Slovenia (SI), Slovakia (SK) and the United Kingdom

[16] For example, the set of papers in Volume 13 of 2010 of the Review of Economic Dynamics consider databases with information on individual income; however, they do not contain information on individual circumstances. Likewise, studies on inequality of opportunity (Roemer et al., 2003, Rodríguez, 2008, Lefranc et al., 2009, Cogneau and Mesplé-Somps, 2009, and Ferreira and Gignoux, 2011) have based their results on the use of a different database for each country so a real cross-country analysis of inequality of opportunity has not been conducted yet.

[17] See, for example, Roemer et al. (2003), Checchi and Peragine (2005 and 2010), Bourguignon et al. (2007b), Rodríguez (2008), Lefranc et al. (2009) and Ferreira and Gignoux (2011).

[18] Nevertheless, it is worth noting that removing transitory income variations might lead to a smoothing of the role of effort, which might then overestimate the relative importance of IO. To neutralize for data extremes, we have omitted those observations with negative or zero incomes, and/or incomes 15 times higher than the mean income of their distribution.

(UK).[19] A second advantage is the considerable number of circumstances that this database contains. For our study, we use the educational levels and occupations of both parents, the origin (national, European or rest of the world) of the individual and, lastly, a qualitative variable that measures the prevalent economic conditions in the individual's home during his/her childhood. To the best of our knowledge, the 2005 EU-SILC database features the highest number of individual circumstances measured homogeneously for such a large number of countries.

The variable used to calculate inequality is the disposable equivalent income for those households whose head is between 26 and 50 years of age.[20] This way, we consider the cohorts with the highest proportion of employed persons and avoid the composition effect (individuals with different ages are in different phases of the wage-earning time series) while approaching the concept of permanent income (Grawe, 2005). In terms of the IO calculation, it must be noted that the circumstance vector observed is, by definition, a subset of the vector of all possible circumstances. The estimated IO values, then, will be a lower-bound of the true IO, and will increase with the number of circumstances observed (Ferreira and Gignoux, 2011).[21] That is why, when measuring

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[19] The EU-SILC database also contains information on Luxembourg, Iceland and Cyprus, though we opted not to use these countries due to the peculiarities they pose and to their small size. The specified codes correspond with the codes provided by Eurostat.

[20] The equivalence scale used in this paper is the same as that used in the EU-SILC database. Specifically, the equivalence scale is $e = 1 + 0.5(N_{14^+} - 1) + 0.3N_{13^-}$, where N_{14^+} is the number of household members 14 years of age or older and N_{13^-} is the number of household members 13 years of age or younger.

[21] In principle, it is possible for unobserved circumstances to be negatively correlated with the set of observed circumstances. If this is the case, IO estimates would be overestimated (see Bourguignon et al., 2007b). However, for parametric estimates, every time we include a new circumstance, whichever correlation it has with the set of observed circumstances, the explained variance of income does not decrease, i.e., the coefficient of determination of the regression is at least as high as it was before the inclusion of the new circumstance. In this sense we can always assure that our parametric estimates are a lower bound. It is worth noting that this problem is not unique to a study of IO, however, and is seen in practically every field of economics. For example, an analysis of salary discrimination must face the problem of heterogeneity that is not explained by the individual characteristics observed. Worse yet, econometric modeling normally introduces a random variable to somehow account for all non-observed variables.

IO, it is important that a database containing sufficient information on the individuals' circumstances be employed.

We present the summary statistics of the selected set of circumstances in Table 1. Given the restrictions imposed on the observations, it is remarkable that the sample size is larger than 2,500 units on average (the range goes from Latvia with 1,159 observations to Italy with 8,638 observations). First of all, we notice that the average of disposable equivalent household income ranges from about 3 thousand Euros for Lithuania, Poland and Slovakia, to the almost 28 thousand Euros of Norway, followed closely by the almost 27 thousand of the UK and the 25 thousand of Denmark and Ireland.[22] It is worth noting that the difference between Denmark, the UK and Ireland is that the former shows a standard deviation which is more than half those of the UK and Ireland. These differences will be reflected in the inequality indexes estimated in the next section. In general, Nordic and Western continental countries present the highest disposable equivalent household income. Italy, Spain, Greece, Slovenia and Portugal follow the leading group, with an average personal income between 10 and 17 thousand. Finally, the remaining Eastern EU countries (Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland and Slovakia) are in the group of low-income countries, and their average income ranges from 3 to 5 thousand Euros.

By circumstances, we find that the greatest heterogeneity is observed for the levels of education attained by parents, especially in terms of their primary and secondary education. For example, the percentage of fathers with at least secondary education (most common in most countries) varies between 7% and 25% in Portugal, Spain, the UK, Ireland and Greece, up to the range of 70%-95% in Slovakia, Hungary, Finland,

[22] These income variables are not PPP-adjusted, hence strict comparisons are misleading. Nevertheless, countries are in general ranked as expected.

Denmark, Czech Republic and Austria. For its part, the father's tertiary education exceeds 20% in Belgium, Denmark, Sweden, Estonia, Finland, Germany, Latvia, Lithuania, the Netherlands, Norway, Slovakia and the UK, while it is lower than 10% in Austria, Greece, Italy, Portugal, Poland and Slovenia. Similar profiles are found for the mother's education.

The distribution of the father's occupation (we do not have data for Sweden for this series) is more homogeneous across countries.[23] With the exceptions of Ireland, Estonia, Finland, Latvia, Greece and the Netherlands, the most common profession (with an average of 26% and a standard deviation of 4.6 points) is that of 'craft and related trades workers'. The next most common occupation on average (16%) is that of 'plant and machine operators and assemblers'. Among the various occupations considered, the one showing the greatest heterogeneity among countries is that of 'skilled agricultural, forestry and fishery workers', which varies between 20% and 35% in Finland, Portugal, Poland and Greece, and is less than 5% in Belgium, Czech Republic, Estonia, Ireland, Latvia, the Netherlands, Slovakia and the UK.

Regarding the economic perception during childhood (we do not have data for Austria, France, Germany, Greece and Portugal for this series), the most common response (on average) is 'never', with 37%; the 'rarely' and 'occasionally' answer reach just over 20%. However, there are also important differences between countries. For example, in Belgium, Denmark, the Netherlands, Norway and Sweden, almost 80% say they 'never' or 'rarely' had economic difficulties, while this percentage drops below 50% in Estonia, Italy, Lithuania, Poland, Slovakia and Slovenia. Finally, regarding the country of birth,

[23] We have considered the father's occupation as the relevant circumstance for most countries, given the large group of missing observations for the mother's occupation. The exception is the UK, where we have used the mother's occupation, because of the many missing observations for the father's occupation.

over 90% of individuals in the sample were born in their country of residence. Only Ireland has a significant percentage (nearly 10%) of people born in another EU country, while in the UK, Sweden, Latvia, Slovenia, Austria, Estonia and France, the percentage of residents born outside the EU is between 8% and 13%.

INSERT TABLE 1 ABOUT HERE

5. Inequality of Opportunity in Europe

In this section we provide overall inequality and IO estimates based on the ex-ante parametric approach of Ferreira and Gignoux (2011) described in Section 3. As a first step, we estimate (by OLS) the regression $\ln y = C\lambda + \varepsilon$ for each country, which relates household income (in logarithms) with the set of circumstances considered in the analysis. The reduced-form OLS regression estimates for all 23 European countries are presented in Table 2.[24] In general terms, coefficients have the expected sign.

The parents' education has a positive influence on children's income, which increases with the educational level of the father and/or the mother. In general, with respect to the omitted category (parents with less than primary education), results are specially significant and robust when parents attain at least secondary or tertiary education. Both variables, father's education and mother's education, are highly significant in France, Germany, Greece, Italy, Portugal, Spain and the UK. However, for some countries (Belgium, Estonia, Hungary, Ireland, Poland and Slovakia), the education attained by

[24] When an explanatory variable's estimated coefficient is not shown, that is because there are no observations with that circumstance in the sample. As emphasized by Ferreira and Gignoux (2011), since this is a reduced-form equation, estimates cannot be interpreted causally, and coefficients would capture not only the direct effects of circumstances on income, but also the indirect effects on income through non-included circumstances or effort.

the mother seems to be more significant than the education attained by the father, while the opposite is true in Latvia, Lithuania, the Netherlands, Sweden and Slovenia.

Regarding the occupation of the father, and taking 'workers in the farming, forestry and fishing' sectors as a reference, all of the remaining occupations tend to have a positive effect on the individual's income. The exception is that of the 'Elementary occupation' concept, whose relative effect is sometimes negative, although just significant for Austria, Hungary and Italy. Among the alternative occupations, the most robust results are found for the 'Managers' category, followed by that of 'Technicians and Professionals', although some exceptions can be found in Belgium, Denmark, the Netherlands and Norway.

The perception of having 'financial difficulties during the childhood years' tends to have a negative effect on household income. Since the omitted category is that the individual 'never had difficulties', most of the estimated coefficients for all other categories are negative, though the number of significant coefficients associated with these categories is smaller than those found for the parents' education variables. Finally, a circumstance that also tends to have a negative effect on household income is that of having roots outside the country of residence, especially if the country of origin is not European. Given the reference category "be born in the country of residence", being from another EU country is insignificant in most cases (except for Belgium, Italy, Portugal and Spain, where it is negative, and Slovakia, where it is positive), while being born outside the EU constitutes a significant and negative circumstance in explaining household income.

INSERT TABLE 2 ABOUT HERE

Now, Table 3 shows the main results for income inequality (Theil 0) and IO for the 23 European countries considered. The first row contains the estimates of overall inequality, the second row the IO estimates, the third provides the relative IO measure, i.e., the IO to total inequality ratio[25], the fourth and the fifth rows show the position of each country (from lowest to highest) by Theil 0 and IO, respectively, and the last row provides the number of observations used to calculate these indexes. Moreover, we show below each estimate the corresponding standard error estimated by the bootstrapping method using the formula (Davison and Hinkley, 2005):

$$\hat{\sigma}(\hat{T}) = \sqrt{\frac{1}{R-1}\sum_{r=1}^{R}\left(T^{*} - \bar{T}^{*}\right)^{2}}\ , \tag{6}$$

where T is the corresponding index and R is the number of replicates.[26]

INSERT TABLE 3 ABOUT HERE

Since the database is homogenous, the set of circumstances (for most countries) and the sample design are common to all countries, and our inequality measures can be used to compare cross-country differences in terms of (absolute and relative) IO. It is worth noting that, despite the required characteristics of our selected sample (recall from the previous section), we observe that the ranking of our overall inequality (Theil 0) estimates is quite similar to that induced from the Eurostat estimates. In fact, their linear coefficient of correlation is 0.92. According to the Eurostat Gini index in 2005, the

[25] This index depends, by construction, not only on opportunities but also on the IE component. For instance, if total inequality increases due to a higher IE component, the relative IO index would decrease, though absolute IO has not changed. As a result, the use of this relative index is problematic. Despite this shortcoming, and in order to check the robustness of our results, we have also considered the relative IO index.

[26] For our calculation, we assumed R = 1000. Cowell and Flachaire (2007) find that, in general, the bootstrap technique improves the numerical performance of the significance tests. Moreover, for small sample sizes, this technique yields a closer margin to the nominal confidence intervals (Davison and Hinkley, 2005).

lowest inequality is observed in Sweden, Denmark and Slovenia, with Gini levels of 0.23-0.24, closely followed by Czech Republic, Finland, Germany, Austria, Slovakia, Netherlands, Hungary, France, Belgium and Norway, with Gini estimates between 0.26 and 0.28.[27] All other European countries present clearly higher Gini indexes (at least 15% higher), between the 0.32 of Ireland and Spain and the highest levels of 0.36-0.38 in Poland, Lithuania, Latvia and Portugal.

Figure 1 shows our Theil 0 estimates, together with the estimated bootstrapped standard deviations (using one standard deviation around the point estimate). Countries are sorted from lowest to highest Theil 0 estimates. We can see clearly that the two main groups (low- and high-inequality countries) are equivalent to those provided by Eurostat, though there are some minor differences when looking inside each group. Nevertheless, considering the fact that some standard deviations overlap, these within-group differences are in some cases not relevant.[28]

INSERT FIGURE 1 ABOUT HERE

The rest of the Section is devoted to commenting on the results of IO. As noted in Section 2, we could apply a partial ordering (see Peragine, 2002 and 2004, Rodríguez, 2008 and Lefranc et al., 2009) to measure IO. The advantage of an ordinal criterion is that comparisons of IO between countries would be more robust. However, an ordinal criterion will be not conclusive in many cases. For example, if there is no first and second stochastic dominance when applying the method proposed in Peragine (2002 and 2004) and Lefranc et al. (2009), or if inequality-of-opportunity curves cross when applying the method proposed in Rodríguez (2008), we would be unable to conclude

[27] Data from Eurostat 2005, in the ‘Living conditions and welfare statistics’ section (Gini coefficients): http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&lang=en.

[28] For example, for the low-inequality group, the estimates for Belgium, Sweden, France, Finland, Norway, Austria and Czech Republic clearly overlap; for the high-inequality group, there is overlap, on the one hand, between Italy, Estonia and UK, and, on the other hand, between Greece, Spain and Portugal.

which country presents a higher IO. For this reason, we opted to compute a complete ordering based on the mean logarithmic deviation, thus enabling us to compare the IO for all countries. Nevertheless, we have considered in our comparisons the fact that some standard deviations overlap.[29]

Figure 2 shows the IO estimates together with their standard deviations. Countries are now ranked from smallest to largest IO. As was the case when comparing Theil 0 estimates, IO intervals overlap for some countries. As a result, we find again two main groups of countries, which basically coincide with those groups of overall inequality: low-IO countries (Denmark, Germany, Sweden, Finland, the Netherlands, Belgium, Slovenia, France, Czech Republic, Austria, Slovakia, Hungary and Norway) and high-IO countries (Latvia, Poland, Lithuania, Portugal, Spain, Greece, the UK, Estonia, Italy and Ireland). The first group basically comprises Nordic, Continental and some Easter countries. In contrast, the second group basically consists of Mediterranean, Atlantic and some other Eastern countries.

We find numerous similarities when comparing these results with previous studies. Based on a heterogeneous database of 11 countries constructed by Roemer et al. (2003), Rodríguez (2008) and Lefranc et al. (2009) applied their proposals.[30] In general terms, these authors find that Denmark (1993), Sweden (1991), Norway (1995) and Germany (1994) are the countries with lowest IO, and Italy (1993) and Spain (1991) are the ones with highest IO. The remaining European countries (the Netherlands, Belgium, France and the UK) present an intermediate IO. Therefore, considering the results of previous

[29] We are aware that a robust ranking comparison between countries would require the application of a dominance criterion, which goes beyond the scope of this paper.
[30] Those countries were originally the following: Belgium (1992), Denmark (1993), France (1994), Great Britain (1991), Italy (1993), The Netherlands (1995), Norway (1995), Spain (1991), Sweden (1991), the United States (1991) and West Germany (1994). Rodríguez (2008) also included Spain (2005), while Lefranc et al. (2009) did not consider the data for Denmark (1993) and Spain (1991).

studies together with our results, we can say that the IO ranking of European countries has changed little in the last fifteen years.

Although IO intervals overlap in some cases, we note that some countries' ranks change significantly depending on whether overall inequality or IO is considered. For example, Sweden, Slovenia, Belgium, France, Hungary, Ireland and Portugal rank worse in terms of IO than total inequality, while the opposite is true for Finland, Germany, Latvia and Slovakia.

INSERT FIGURE 2 ABOUT HERE

Lastly, we comment on the results for the relative IO, i.e., the IO to total inequality ratio (see Table 3). For illustrative purposes, we show the ranking of countries from lowest to highest relative IO in Figure 3. We first notice that the percentage of total inequality represented by IO in Europe is on average approximately 9%, ranging from 2% in Denmark to 22% in Portugal.[31] Comparing absolute with IO ratio estimates, most countries maintain their relative position. However, there are several notable exceptions. When looking at IO ratios instead of absolute estimates, the positions of Slovenia, Hungary, Ireland and Belgium worsen significantly, while Latvia, Greece and Poland perform better.

INSERT FIGURE 3 ABOUT HERE

[31] In this respect, note that Checchi and Peragine (2005 and 2010) computed an IO ratio below 10% for Italy, while Ferreira and Gignoux (2011) found percentages between 20% and 33% for six Latin American countries (Brazil, Colombia, Ecuador, Guatemala, Panama and Peru) when using the income variable.

6. Accounting for Inequality of Opportunity in Europe

The *augmented Kuznets curve hypothesis* (Milanovic, 1994; Tanzi, 1998) emphasizes that inequality is determined by '*given*' (*long-term*) factors involving the country's resources, the degree of development, social norms, etc., and by *short-term* factors, such as education, the functioning of the labor market, social public expenditures, etc.[32] Although we are aware that our limited sample prevents us from carrying out a rigorous quantitative analysis of the determinants of IO, we still consider it instructive to show the correlation between different measures of inequality (total and IO) and certain indicators related to those long- and short-term factors.[33]

For this exercise, we consider a variety of indicators that reflect a country's level of development: the PPP-adjusted per capita GDP and the percentage of jobs concentrated in the agriculture and in the service sector. With respect to the labor market, we take the employment rate (total and female) and the unemployment rate (total and the long-term rate). We also consider standard variables for measuring education: the population with at least a secondary level of education (total and female) and with at least a university degree (both as a percentage of the population older than 15), and the percentage of the population between the ages of 18-24 without a secondary education degree (early leaves). Finally, we consider the total spending on social protection, as well as their

[32] Taking a set of European regions and using a simple cross-section regression equation, Perugini and Martino (2008) study the factors that explain aggregate inequality in Europe, distinguishing between these long- and short-term factors.
[33] Total inequality and IO are highly persistent variables. As a result, it is possible that past levels of either one of these measures of inequality cause past or present levels of education, economic development or social public expenditures. In addition, omitted (observable or not) variables, such as the quality of institutions or the initial economic efficiency, might affect not only the employment rate, social protection and education attained, but also current inequality. It is thus needless to say that reverse causation and omitted bias problems (both sources of endogeneity) are difficult to address even in a dynamic panel data model when considering a cross-section regression with just 23 observations. We acknowledge this point to an anonymous referee.

various outlays including child care, disability, social exclusion, health care, pensions and unemployment (all measured as a percentage of GDP).[34]

Table 4 shows contemporaneous (i.e., inequality and indicators are both measured in 2005) and lagged (i.e. inequality is measured in 2005 and indicators are measured in 1998) cross-correlations of total inequality and IO with respect to all the indicators commented above. It seems interesting to calculate cross-lagged correlations and compare them with contemporaneous correlations. The reason lies in the fact that most of the short- and long-term factors may have effective effects on inequality and IO with some delay. For example, education, health care or long-term unemployment policies are clear examples of the existence of such delays on their possible effects on income and hence on income inequality. Although the differences are generally small because of the persistence of inequality and IO, several cases are worth noting. For example, the lagged correlation is clearly superior in magnitude to the contemporary one for the cases of overall and long-term unemployment rate, education dropouts, expenditures on social protection, unemployment and health care expenditures. We focus on lagged correlations hereinafter.

INSERT TABLE 4 ABOUT HERE

The correlations between both measures of inequality and development indicators are negative.[35] This negative correlation is explicitly shown in Figure 4, which represents the scatter plot between IO and per capita real GDP (PPP). This result is consistent with the down slope of a Kuznets inverted U curve. Unfortunately, an exhaustive analysis of the Kuznets hypothesis requires more data points, which goes beyond the possibilities of the EU-SILC database. Nevertheless, we can use Figure 4 to show differences across

[34] The sources used for these indicators and their descriptive statistics are shown in the Appendix.
[35] Note that the correlation with the share of employment in the agriculture sector is positive, but this indicator must be taken as one of non-development.

countries in IO levels for a given degree of development. First, eastern European countries with higher per capita GDP (Hungary, Slovakia, Czech Republic and Slovenia) are well below the regression curve, meaning that their IO levels are below what would be associated with their levels of development. However, poorer eastern EU countries (Estonia, Latvia, Poland and especially Lithuania) do not perform so well. Thus, while their Communist roots and the great opportunities created in these economies after the expansion of the European Union could partly explain a favorable situation for IO, other factors inherent to each economy (education, social policies, institutional changes, etc.) must also be playing an important role. Focusing on the richest western countries, there are three clearly distinguishable groups: Denmark, Finland, Austria, Germany, Norway and the Netherlands, whose IO levels are less than expected based on their levels of development; the UK, Italy, Ireland, Spain and especially Portugal, whose IO levels are clearly higher than expected; and, Sweden, France, Belgium and Greece, which are very close to the regression line. Despite having highlighted certain geographical patterns among European countries, much remains to be explained in terms of the differences noted in total inequality and IO for these countries, which is a challenging and promising extension of the paper.

From a theoretical standpoint, the correlation between the labor market and inequality is complex and inconclusive (Burniaux et al., 2006). On the one hand, better functioning of the labor market involves less exclusion, and therefore less inequality. This result could be applied to IO if the labor market favored the inclusion of those population sectors that had, a priori, fewer opportunities, such as immigrants, youth and women. On the other hand, labor inclusion could place pressure on less-qualified employees as a whole, increasing salary differences between this group and that of more qualified workers (Topel, 1994). In general, we find negative correlations between inequality (total and IO) and labor market indicators, although they are the weaker among all analyzed.[36] Results for the unemployment rate and long-term unemployment rate deserve some attention. On one hand, their lag correlations with respect to total inequality are close to 0.5. On the other hand, while IO is poorly lag correlated with the overall unemployment rate (0.3), its lag correlation with long-term unemployment is close to 0.5. Accordingly, it seems that while unemployment may affect overall inequality, long-term unemployment, which is basically supported in a higher proportion by people with poor opportunities, is the one that matters for IO. For illustrative purposes, Figure 5 shows the scatter plot between IO and the long-term unemployment rate.

With respect to the education variables, the theory says that higher levels of education help to balance the initial distribution of human capital, and thereby reduce one of the main causes of inequality in developed economies (Tanzi, 1998).[37] With the exception of the variable for tertiary and upper education attained, our estimated correlations are consistent with this idea.[38] Moreover, correlations are higher for IO than for total inequality. Among all estimates, the correlation between IO and past dropouts is the closest to one. Accordingly, it seems that preventing dropouts and promoting the attainment of a secondary level of education should be particularly helpful in balancing the distribution of human capital opportunity. Figure 6 shows the scatter plot between early school-leavers and IO. The fit is clearly positive, and it is the most significant among all the indicators considered. When compared to other scatter plots, we note the

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[36] We have also calculated correlations between IO and part-time employment, temporary employment, self-employment and unemployment rate gaps but they are close to zero. For simplicity, these results are not shown in the table.

[37] Empirical evidence suggests that parents with higher levels of education generally attach a higher importance to the education of their children (Kirchsteiger and Sebald, 2010).

[38] Bergh and Fink (2009) find that the effect of elite education on income inequality is ambiguous because it decreases income dispersion at the bottom, and increases income dispersion at the top of the income distribution.

good fit for Greece, Spain, the UK, Slovenia, Latvia and Hungary, as well as the improvement for Ireland and the nearly perfect fit for Portugal. Although this result is by no means definitive proof of the relevance of this variable to explaining observed differences in IO across European countries, its significant correlation is worth noting.

Finally, with respect to social protection expenditures, all items are negatively correlated with total inequality and IO. It is worth noting that, for all social expenditure concepts, we observe very little differences between IO and Theil 0 correlations. Some of these social expenditures, together with those for education, are the most correlated factors with IO. Figure 7 shows the scatter plot between social protection spending (as a percentage of GDP) and IO. The fit is clearly negative and significant. An additional finding is that some items among those included in social protection expenditures are more correlated with inequality and IO than others. In particular, social exclusion, health care and, especially, child care expenditures are highly correlated with both inequalities, overall and IO. In this respect, note that child care expenditure is a clear way to equalize opportunities between women and men, in particular because it improves the situation of those women with worse initial circumstances. The remaining items (unemployment benefits, pensions, disability and work leaves) are less correlated with both concepts of inequality.

INSERT FIGURES 4, 5, 6 AND 7 ABOUT HERE

7. Concluding remarks

The modern theories of justice recognize an individual's income as being a function of the effort made and of the initial circumstances affecting the individual. And yet, individuals are only responsible for their own efforts, since the circumstances remain beyond their control. Thus, a greater inequality in the distribution of income does not imply, *per se*, that the course of the economy in general, or the redistributive capacity of a public policy in particular, is bad. It may happen that the level of effort made by individuals is different. In fact, a country's fiscal policy could correct the uneven distribution of initial circumstances while at the same time respecting the individual labor supply. For this to happen, a public policy must be implemented that, far from simply redistributing income, provides every individual with the same initial conditions without modifying the economic incentives to maximize effort.

When comparing the IO results obtained in this paper for 23 European countries with previous IO results (obtained from heterogeneous databases), we observe a high persistence of the IO levels and rankings between countries. Thus, we find that the Nordic countries, continental countries and some eastern countries are low-IO countries, while the Mediterranean countries, Atlantic countries and some other eastern countries are high-IO countries. Understanding the main factors (institutional, political, cultural or geography) behind the persistence of such country differences constitutes, therefore, one of the main challenges in the agenda of the inequality-of-opportunity analysis.

As preliminary evidence, our findings highlight educational policies first and foremost. In particular, a reduction in the academic dropout rate seems to constitute a fundamental tool to increasing the opportunities available in an economy. Reaching secondary education levels would also help to reduce IO indices, while tertiary education does not seem to have a significant impact on IO. A second pillar on which any policy aimed at reducing IO seems to be based is social protection spending, though not all items of expenditure are equally correlated. Spending to reduce social exclusion and on child and health care are greatly correlated with IO, while expenses on unemployment benefits, retirement and disability show little correlation. Correspondingly, in order to reduce IO without affecting the public sector budget, properly tuning the composition of social expenditure could be a better policy than uniformly increasing public expenditure.

Apart from accumulating empirical evidence, it is clear from the above that future research on equality of opportunity should also focus its attention on developing a formal theoretical framework which explicitly specifies the IO factors and its channels of causality.

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Table 1. Summary statistics of the EU-SILC database.

	AT	BE	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LV	NL	NO	PL	PT	SE	SI	SK	UK	Mean	Std
Selected sample size[1]	2,155	1,838	1,589	4,255	1,241	1,377	2,126	5,389	1,980	3,725	2,590	1,449	8,638	1,702	1,159	1,695	1,423	6,055	1,654	1,342	1,393	2,292	1,874	2,563	1,869
Equivalized personal income [2]																									
Average	19,633	19,553	5,075	20,163	24,716	3,753	11,766	13,041	20,930	18,533	3,950	24,359	17,281	2,736	3,058	19,807	28,470	3,187	9,693	18,908	10,045	3,212	26,850	14,292	8,629
Standard deviation	10,283	9,848	3,089	12,609	8,628	2,515	8,230	8,187	12,135	9,858	2,595	15,978	10,711	1,970	2,856	8,762	13,742	2,527	7,954	7,474	4,246	1,934	18,361	8,021	4,720
Father's Education																									
Less than Primary*	--	12.6	--	--	--	0.5	23.7	21.3	0.2	5.3	0.6	1.9	12.3	4.8	1.1	--	--	10.6	30.2	1.6	3.2	--	44.6	10.9	12.9
Primary	0.1	27.0	0.4	2.1	--	11.3	51.6	56.1	1.9	50.9	13.8	62.1	50.8	32.8	11.0	21.7	--	37.6	58.9	41.3	36.5	4.7	--	28.6	21.9
Secondary	95.3	38.8	88.0	60.3	78.4	63.7	15.8	12.5	75.3	32.9	71.9	22.4	33.2	37.7	67.6	54.9	56.0	45.0	7.0	35.8	51.3	84.3	19.5	49.9	25.6
Tertiary	4.6	21.6	11.6	37.5	21.6	24.5	8.9	10.0	22.7	10.9	13.6	13.6	3.6	24.7	20.4	23.4	44.0	6.9	3.9	21.2	9.0	11.1	35.8	17.6	11.0
Mother's Education																									
Less than Primary*	--	14.2	--	--	--	0.9	28.6	24.3	0.2	6.3	0.9	1.7	16.4	5.7	1.5	--	--	12.0	41.0	2.6	4.4	--	53.9	13.4	16.0
Primary	1.8 [3]	31.8	0.4	3.3	0.2	10.6	52.4	60.0	2.1	57.2	16.4	57.9	55.5	34.1	10.9	25.0	--	41.9	51.8	41.1	54.6	5.1	--	30.6	22.7
Secondary	62.0[3]	39.0	93.3	81.3	83.3	61.9	12.9	11.3	80.8	28.1	72.4	29.3	26.6	32.8	67.6	65.5	67.8	39.9	3.6	37.0	35.6	89.5	26.6	49.4	27.5
Tertiary	3.9[3]	15.0	6.2	15.4	16.5	26.6	6.1	4.3	16.9	8.4	10.3	11.2	1.5	27.4	20.0	9.5	32.2	6.2	3.6	19.3	5.5	5.4	19.5	13.1	8.5
Father's Occupation																									
Manager	5.0	11.5	4.3	6.7	9.6	10.5	11.7	6.7	10.2	8.5	5.9	25.1	9.9	6.6	6.2	23.1	13.2	3.5	7.3	--	4.7	8.3	13.4	9.6	5.5
Professional	3.4	12.9	6.7	16.6	13.3	8.3	4.5	3.9	8.0	10.7	6.7	9.8	3.7	8.1	9.2	14.2	10.5	4.8	2.5	--	5.2	7.7	15.4	8.5	4.1
Technician	12.4	6.8	16.1	12.2	10.8	5.4	2.2	4.8	12.9	8.4	5.4	3.0	7.5	2.9	5.8	15.2	18.9	6.5	4.3	--	9.9	11.0	8.2	8.7	4.6
Clerk	6.1	10.3	3.0	7.4	4.4	0.9	5.4	5.8	1.8	5.2	3.2	6.4	5.7	2.2	1.3	7.3	4.6	3.1	5.1	--	4.8	2.9	3.7	4.6	2.2
Salesman	10.5	6.1	3.9	3.0	6.2	1.2	4.8	7.8	3.8	3.3	3.3	5.6	4.2	2.0	2.2	4.5	4.6	2.2	5.7	--	5.7	2.8	3.8	4.4	2.1
Skill agricultural*	14.6	4.1	4.1	5.3	12.6	3.0	34.8	14.2	22.4	12.0	10.5	1.1	11.9	5.1	2.8	1.5	9.6	24.4	22.7	--	13.4	2.7	3.0	10.7	8.9
Craft trade	25.7	25.4	35.6	31.0	23.0	28.7	18.0	24.8	21.5	24.1	35.5	19.8	28.1	27.3	27.5	19.5	22.7	29.4	28.1	--	26.2	28.8	23.9	26.1	4.6
Machine operator	7.7	9.5	19.5	11.3	8.3	33.0	7.7	11.7	15.5	17.4	17.6	10.1	14.7	24.3	31.1	9.4	14.0	16.4	12.0	--	23.3	22.6	16.2	16.1	7.2
Elementary occup.	14.5	11.0	5.7	5.3	11.0	7.6	9.9	18.7	3.3	7.1	10.0	17.1	12.4	20.6	11.8	4.0	1.0	8.1	10.9	--	6.0	13.1	12.4	10.1	5.0
Armed/military	0.1	2.3	1.1	1.1	0.8	1.5	1.0	1.7	0.7	3.4	1.9	1.9	1.9	0.8	2.1	1.4	0.9	1.6	1.3	--	0.9	0.0	0.0	1.3	0.8
Economic Difficulties during childhood																									
Most of time	--	3.1	3.6	--	1.9	2.4	--	7.9	4.2	--	9.3	6.9	12.7	8.0	5.3	2.3	1.8	7.2	--	3.7	11.3	23.9	7.5	6.8	5.4
Often	--	5.0	8.7	--	3.8	11.0	--	9.1	7.3	--	16.9	7.3	20.2	15.3	12.1	6.5	3.7	13.8	--	5.5	21.2	29.4	9.5	11.5	6.9
Occasionally	--	11.7	26.9	--	14.4	36.5	--	20.2	24.4	--	15.6	21.0	31.1	29.2	26.2	13.8	12.7	30.5	--	12.8	31.8	32.0	21.8	22.9	8.0
Rarely	--	11.1	26.1	--	17.1	23.9	--	21.1	24.7	--	33.6	24.2	19.8	19.0	19.4	20.2	27.5	16.2	--	20.9	19.3	12.3	22.4	21.0	5.3
Never*	--	69.1	34.7	--	62.8	26.1	--	41.7	39.4	--	24.4	40.6	16.2	28.5	37.0	57.2	54.4	32.2	--	57.0	16.4	2.5	38.8	37.7	17.6
Country of Birth																									
Local*	88.7	88.3	97.4	95.7	97.4	89.5	90.4	93.1	97.8	88.4	97.6	86.2	93.1	94.2	87.3	94.8	92.1	99.8	96.3	87.6	91.0	98.6	89.1	92.8	4.2
Other EU	2.9	5.4	1.7	0.0	0.8	0.0	2.4	6.4	1.2	3.7	0.3	9.8	1.4	0.4	0.0	1.2	3.4	0.0	1.4	4.5	0.0	1.0	0.5	2.1	2.5
Others	8.4	6.4	0.9	4.3	1.8	10.5	7.2	0.5	1.0	7.9	2.0	3.9	5.5	5.5	12.7	4.0	4.4	0.1	2.4	8.0	9.0	0.4	10.5	5.1	3.7

(1) We restrict the sample to households' head aged 26 to 50. We exclude outliers and observations with missing data or showing negative or zero values of income.

(2) The equivalence scale is: $e = 1+0.5(N_{14+}-1)+0.3N_{13-}$, where N_{14+} and N_{13-} are the number of household members 14 years of age or older and 13 years of age or younger, repectively.

(3) Data for mother's education in Austria is incomplete (percentages do not add up to one).

Codes: AT- Austria; BE- Belgium; CZ- Czech Republic; DE- Germany; DK- Denmark; EE- Estonia; EL- Greece; FI- Finland; IE- Ireland; ES- Spain; FR- France; IT- Italy; LV- Latvia; LT- Lithuania; HU- Hungary; NL- The Netherlands; NO- Norway; PL- Poland; PT- Portugal; SI- Slovenia; SK- Slovakia; SE- Sweden; UK- The United Kingdom

*: When data are available, these are the omitted categories in the OLS regression (5). If data are non-available, the omitted category is the next superior.

Table 2. Reduced-form OLS regression of household income on circumstances

Variables	AT	BE	CZ	DE	DK	EE	EL
Primary education (F)		-0.021					0.105**
		(0.060)					(0.054)
Secondary education (F)		0.012		0.175***		-0.034	0.231***
		(0.059)		(0.061)		(0.068)	(0.073)
Tertiary education (F)	-0.069	0.028	0.077*	0.126**	0.015	0.131*	0.086
	(0.100)	(0.067)	(0.051)	(0.063)	(0.047)	(0.083)	(0.104)
Primary education (M)		0.059					0.084**
		(0.058)					(0.051)
Secondary education (M)		0.137***		0.192***		0.195***	0.147**
		(0.056)		(0.049)		(0.069)	(0.073)
Tertiary education (M)	-0.016	0.138**	0.100**	0.152***	-0.070	0.331***	0.365***
	(0.058)	(0.064)	(0.053)	(0.053)	(0.041)	(0.078)	(0.100)
Manager (F)	0.114**	0.048	0.186**	0.139***	0.068	0.216**	0.169***
	(0.059)	(0.068)	(0.083)	(0.046)	(0.059)	(0.124)	(0.060)
Proffesional (F)	0.219**	0.025	0.227***	0.140***	0.030	0.164	0.232**
	(0.118)	(0.070)	(0.083)	(0.042)	(0.067)	(0.131)	(0.105)
Technician (F)	0.129***	-0.028	0.140**	0.052	0.014	0.238**	0.302***
	(0.043)	(0.072)	(0.065)	(0.041)	(0.060)	(0.135)	(0.125)
Clerk (F)	0.111**	0.013	0.246***	0.026	-0.013	0.304*	0.172**
	(0.053)	(0.068)	(0.089)	(0.045)	(0.075)	(0.225)	(0.085)
Salesman (F)	0.029	0.017	0.054	0.108**	0.031	0.344**	0.003
	(0.044)	(0.073)	(0.083)	(0.057)	(0.066)	(0.202)	(0.083)
Craft trade worker (F)	0.015	-0.022	0.068	0.005	-0.058	0.111	0.124***
	(0.036)	(0.060)	(0.061)	(0.037)	(0.047)	(0.113)	(0.051)
Machine operator (F)	-0.025	-0.030	0.066	0.014	-0.050	-0.002	0.064
	(0.049)	(0.067)	(0.064)	(0.041)	(0.060)	(0.113)	(0.069)
Elementary occupation (F)	-0.087**	-0.039	-0.115	0.077*	-0.008	-0.050	0.005
	(0.041)	(0.065)	(0.076)	(0.048)	(0.055)	(0.126)	(0.062)
Armed occupation (F)	0.528*	0.035	0.107	0.077	0.073	-0.132	0.153
	(0.361)	(0.093)	(0.130)	(0.083)	(0.157)	(0.190)	(0.181)
Difficulties most of the time		-0.381***	-0.210***		-0.032	-0.158	
		(0.066)	(0.066)		(0.098)	(0.126)	
Difficulties often		-0.147***	-0.079**		0.031	-0.123**	
		(0.053)	(0.045)		(0.071)	(0.067)	
Difficulties occasionally		-0.139***	-0.034		0.040	0.032	
		(0.036)	(0.031)		(0.040)	(0.048)	
Difficulties rarely		-0.082**	0.001		0.022	0.073*	
		(0.037)	(0.031)		(0.037)	(0.052)	
EU	0.026	-0.084**	0.053		0.178		0.132
	(0.067)	(0.050)	(0.091)		(0.151)		(0.113)
Other	-0.286***	-0.348***	-0.310***	-0.110***	-0.090	-0.056	-0.495***
	(0.040)	(0.049)	(0.126)	(0.040)	(0.102)	(0.061)	(0.067)
Constant	9.765***	9.754***	8.336***	9.402***	10.049***	7.726***	8.934***
	(0.029)	(0.067)	(0.061)	(0.068)	(0.040)	(0.124)	(0.039)
Observations	2155	1838	1589	4255	1241	1377	2126
R-squared	0.05	0.11	0.06	0.02	0.01	0.09	0.07

Standard errors in parenthesis. * significant at 10 %; ** significant at 5 %; *** significant at 1 %.
Omitted categories are: less than primary education; skill agricultural, forestry and fishery worker; never; local.
Codes: AT- Austria; BE- Belgium; CZ- Czech Republic; DE- Germany; DK- Denmark; EE- Estonia; EL- Greece;
M: Mother. F: Father.

Table 2. Reduced-form OLS regression of household income on circumstances (Cont.)

Variables	ES	FI	FR	HU	IE	IT	LT
Primary education (F)	0.178***		0.072**			0.186***	0.371***
	(0.039)		(0.041)			(0.032)	(0.105)
Secondary education (F)	0.234***		0.091**	0.024	0.131***	0.227***	0.377***
	(0.053)		(0.043)	(0.039)	(0.043)	(0.037)	(0.110)
Tertiary education (F)	0.254***	0.086**	0.152***	0.047	0.061	0.371***	0.511***
	(0.064)	(0.038)	(0.052)	(0.057)	(0.059)	(0.068)	(0.126)
Primary education (M)	0.155***		0.078**			0.127***	-0.023
	(0.037)		(0.041)			(0.028)	(0.096)
Secondary education (M)	0.237***	0.114*	0.142***	0.118***	0.179***	0.191***	0.012
	(0.053)	(0.074)	(0.044)	(0.035)	(0.040)	(0.034)	(0.101)
Tertiary education (M)	0.302***	0.142	0.205***	0.200***	0.149***	0.275***	0.256**
	(0.070)	(0.079)	(0.051)	(0.049)	(0.058)	(0.080)	(0.110)
Manager (F)	0.108**	0.164***	0.202***	0.354***	0.061*	0.075**	0.288**
	(0.055)	(0.048)	(0.034)	(0.055)	(0.042)	(0.038)	(0.126)
Proffesional (F)	0.256***	0.067	0.150***	0.389***	0.197***	0.087*	0.127
	(0.080)	(0.054)	(0.037)	(0.061)	(0.064)	(0.063)	(0.124)
Technician (F)	0.329***	0.047	0.191***	0.272***	0.148**	0.098***	0.165
	(0.063)	(0.041)	(0.034)	(0.053)	(0.087)	(0.042)	(0.149)
Clerk (F)	0.210***	0.049	0.114***	0.202***	0.112**	0.055	0.396***
	(0.058)	(0.083)	(0.038)	(0.062)	(0.064)	(0.045)	(0.161)
Salesman (F)	0.107**	0.079*	0.057	0.164***	0.122**	-0.023	0.401***
	(0.051)	(0.060)	(0.045)	(0.062)	(0.067)	(0.049)	(0.169)
Craft trade worker (F)	0.055*	0.025	0.057**	0.143***		0.001	0.153*
	(0.038)	(0.032)	(0.026)	(0.035)		(0.030)	(0.097)
Machine operator (F)	0.169***	0.040	0.049**	0.096***	-0.009	0.102***	0.015
	(0.045)	(0.036)	(0.027)	(0.039)	(0.054)	(0.034)	(0.099)
Elementary occupation (F)	0.043	-0.021	-0.007	-0.057*	-0.053	-0.138***	-0.035
	(0.040)	(0.063)	(0.034)	(0.042)	(0.046)	(0.034)	(0.099)
Armed occupation (F)	0.228**	0.220**	0.148***	0.172**	-0.031	0.182***	0.094
	(0.092)	(0.132)	(0.046)	(0.081)	(0.105)	(0.067)	(0.243)
Difficulties most of the time	-0.088**	0.006		-0.104***	-0.271***	-0.195***	-0.150**
	(0.045)	(0.056)		(0.038)	(0.059)	(0.033)	(0.083)
Difficulties often	-0.098**	-0.031		-0.086***	-0.292***	-0.165***	-0.042
	(0.042)	(0.043)		(0.031)	(0.058)	(0.030)	(0.066)
Difficulties occasionally	-0.162***	0.017		-0.015	-0.149***	-0.081***	-0.028
	(0.031)	(0.028)		(0.031)	(0.039)	(0.027)	(0.054)
Difficulties rarely	-0.051**	-0.005		-0.020	-0.134***	-0.063**	0.013
	(0.030)	(0.028)		(0.026)	(0.037)	(0.029)	(0.060)
EU	-0.349***	0.016	-0.021	0.034	-0.140	-0.454***	0.006
	(0.046)	(0.101)	(0.039)	(0.174)	(0.048)	(0.073)	(0.340)
Other	-0.673***	-0.218**	-0.238***	-0.068	-0.254***	-0.270***	0.006
	(0.159)	(0.109)	(0.031)	(0.068)	(0.073)	(0.037)	(0.089)
Constant	8.960***	9.654***	9.470***	7.917***	9.918***	9.356***	7.139***
	(0.041)	(0.077)	(0.044)	(0.041)	(0.040)	(0.040)	(0.143)
Observations	5389	1980	3725	2590	1449	8638	1702
R-squared	0.08	0.03	0.09	0.12	0.15	0.07	0.10

Standard errors in parenthesis. * significant at 10 %; ** significant at 5 %; *** significant at 1 %.
Omitted categories are: less than primary education; skill agricultural, forestry and fishery worker; never; local.
Codes: FI- Finland; IE- Ireland; ES- Spain; FR- France; IT- Italy; LV- Latvia; LT- Lithuania;
M: Mother. F: Father.

Table 2. Reduced-form OLS regression of household income on circumstances (Cont.)

Variables	LV	NL	NO	PL	PT	SE
Primary education (F)				0.067	0.219***	
				(0.055)	(0.041)	
Secondary education (F)	0.229**	0.069**		0.087*	0.365***	-0.057
	(0.108)	(0.030)		(0.058)	(0.086)	(0.050)
Tertiary education (F)	0.417***	0.162***	-0.020	0.094	0.728***	0.083*
	(0.146)	(0.041)	(0.040)	(0.086)	(0.149)	(0.064)
Primary education (M)				0.057	0.116***	-0.100
				(0.052)	(0.038)	(0.140)
Secondary education (M)	0.113	0.017		0.210***	0.179**	-0.015
	(0.105)	(0.028)		(0.054)	(0.101)	(0.145)
Tertiary education (M)	0.201*	-0.021	0.031	0.344***	0.308***	-0.060
	(0.130)	(0.046)	(0.040)	(0.072)	(0.111)	(0.150)
Manager (F)	0.242	0.011	0.010	0.257***	0.385***	
	(0.210)	(0.033)	(0.072)	(0.064)	(0.068)	
Proffesional (F)	0.271*	-0.013	0.015	0.439***	0.256*	
	(0.209)	(0.043)	(0.079)	(0.077)	(0.159)	
Technician (F)	0.277*	0.074**	-0.001	0.257***	0.446***	
	(0.211)	(0.037)	(0.068)	(0.050)	(0.092)	
Clerk (F)	-0.290	0.088**	0.152*	0.204***	0.287***	
	(0.303)	(0.046)	(0.095)	(0.063)	(0.079)	
Salesman (F)	0.240	-0.095**	-0.018	0.085	0.331***	
	(0.255)	(0.055)	(0.094)	(0.072)	(0.073)	
Craft trade worker (F)	0.104		-0.038	0.132***	0.125***	
	(0.180)		(0.064)	(0.031)	(0.043)	
Machine operator (F)	0.181	0.004	0.038	0.140***	0.100**	
	(0.179)	(0.042)	(0.070)	(0.034)	(0.055)	
Elementary occupation (F)	0.113	-0.022	0.003	0.031	0.127**	
	(0.191)	(0.058)	(0.177)	(0.041)	(0.056)	
Armed occupation (F)	0.156	-0.032	-0.076	0.350***	0.534***	
	(0.273)	(0.095)	(0.183)	(0.089)	(0.139)	
Difficulties most of the time	-0.023	-0.154**	-0.045	-0.240***		0.129
	(0.136)	(0.072)	(0.129)	(0.043)		(0.107)
Difficulties often	0.006	-0.057*	-0.033	-0.162***		0.037
	(0.096)	(0.045)	(0.091)	(0.034)		(0.088)
Difficulties occasionally	-0.043	-0.056**	-0.105**	-0.056**		0.030
	(0.073)	(0.032)	(0.053)	(0.027)		(0.061)
Difficulties rarely	0.022	-0.021	-0.056*	-0.046*		0.021
	(0.080)	(0.028)	(0.039)	(0.031)		(0.050)
EU		0.107	0.105		-0.173*	-0.155*
		(0.099)	(0.092)		(0.129)	(0.096)
Other	-0.127*	-0.213***	-0.372***	-0.369*	-0.147*	-0.473***
	(0.088)	(0.055)	(0.083)	(0.282)	(0.101)	(0.083)
Constant	7.235***	9.734***	10.178***	7.543***	8.543***	9.828***
	(0.201)	(0.034)	(0.058)	(0.040)	(0.036)	(0.141)
Observations	1159	1695	1423	6055	1654	1342
R-squared	0.05	0.04	0.03	0.08	0.20	0.04

Standard errors in parenthesis. * significant at 10 %; ** significant at 5 %; *** significant at 1 %.
Omitted categories are: less than primary education; skill agricultural, forestry and fishery worker; never; local.
Codes: HU-Hungary; NL- The Netherlands; NO- Norway; PL- Poland; PT- Portugal; SI- Slovenia;
M: Mother. F: Father.

Table 2. Reduced-form OLS regression of household income on circumstances (Cont.)

Variables	SI	SK	UK
Primary education (F)	0.176**		
	(0.087)		
Secondary education (F)	0.246***	0.006	0.140***
	(0.088)	(0.073)	(0.051)
Tertiary education (F)	0.210**	0.076	0.191***
	(0.109)	(0.086)	(0.046)
Primary education (M)	-0.126**		
	(0.074)		
Secondary education (M)	-0.062	0.089	0.171***
	(0.077)	(0.070)	(0.044)
Tertiary education (M)	-0.064	0.184**	0.122***
	(0.096)	(0.085)	(0.049)
Manager (F)	0.284***	0.151**	0.247***
	(0.077)	(0.075)	(0.103)
Proffesional (F)	0.127*	0.188***	0.185**
	(0.087)	(0.079)	(0.104)
Technician (F)	0.173***	0.178***	0.112
	(0.057)	(0.071)	(0.108)
Clerk (F)	0.088*	0.193**	0.007
	(0.065)	(0.088)	(0.123)
Salesman (F)	0.115**	0.144*	0.179*
	(0.063)	(0.088)	(0.122)
Craft trade worker (F)	0.008	0.103*	0.083
	(0.044)	(0.066)	(0.098)
Machine operator (F)	0.029	0.080	0.085
	(0.043)	(0.067)	(0.100)
Elementary occupation (F)	0.009	0.001	0.043
	(0.058)	(0.069)	(0.102)
Armed occupation (F)	0.243**		
	(0.134)		
Difficulties most of the time	0.010	-0.006	-0.105*
	(0.049)	(0.070)	(0.064)
Difficulties often	0.026	-0.017	-0.003
	(0.042)	(0.069)	(0.058)
Difficulties occasionally	0.024	-0.054	0.072**
	(0.038)	(0.069)	(0.043)
Difficulties rarely	0.067	-0.062	-0.043
	(0.040)	(0.073)	(0.042)
EU		0.165*	-0.005
		(0.105)	(0.228)
Other	-0.179***	-0.138	-0.225***
	(0.043)	(0.158)	(0.052)
Constant	8.942***	7.772***	9.751***
	(0.082)	(0.101)	(0.096)
Observations	1393	2293	1874
R-squared	0.08	0.04	0.08

Standard errors in parenthesis. * significant at 10 %; ** significant at 5 %; *** significant at 1 %.
Omitted categories are: less than primary education; skill agricultural, forestry and fishery worker; never; local.
United Kingdom: occupation variables are refered to mother's occupation.
Codes: SK- Slovakia; SE- Sweden; UK- The United Kingdom
M: Mother. F: Father.

Table 3. Indices of total inequality, absolute IO and relative IO in Europe (2005).

Index	AT	BE	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LV	NL	NO	PL	PT	SE	SI	SK	UK
Theil 0	0.1181	0.1031	0.1196	0.1305	0.0689	0.1985	0.2127	0.2144	0.1160	0.1096	0.1314	0.1611	0.1874	0.2482	0.2995	0.0884	0.1169	0.2649	0.2264	0.1095	0.0873	0.1251	0.1952
	(0.0062)	(0.0075)	(0.0079)	(0.0052)	(0.0083)	(0.0115)	(0.0126)	(0.0087)	(0.0066)	(0.0035)	(0.0074)	(0.0084)	(0.0065)	(0.0144)	(0.0242)	(0.0052)	(0.0118)	(0.0078)	(0.0113)	(0.0152)	(0.0059)	(0.0068)	(0.0115)
IO	0.0060	0.0123	0.0070	0.0027	0.0013	0.0218	0.0230	0.0286	0.0038	0.0097	0.0152	0.0242	0.0220	0.0358	0.0213	0.0041	0.0048	0.0272	0.0503	0.0087	0.0084	0.0045	0.0199
	(0.0012)	(0.0032)	(0.0016)	(0.0006)	(0.0009)	(0.0047)	(0.0034)	(0.0028)	(0.0011)	(0.0011)	(0.0018)	(0.0031)	(0.0023)	(0.0065)	(0.0078)	(0.0011)	(0.0033)	(0.0030)	(0.0061)	(0.0054)	(0.0016)	(0.0013)	(0.0034)
Ratio (%)	5.08	11.93	5.85	2.07	1.89	10.98	10.81	13.34	3.28	8.85	11.57	15.02	11.74	14.42	7.11	4.64	4.11	10.27	22.22	7.95	9.62	3.60	10.19
	(0.97)	(2.44)	(1.26)	(0.46)	(0.96)	(1.95)	(1.55)	(1.13)	(0.88)	(1.00)	(1.35)	(1.88)	(1.05)	(2.15)	(2.45)	(1.13)	(2.48)	(0.99)	(2.22)	(3.81)	(1.85)	(0.96)	(1.61)
T0 position	9	4	10	12	1	17	18	19	7	6	13	14	15	21	23	3	8	22	20	5	2	11	16
IO position	7	12	8	2	1	16	18	21	3	11	13	19	17	22	15	4	6	20	23	10	9	5	14
N	2155	1838	1589	4255	1241	1377	2126	5389	1980	3725	2590	1449	8638	1702	1159	1695	1423	6055	1654	1342	1393	2292	1874

Table 4. Correlation of overall inequality and IO with alternative indicators.

	Lag correlation* (1998 Vs. 2005)		Contemporaneous correlation* (2005 Vs. 2005)	
Development indicators	**Theil 0**	**IO**	**Theil 0**	**IO**
GDP	-0.6240	-0.4679	-0.5772	-0.4421
% empl. Agric.	0.7287	0.5754	0.6761	0.6289
% empl. Serv.	-0.5135	-0.4653	-0.4812	-0.4758
Education indicators	**Theil 0**	**IO**	**Theil 0**	**IO**
Second.attained (total)	-0.2072	-0.5855	-0.2177	-0.5972
Second.attained (female)	-0.1493	-0.5228	-0.1515	-0.5333
Tertiary-upper attained (total)	-0.0032	0.0772	0.3697	0.2280
Early leaves	0.5333	0.7852	0.3595	0.6620
Labor market indicators	**Theil 0**	**IO**	**Theil 0**	**IO**
Employment rate	-0.3585	-0.3007	-0.4020	-0.2678
Employment rate (female)	-0.3610	-0.3810	-0.4248	-0.3638
Unemployment rate	0.5234	0.2790	0.3596	0.1311
Long-run unemployment	0.4485	0.4604	0.2748	0.2142
Social public expenditures items	**Theil 0**	**IO**	**Theil 0**	**IO**
Total	-0.6746	-0.6049	-0.6222	-0.4181
Social protection, total	-0.6689	-0.6403	-0.6245	-0.4346
Unemployment	-0.5649	-0.4365	-0.4531	-0.2750
Old persons	-0.2115	-0.3355	-0.3104	-0.2079
Health	-0.7539	-0.5517	-0.6587	-0.3617
Social exclusion	-0.6111	-0.5422	-0.6271	-0.5624
Disability	-0.4391	-0.4184	-0.5061	-0.4063
Child care	-0.6507	-0.6994	-0.6827	-0.6565

(*): Lag correlation: Corr.($Ineq._{1998}$, $Indicator_{2005}$); Contemporaneous correlation: Corr.($Ineq._{2005}$, $Indicator_{2005}$)

Figure 1. Total inequality in Europe (2005).
(Theil 0 index)

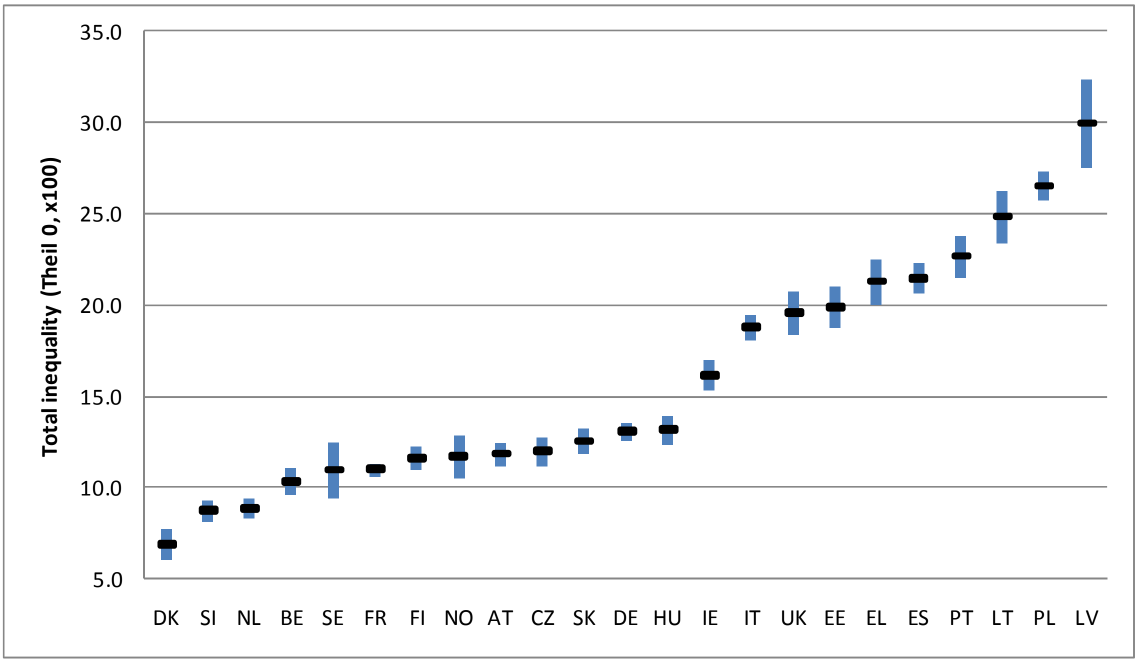


Figure 2. Absolute inequality of opportunity in Europe (2005).
(Theil 0 index)

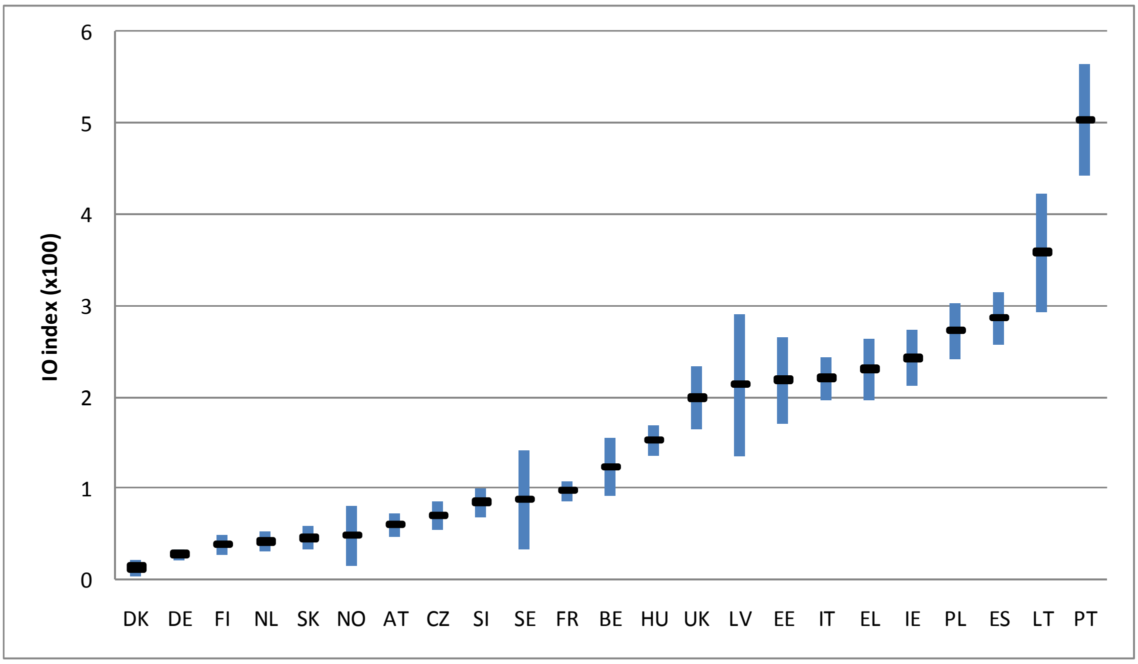


Figure 3. Relative inequality of opportunity in Europe (2005).
(Theil 0 index)

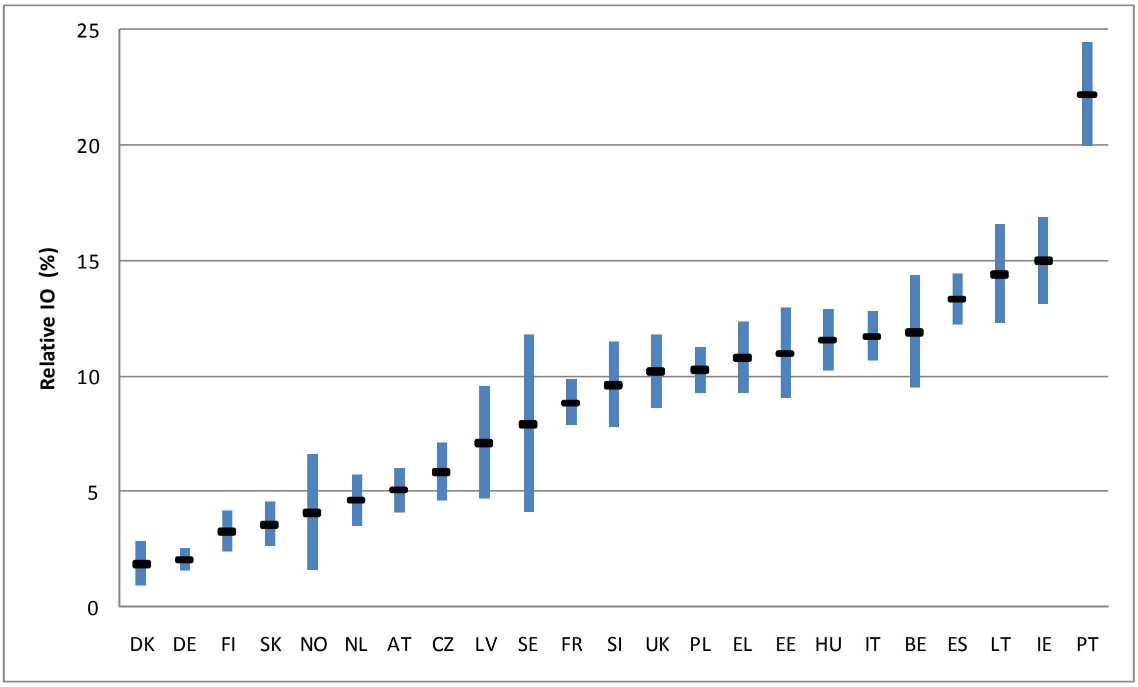


Figure 4. Development and IO in Europe.

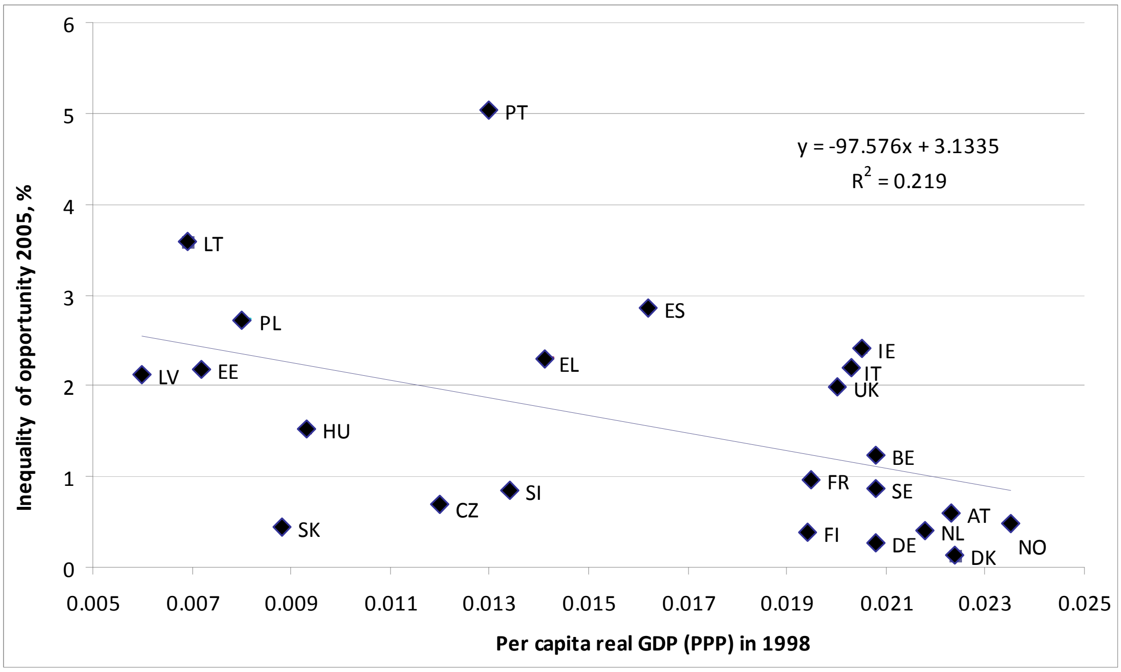


Figure 5. Long-run unemployment rate and IO in Europe.

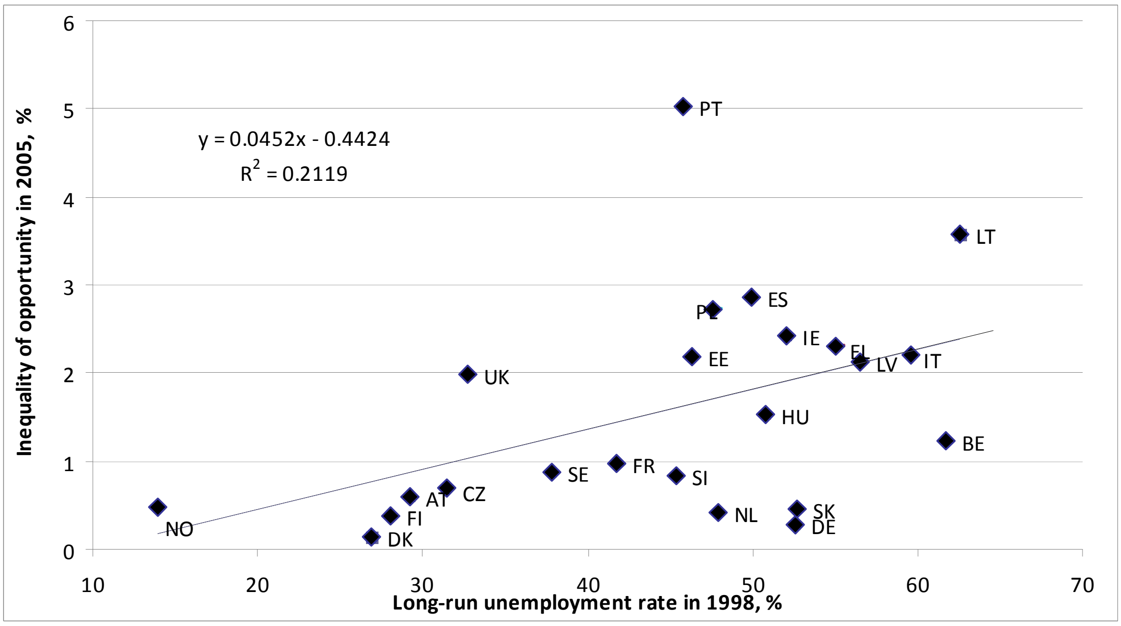


Figure 6. Early school-leavers and IO in Europe.

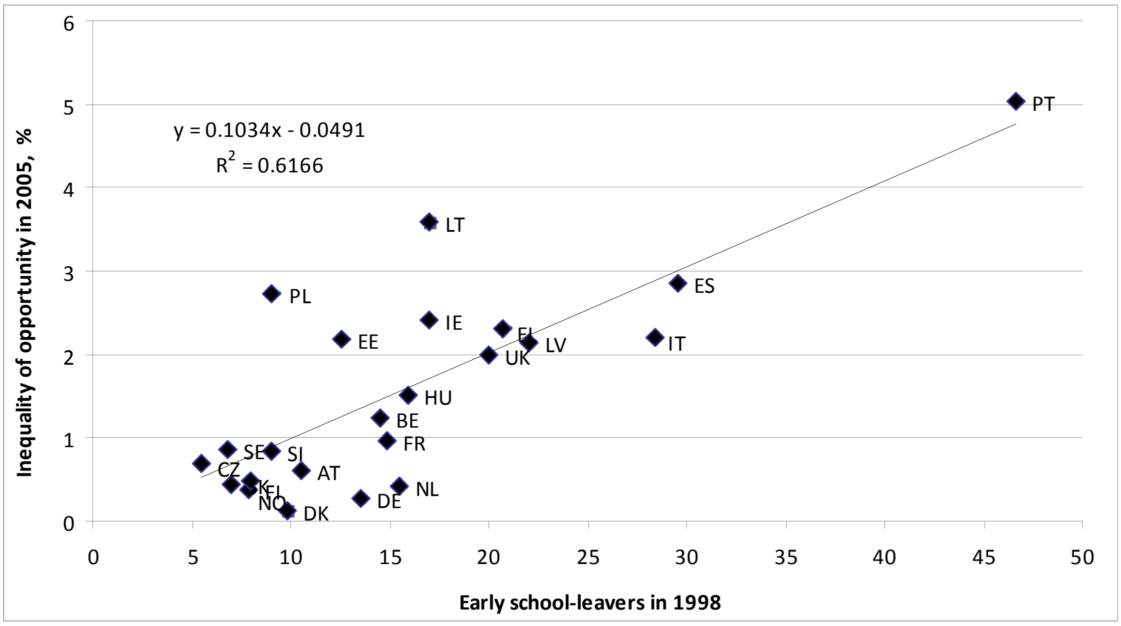
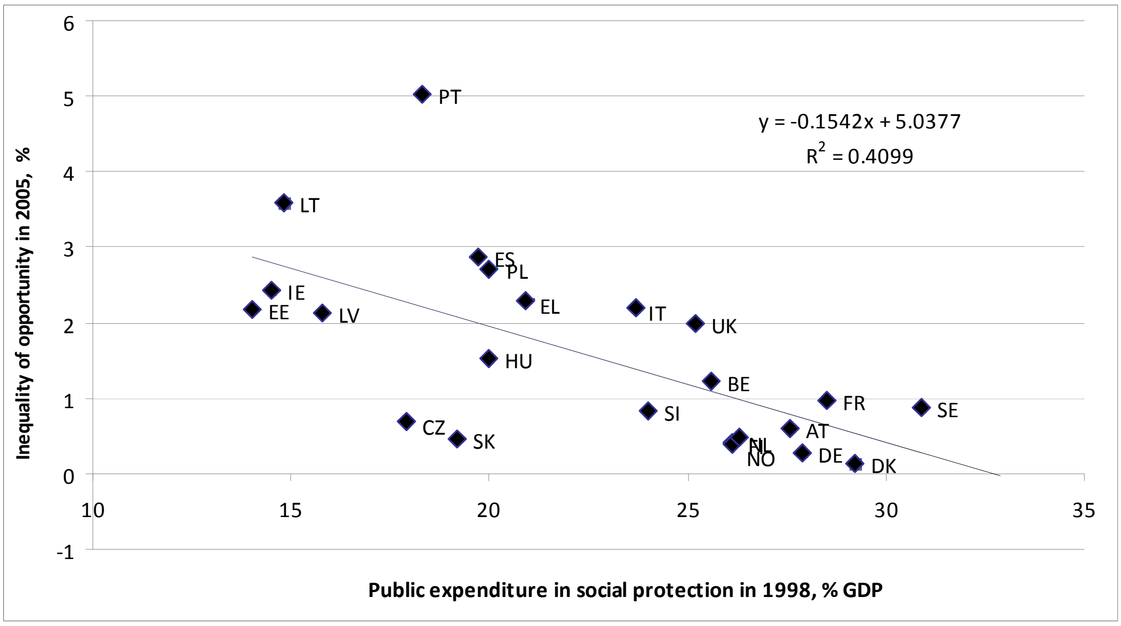


Figure 7. Public expenditure in social protection and IO in Europe.



APPENDIX

Table 1A. Descriptive statistics for the independent variables

	Development indicators			**Labor Market indicator**			
	GDP per capita (PPP adjusted)	Employ. in agriculture	Employ. in service	Employ. rate	Female employ. rate	Unempl. rate	Long-term unempl. (12 months or more)
Year	2005	2005	2005	2005	2005	2005	2005
Source	Eurostat, National accounts	Eurostat, Labour Force Survey	Eurostat, Labour Force Survey	Eurostat, Labour Force Survey	Eurostat, Labour Force Survey	Eurostat, Labour Force Survey	Eurostat, Labour Force Survey
Units	Millions of PPP/habitant	% over total	% over total	% population 15-64	% population, fem. 15-64	% active population	%unemploy.
AT	0.0279	6.0	70.1	75.0	62.0	5.2	25.3
BE	0.0268	2.0	77.5	65.9	53.8	8.5	51.7
CZ	0.0171	3.8	57.9	71.7	56.3	7.9	53.0
DE	0.0263	2.2	71.9	75.5	60.6	10.7	53.0
DK	0.0278	3.0	76.1	82.3	71.9	4.8	23.4
EE	0.0139	5.3	61.0	69.1	62.1	7.9	53.4
EL	0.0206	12.4	67.7	64.2	46.1	9.9	52.2
ES	0.0229	5.2	65.5	68.9	51.2	9.2	24.5
FI	0.0257	5.1	69.1	72.8	66.5	8.4	25.8
FR	0.0249	3.6	76.0	66.0	58.5	9.3	41.1
HU	0.0142	8.7	59.7	63.3	51.0	7.2	45.0
IE	0.0323	5.9	66.5	71.8	58.3	4.4	33.4
IT	0.0236	4.2	67.0	68.0	45.3	7.7	49.9
LT	0.0119	14.0	57.1	65.7	59.4	8.3	52.5
LV	0.0109	11.2	62.3	67.9	59.3	8.9	46.0
NL	0.0294	3.2	79.3	79.1	66.4	4.7	40.2
NO	0.0396	3.3	76.7	83.4	71.7	4.5	18.7
PL	0.0115	17.4	53.5	54.5	46.8	17.8	57.7
PT	0.0173	11.9	58.8	76.2	61.7	7.7	48.2
SE	0.0271	2.3	74.8	80.3	70.4	7.4	18.0
SI	0.0197	10.0	54.9	68.5	61.3	6.5	47.3
SK	0.0135	4.4	61.6	56.0	50.9	16.3	71.9
UK	0.0274	1.5	80.3	77.5	65.8	4.8	21.1

Table 1A. Descriptive statistics for the independent variables (Cont.)

	Education indicators				Expenditure in Social protection and taxes						
	Educ. attained (at least secondary)	Educ. female attained (at least secondary)	Early school-leavers	Educ. attained, at least Tertiary	Total expenditure in social protection	Health care/Sickness	Disability	Child care	Social exclusion	Unemploy. benefits	Old age
Year	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
Source	Eurostat (ISCED)	Eurostat (ISCED)	Eurostat (ISCED)	Eurostat (ISCED)	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare	Eurostat, Living conditions and welfare
Units	% population 25-64	% population fem. 25-64	% people 18-24, at most lower second. educ.	%, population 24-65	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP
AT	80.6	75.4	9.00	4.7	23.7	7.1	2.4	1.2	0.2	1.4	9.8
BE	66.1	65.9	13.00	6.1	25.9	6.7	3.3	3.0	0.5	2.4	8.7
CZ	89.9	86.3	6.40	4.8	21.5	6.4	2.1	2.5	0.1	0.6	8.8
DE	83.1	79.7	13.80	4.4	25.8	8.0	2.3	1.6	0.2	0.7	10.8
DK	81.0	79.6	8.50	6.9	29.3	6.1	4.2	3.8	1.0	2.5	11.0
EE	89.1	90.9	14.00	7.8	28.3	7.7	2.0	2.0	0.4	3.5	9.8
EL	60.0	58.9	13.30	9.1	19.2	3.8	2.0	0.8	0.4	0.6	9.3
ES	48.5	48.5	30.80	6.5	23.6	6.6	1.2	1.5	0.5	1.2	11.3
FI	78.8	81.0	9.30	9.3	28.5	8.1	1.8	3.3	0.2	2.0	10.3
FR	66.8	64.9	12.00	5.5	23.4	7.5	4.5	2.8	0.7	0.6	6.9
HU	76.4	72.7	12.30	6.6	30.9	8.0	4.6	2.9	0.6	1.9	11.7
IE	65.2	68.1	12.30	6.8	12.5	4.0	1.2	1.5	0.1	0.2	5.4
IT	50.4	50.6	21.90	5.6	20.6	6.3	1.5	1.2	0.2	2.5	8.0
LT	87.6	88.6	9.20	8.8	12.7	3.9	1.3	1.2	0.2	0.2	5.5
LV	84.5	87.4	11.90	8.7	25.4	6.8	1.5	1.1	0.0	0.5	12.9
NL	71.8	68.4	13.60	5.4	11.8	3.1	0.9	1.3	0.1	0.5	5.6
NO	88.2	88.0	4.60	7.6	16.1	4.8	1.3	1.9	0.5	0.5	6.9
PL	84.8	83.9	5.50	8.2	22.5	7.3	1.9	1.9	0.6	0.7	9.5
PT	26.5	28.6	38.60	5.7	26.0	8.0	2.5	1.3	1.2	1.6	9.7
SE	83.6	85.7	11.70	7.9	18.5	6.5	1.4	1.4	0.5	0.7	7.1
SI	80.3	77.4	4.30	8.4	29.5	8.8	1.7	2.5	0.5	2.2	11.0
SK	87.9	84.7	5.80	4.9	27.9	7.1	2.4	3.0	0.3	1.6	11.3
UK	71.8	67.5	14.00	6.2	16.9	6.9	0.9	2.5	0.3	1.3	3.8