The measurement of inequality of opportunity

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Based on joint works with R. Aaberge, P. Brunori, D. Checchi, M. Fleurbaey, M. Mogstad, F. Palmisano, L. Serlenga
The plan of the talk

- A conceptual framework
  - compensation and reward
  - ex ante and ex post

- EOp measurement in practice
  - income and opportunity inequality in 24 European Countries
  - long term opportunity inequality in Norway

- The opportunity growth incidence curve
A reduced form model of EOp

\[ x_i = f(c_i, e_i, t_i) \]
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- \( x_i \) outcome, \( t_i \) policy, \( c_i \) circumstances, \( e_i \) responsibility

- **Compensation**: inequalities due to circumstances should be eliminated as much as possible: \( x_i \) should depend only on \( e_i \)

- **Reward**: how to be fair to individuals with identical circumstances, how to apportion outcome to effort
  - **liberal**: given \( c_i \), inequality aversion wrt transfers \( t_i \)
  - **utilitarian**: given \( c_i \), zero inequality aversion wrt outcomes \( x_i \)
The clash between compensation and reward

- $x_i$ depends only on $e_i$ & $t_i$ depends only on $c_i$: impossible unless separability in $(t, c)$
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- Unless the effect of \( c \) on \( x \) is independent of \( e \), it is impossible to satisfies (i) and (ii).
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Compromise solutions: fully consistent with one principle, generally violate the other
The compensation/reward clash is an expression of a deeper tension: ex ante vs. ex post

- **The ex post approach**: focus on outcome inequalities among individuals who exert the same effort (tranches). The effort of individuals must be identified. Ex: Roemer (1993), Fleurbaey (1995)
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- Most of the empirical work on EOp is ex ante (information parsimony?). Ex: de Barros et al. (2009), World Bank (2006).
The clash between Ex ante and Ex post EOp

Fleurbaey and Peragine (2010)

- **Ex post compensation**: progressive transfer involving individuals who exert the same effort
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- **Ex post compensation**: progressive transfer involving individuals who exert the same effort
- **Ex ante compensation**: progressive transfer from an individual in a richer type to an individual in a poorer type
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- **Ex post compensation**: progressive transfer involving individuals who exert the same effort

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- **Ex post and Ex ante compensation are incompatible**
The clash between Ex ante and Ex post EOp

Fleurbaey and Peragine (2010)

- **Ex post compensation**: progressive transfer involving individuals who exert the same effort

- **Ex ante compensation**: progressive transfer from an individual in a richer type to an individual in a poorer type

- **Ex post and Ex ante compensation are incompatible**

- Moreover, the tension between reward and compensation only exists if one endorses an ex post view of EOp.
Ex ante measures of IOp

- Given a population cdf $F(x)$, consider $F(x|c_i)$, the outcome distribution conditional to $c_i$, interpreted as the opportunity set of individuals with $c_i$. 

- Focus on differences between $F(x|c_i)$, different $c_i$.

- Utilitarian: focus on type mean income $\mu_i$ (zero inequality aversion within type).

- Welfare: opportunity generalized Lorenz $GL(j) = \frac{1}{n} \sum_{i=1}^{n} q_i \mu_i$.

- Inequality: opportunity Lorenz $L(j) = \frac{1}{n} \sum_{i=1}^{n} q_i \mu_i \frac{1}{\sum_{i=1}^{n} q_i \mu_i}$.

- Inequality in the smoothed distribution ($\mu_1, ... , \mu_n$).

- Parametric versions.

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- Inequality in the *smoothed* distribution $(\mu_1 \mathbf{1}_1, \ldots, \mu_n \mathbf{1}_n)$
Ex ante measures of IOp

Given a population cdf $F(x)$, consider $F(x | c_i)$, the outcome distribution conditional to $c_i$, interpreted as the opportunity set of individuals with $c_i$.

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inequality in the *smoothed* distribution $(\mu_1 1_1, \ldots, \mu_n 1_n)$

Parametric versions
Ex post measures of IOp

- $F(x|e_j)$ is the distribution of outcome conditional to effort $e_j$ (tranche $j$)
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- Define a class: individuals at the same position in the tranche distribution
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- Measure inequality within tranches
- Check Lorenz and generalized Lorenz dominance for every tranche

- Define a class: individuals at the same position in the tranche distribution
- Focus on inequality between classes (Fleurbaey and Peragine 2011)
Equality of opportunity in Europe

Checchi, Peragine, Serlenga (2010)

- 2005 wave of the Survey on Income and Living Conditions (EU-SILC);
- 27 countries. Restrict sample to 30-60 years old. 127,460 observation

Outcome: post-tax individual income

Circumstances: family background (parental occupation and education), gender, location, nationality. 72 types

Effort: rank in the type distribution

Ex ante and ex post measures, parametric and non parametric
Inequality of opportunity account for a relevant part of income inequality in Europe (from 5% to 40%)
Difference between ex ante/ex post; Ex post more correlated with overall inequality
Income inequality and ex ante opportunity inequality. EU SILC 2005.

Three groups of countries: continental and med. European countries, formerly centrally planned economies, Nordic countries.
Main differences between short term and long term inequality:

- The existence of transitory components
- The life cycle growth of earnings

How these factors affect inequality of opportunity?

Two approaches to long term EOp

1. First evaluate income distributions of type $i$ at each time $t$; then aggregate across periods, obtaining a lifetime evaluation of the opportunity set. Finally evaluate the distribution of lifetime opportunity sets. (Bourguignon et al. 2007)

Our approach: first evaluate the individual income streams, obtaining a distribution of permanent incomes (we use equally allocated equivalent income). Then measure EOp.
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Aaberge Mogstad Peragine (2011)

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The data

- A longitudinal dataset with records for every Norwegian male from 1967 to 2006;
- Focus on the 1942-1944 cohorts (entire working lifespan). Final sample: 26 090 individuals;
- Income incorporates annual wages, capital income, and all public cash transfers. Focus on individual income;
- Circumstances: birth cohort, educational attainment of the parents (compulsory sc. (1-7), middle sc. (8-10), higher ed. (11 or more)), urbanity, family size (one if the individual has two or more siblings);
- 36 types and 100 tranches.
Income and opportunity inequality based on period-specific and permanent income

Fig 2. Permanent and period inequalities
Percentile-specific inequality based on permanent income
Main empirical results

- Snapshot income inequality always higher than permanent income inequality. A different pattern for opportunity inequality.

- Snapshots of inequality based on income early in the working lifespan provide a reasonable approximation of inequality in permanent income.

- Difference between ex-ante and ex-post EOp measures. Particularly in the latest 15 years of the participation of the labour market.

- Ex post inequality of opportunity is higher at the tails of the distribution.
Opportunity Growth Incidence Curve

Brunori, Palmisano, Peragine (2011)

- Growth Incidence Curve (Ravallion and Chen 2003):

\[ g(p) = \frac{y_{t+1}(p) - y_t(p)}{y_t(p)} \]

- Cumulated (NA) Opportunity GIC

\[ C_{gO}(j) = \sum_{i=1}^{j} q_i gO(i) \]

Relation with welfare dominance

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- Relation with welfare dominance

- *Pesquisa Nacional por Amostra de Domicílios (PNAD)*, from 2002 to 2008.
- **Income**: gross monthly per capita household income.
- **Circumstances**: region of birth (North, Northeast, Southeast, South, Center-west) and race (white/east Asians, black/mixed race, indigenous).

<table>
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<tr>
<th>rank</th>
<th>Race</th>
<th>Region of birth</th>
<th>mj</th>
<th>qj</th>
<th>sample size j</th>
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<td>0.0003</td>
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</table>

*Table 3: Types average income year 2002 in 2008 real. Source: Authors’ calculation from PNAD*
Growth Incidence Curve: Brazil
Opportunity Growth Incidence Curve: Brazil

Opportunity Growth Incidence Curve
Brazil 2002-05 Vs. 2005-08

Cumulated Weighted Opportunity Growth Incidence Curve

2002-2005  2005-2008