Fair and Unfair Income Inequalities in Europe

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Fair and Unfair Income Inequalities in Europe

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This paper:

- proposes a methodology to measure fair and unfair income inequality
- applies this methodology to 24 European countries
- explores the association between such inequalities and some institutional variables
- The concept of fairness in this paper: equality of opportunity (EOp)
- EOp is very popular and very vague.
This presentation

- the (different) concept(s) of EOp
- the (different) approach(es) to measurement
- our methodology and our results
Why is EOp relevant?  
(in addition to normative reasons)

EOp and the support for redistribution (Alesina and Glaeser, 2006).

Sources of income inequality and priorities of redistributive and social policy.

EOp and growth (World Bank, 2006).
Equality of opportunity: a short history

‘70s and ’80s: the philosophers (Rawls, Sen, Dworkin, Arneson, Cohen, Roemer commenting on Dworkin)
  ⊗ Critique of welfarism and consequentialism
  ⊗ The role of responsibility

90s: the economists
  ⊗ Roemer’s algorithm and statistical solution
  ⊗ Fleurbaey’s distinction between Compensation and Reward
  ⊗ Kranich and Ok’s abstract model

Last decade: the measurement.
Measuring opportunity inequality


Test for existence of EOp (Lefranc et al. 2006)

EOp and mobility (Shokkaert et al. 2003)

Long term inequality of opportunity (Aaberge et al. 2009)
The economic model of EOp

\[ x = g(c, e, r) \]

Circumstances, Effort, Resources

Principle of Compensation

Principle of Reward:
- utilitarian
- liberal:

Compensation and reward are independent and, unless \( g \) is separable, incompatible (Bossert, 1995; Fleurbaey, 1994).
Ex ante

EOp as "equal opportunity sets". Inequality of opportunity decreases if inequality between opportunity sets decreases.

**Type**: set of individuals with the same circumstances \( c \).

\( F (x|c_i) \) is interpreted as the opportunities set of individuals with \( c_i \).

Ex ante focus on inequality **between types**: no need to observe effort.


Ex post

EOp as "equal outcome for equal effort". Inequality of opportunity decreases if outcome inequality decreases among the individuals with the same effort.

Tranche: set of individuals with the same effort $e$.

$F(x|e_p)$ is the distribution of outcome conditional to effort $e_p$.

Ex post focus on inequalities within tranches.

Unobservable effort: rank solution (Roemer, 1993).
Ex post cont.


Empirical: Checchi and Peragine (2005), Aaberge et al. (2009), Li Donni et al. (2009)

Ex-ante and ex-post converge on the equitable allocation: the EOp allocation

Fleurbaey and Peragine 2009:
- in general ex ante and ex post clash
- the compensation/reward clash holds only for ex post
Figure: 1 - The ex ante and ex post clash
The ex ante approach

original distribution: \{x(c_i, e_i)\}

*smoothed* distribution: \{x(c_i, \bar{e})\}, reference effort \bar{e}

*standardized* distribution: \left\{ \frac{x(c_i, e_i)}{x(c_i, \bar{e})} \right\}, reference effort \bar{e}

\{x(c_i, \bar{e})\} eliminates within-types inequality, \{x(c_i, \bar{e})\} captures opportunity inequality

\left\{ \frac{x(c_i, e_i)}{x(c_i, \bar{e})} \right\} eliminates between-types inequality and captures only effort inequality.
How to interpret $x(c_i, \bar{e})$?

**Non parametric method:**

$x(c_i, \bar{e})$ as mean income of type $i$ ($\mu_i$)

Inequality between types as inequality in the smoothed distribution

$$x(c_i, \bar{e}) := \{\mu_1 1_{N_1}, ..., \mu_n 1_{N_n}\}$$

**Parametric method:**

Consider the reduced-form model: $x_i = \beta c_i + \epsilon_i$ from which:

$\hat{x}_i = \hat{\beta} c_i$

Inequality between types as inequality in the *smoothed* distribution

$$x(c_i, \bar{e}) = \{\hat{x}_1 1_{N_1}, ..., \hat{x}_n 1_{N_n}\}$$
Decomposable inequality

For parametric and non-parametric methods, given a (scale invariant) inequality measure $I$:

$$OI_{\text{ex-ante}} = \frac{I\{x(c_i, \bar{e})\}}{I\{x(c_i, e_i)\}}$$

We use the *mean logarithmic deviation*, the only index with a path-independent decomposition (Foster and Shneyrov, 2000) based on the arithmetic mean:

$$I(x(c_i, e_i)) = I\left\{\frac{x(c_i, e_i)}{x(c_i, \bar{e})}\right\} + I\{x(c_i, \bar{e})\}$$

Total inequality = effort ineq. + opportunity ineq.
The ex post approach

original distribution: $\{x(c_i, e_i)\}$

smoothed distribution: $\{x(\bar{c}, e_i)\}$, reference circumstance $\bar{c}$

standardized distribution: $\left\{\frac{x(c_i, e_i)}{x(\bar{c}, e_i)}\right\}$, reference circumstance $\bar{c}$

$\{x(\bar{c}, e_i)\}$ eliminates within tranches inequality: $I\{x(\bar{c}, e_i)\}$ captures the effort inequality

$\left\{\frac{x(c_i, e_i)}{x(\bar{c}, e_i)}\right\}$ eliminates between tranches inequality: $I\left\{\frac{x(c_i, e_i)}{x(\bar{c}, e_i)}\right\}$ captures the opportunity inequality

Fleurbaey and Shokkaert (2008) propose: $I(x(c_i, e_i) - x(\bar{c}, e_i))$
What is the meaning of $x(\bar{c}, e_i)$?

Non parametric method:

$x(\bar{c}, e_i)$ is the mean income of a given tranche ($\mu_{ei}$)

$$\left\{ \frac{x(c_i, e_i)}{x(\bar{c}, e_i)} \right\}$$

is obtained by rescaling each tranche $i$ income:

$$X_i \rightarrow \frac{\mu X}{\mu e_i} X_i \rightarrow \frac{x_i}{\mu e_i}$$

Parametric method:

Estimate for each tranche $p$: $x_i = \beta c_i + \epsilon_i, \forall p$ obtaining $\hat{\beta}_p$.

Derive the counterfactual distribution $\hat{x}_p = \hat{\beta}_p \bar{c}_p$ where $\bar{c}_p$ are the mean values of circumstances calculated over tranche.

Inequality within tranche is measured by inequality in the

*standardized* tranche distribution: $\left\{ \frac{x_i}{\hat{x}_p} \right\}$. 
Decomposable inequality

For any given (scale invariant) inequality index $I$:

$$O^\text{ex-post} = \frac{I\left\{\frac{x(c_i,e_i)}{x(\bar{c},e_i)}\right\}}{I\left\{x\left(c_i,e_i\right)\right\}}$$

Use the *mean logarithmic deviation* (MLD) and obtain:

$$I\left\{x\left(c_i,e_i\right)\right\} = I\left\{\frac{x(c_i,e_i)}{x(\bar{c},e_i)}\right\} + I\left\{x\left(\bar{c},e_i\right)\right\}$$

Total ineq. = opportunity ineq. + effort ineq.
Some theoretical questions:

- characterize dominance conditions consistent with the measures used here
- use alternative (e.g. normative) representative income and obtain different inequality measures
- long term inequality of opportunity
The empirical analysis

2005 wave of the Survey on Income and Living Conditions (EU-SILC).

25 countries: Austria, Belgium, Czech Republic, Denmark, Germany, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherland, Norway, Poland, Portugal, Spain, Sweden, Slovenia, Slovak Republic and United Kingdom.

Restrict our sample to individuals working full-time or part-time, unemployed and those fulfilling domestic tasks and care responsibilities, 30-60 years old.

127,460 observation
Model specification

*Outcome*: post-tax individual income

*Circumstances*: family background (parental occupation and education), gender, location, nationality

\[3 \times 3 \times 2 \times 2 \times 2 = 72 \text{ types}\]

*Effort*: rank in the type distribution.

*Institutional variables*: educational system, labor market regulation, fiscal redistribution.
Figure: 2 - Income inequality according to different data source (OECD and EUSILC)
Figure: 3 - Income inequality according to different indicators (Gini and MLD) - EUSILC 2005
Table: 1- Inequality of opportunity as a percentage of total inequality

<table>
<thead>
<tr>
<th>country</th>
<th>ex ante</th>
<th>ex post</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>0.226</td>
<td>0.396</td>
</tr>
<tr>
<td>BE</td>
<td>0.159</td>
<td>0.372</td>
</tr>
<tr>
<td>DE</td>
<td>0.162</td>
<td>0.270</td>
</tr>
<tr>
<td>DK</td>
<td>0.120</td>
<td>0.241</td>
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<tr>
<td>EE</td>
<td>0.086</td>
<td>0.272</td>
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<tr>
<td>ES</td>
<td>0.176</td>
<td>0.329</td>
</tr>
<tr>
<td>FI</td>
<td>0.088</td>
<td>0.169</td>
</tr>
<tr>
<td>FR</td>
<td>0.104</td>
<td>0.258</td>
</tr>
<tr>
<td>GR</td>
<td>0.130</td>
<td>0.270</td>
</tr>
<tr>
<td>HU</td>
<td>0.043</td>
<td>0.211</td>
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<tr>
<td>IE</td>
<td>0.171</td>
<td>0.337</td>
</tr>
<tr>
<td>IS</td>
<td>0.122</td>
<td>0.372</td>
</tr>
<tr>
<td>IT</td>
<td>0.122</td>
<td>0.305</td>
</tr>
<tr>
<td>LT</td>
<td>0.070</td>
<td>0.215</td>
</tr>
<tr>
<td>LU</td>
<td>0.176</td>
<td>0.311</td>
</tr>
<tr>
<td>LV</td>
<td>0.087</td>
<td>0.214</td>
</tr>
<tr>
<td>NL</td>
<td>0.179</td>
<td>0.380</td>
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<tr>
<td>NO</td>
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<td>0.276</td>
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<tr>
<td>PL</td>
<td>0.063</td>
<td>0.207</td>
</tr>
<tr>
<td>PT</td>
<td>0.089</td>
<td>0.312</td>
</tr>
<tr>
<td>SE</td>
<td>0.104</td>
<td>0.189</td>
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<tr>
<td>SI</td>
<td>0.019</td>
<td>0.135</td>
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<tr>
<td>SK</td>
<td>0.106</td>
<td>0.242</td>
</tr>
<tr>
<td>UK</td>
<td>0.181</td>
<td>0.314</td>
</tr>
</tbody>
</table>

Notes: The columns refer to MLD in relative terms.
Table: 2 - Inequality of opportunity in absolute term

<table>
<thead>
<tr>
<th>country</th>
<th>ex ante</th>
<th>ex post</th>
<th>country</th>
<th>ex ante</th>
<th>ex post</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.024</td>
<td>0.060</td>
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<tr>
<td>BE</td>
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<tr>
<td>DE</td>
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<td>LU</td>
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<td>0.046</td>
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<tr>
<td>DK</td>
<td>0.010</td>
<td>0.020</td>
<td>LV</td>
<td>0.020</td>
<td>0.049</td>
</tr>
<tr>
<td>EE</td>
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<td>0.066</td>
<td>NL</td>
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<tr>
<td>ES</td>
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</tr>
<tr>
<td>FI</td>
<td>0.012</td>
<td>0.023</td>
<td>PL</td>
<td>0.017</td>
<td>0.056</td>
</tr>
<tr>
<td>FR</td>
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<td>0.042</td>
<td>PT</td>
<td>0.022</td>
<td>0.077</td>
</tr>
<tr>
<td>GR</td>
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<td>0.054</td>
<td>SE</td>
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<tr>
<td>HU</td>
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<td>0.014</td>
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<tr>
<td>IE</td>
<td>0.032</td>
<td>0.063</td>
<td>SK</td>
<td>0.014</td>
<td>0.032</td>
</tr>
<tr>
<td>IS</td>
<td>0.023</td>
<td>0.070</td>
<td>UK</td>
<td>0.037</td>
<td>0.064</td>
</tr>
</tbody>
</table>

Notes: The columns refer to MLD in absolute terms.
Figure: 4 - Ex post and ex ante opportunity inequality - EUSILC 2005
Figure: 5 - Ex post and total inequality - EUSILC 2005
Figure: 6 - Ex ante and total inequality - EUSILC 2005
Figure: 7 - Confidence ellipses
Figure: 8 - Opportunity inequality and schooling (pupil/teacher rate in primary school, expenditure in education/gdp)
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Empirical Analysis

**Figure: 9 - Opportunity inequality and educational resources (enrollment preprimary over primary, % 2nd school male student vocational programs)**
Figure: 10 - Opportunity inequality and labour market institutions (union density, OECD employment protection legislation (2d version))
Figure: 11 - Opportunity inequality and the role of fiscal redistribution (gini before/after tax and transfer, expenditure in social protection)
Main empirical results

- Inequality of opportunity account for a relevant part of income inequality
- The difference between ex ante and ex post does matter: ex post IO higher than ex ante IO and more correlated with overall inequality
- Pattern income/opportunity inequality: three groups of countries: formerly centrally planned economies, continental Europe, Nordic countries.
Main empirical results cont.

Ex ante EOp is positively correlated with pre-primary education and de-tracked secondary school systems.

Ex post EOp is also positively associated to labour market regulation (mainly for gender), to union density and to wage centralization, to fiscal redistribution.