Intergenerational income mobility and the role of family background

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Main messages:

1. Mobility estimates do not reveal the full influence of family background. Thus they tend to underestimate the degree of inequality of opportunity in society.

2. Childhood interventions to promote social (or intergenerational) mobility take 40-45 years to evaluate in terms of mobility estimates. Other indicators are needed to follow up such interventions within a shorter period of time.

Roadmap

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1. Intergenerational income mobility estimates reveal quite much mobility and suggest substantial equality of opportunity.
2. Sibling correlations reveal a much stronger impact of factors that siblings share (family and neighborhood). A large gap between IG-estimates and sibling correlations.
3. Equality-of-opportunity estimates in John Roemer's spirit provide a multivariate approach to the role of family background. Some interesting results. But has not been able to fill the gap between IG-estimates and sibling correlations.

1. Intergenerational mobility

Prototypical model:

$$Y_i^{son} = \alpha + \beta Y_i^{father} + e_i$$

β: regr. coefficient or elasticity (IGE)

Correlation = IGC = $\beta\,(\sigma^{father}/\sigma^{son})$

Sometimes nonlinearities
Sometimes rank correlations
Sometimes transition matrices

Cross-national results

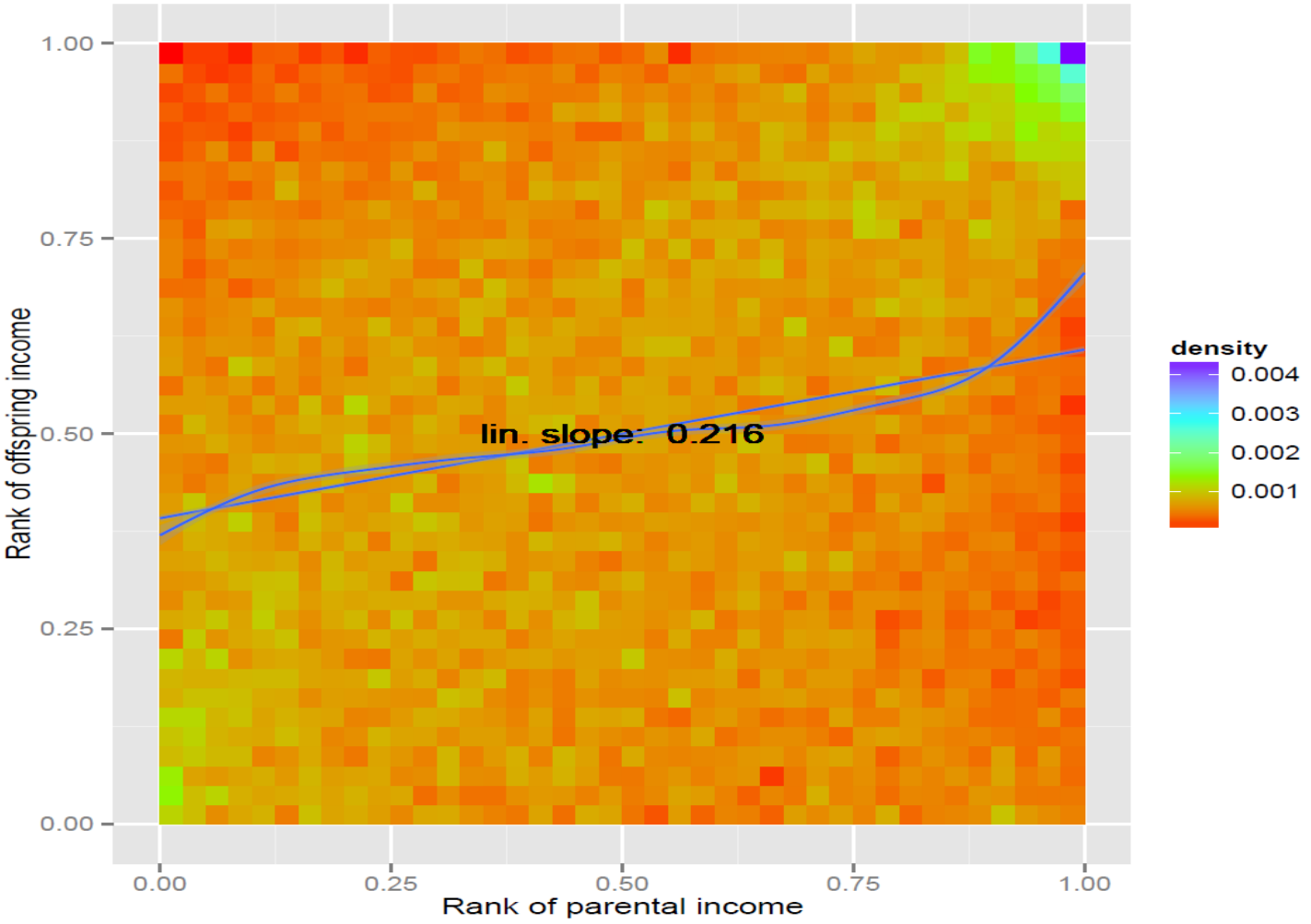
IGEs: 0.15-0.50 (e.g. Corak 2013)

Great Gatsby Curve: IGEs and conventional income inequality positively related across countries! Inequality of opportunity and inequality of outcomes positively related! But how robust is this curve?

IGCs: possibly less variation (according to Corak, Lindquist & Mazumder 2014) but there is less comparable information about IGCs.

Thus: R-squares (IGC^2) from 0.02-0.25.

Swedish illustration: 7-year averages for sons and parents, total income. IGE: 0.265 and IGC: 0.153



Some results, years of schooling (from Hertz, BEJEAP 2008)

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Country	Regression coefficient	Correlation
USA	.46	.46
Denmark	.49	.30
Finland	.48	.33
Norway	.40	.35
Sweden	.58	.40
Great Britain	.71	.30
The Netherlands	.58	.36
Belgium	.41	.40
Italy	.67	.40

Main results:

- Income associations are not that strong. Correlations from 0.15 to 0.5 imply R-squares of 0.02-0.25.
  - Scatter plots also reveal a lot of mobility. Except possibly in the very top, when capital income is included.

- Education associations are only slightly stronger.

2. The sibling correlation

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$y_{ij} = a_i + b_{ij}$

a_i common to all siblings in family *i*

b_{ij} unique to individual *j* in family *i*

a_i and b_{ij} orthogonal by construction. Thus:

$$\sigma_y^2 = \sigma_a^2 + \sigma_b^2$$

The family share of the outcome variance is:

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}$$

ρ is also the sibling correlation

A sibling correlation captures more than an intergenerational correlation (IGC)

Sibling correlation = $(IGC)^2$ + other shared factors that are uncorrelated with parental *y*

An omnibus measure! Captures both observed and unobserved family background (and neighborhood) factors

Yet it is a lower bound, because all family background factors are not shared by siblings

Some estimates of brother correlations in long-run earnings

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Country	Estimate	Study
USA	.49	Mazumder (2008)
Denmark	.23	Björklund et al. (2002)
Finland	.26	Björklund et al. (2002)
Norway	.14	Björklund et al. (2002)
Sweden	.25	Björklund et al. (2002)
Sweden	.32	Björklund, Jäntti & Lindquist (2009)
Germany	.43	Schnitzlein (2013)

Some estimates of sibling correlations in years of schooling

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Country	Sibling type	Estimate	Study
USA	Mixed sexes	.60	Mazumder (2008)
Norway	Mixed sexes	.41	Björklund & Salvanes (2010)
Sweden	Brothers	.43	Björklund & Jäntti (2012)
Sweden	Sisters	.40	Björklund & Jäntti (2012)
Germany	Brothers	.66	Schnitzlein (2013)
Germany	Sisters	.55	Schnitzlein (2013)

How much do IG-mobility estimates ”explain” (account for)? How large is the gap?

Use:

Sibling correlation = $(IGC)^2$ + other shared factors that are uncorrelated with parental *y*

Swedish estimates:

Sibling correlations vs. intergenerational correlations, Sweden

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Outcome	Sibling correlation	$(IGC)^2=R^2$	Other factors
Brothers			
Earnings	.24	.02	.22
Schooling	.46	.15	.31
Sisters			
Schooling	.40	.11	.29

These quite high numbers are only lower bounds. What is missing?

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1. Full siblings have only about half of (initial) genes in common. But each individual has 100% of her (initial) genes from her parents.

2. Not all environmental experience and ”shocks” are shared, only some. Thus some environmental stuff is missing.

3. Differential treatment by parents. Will not be captured if it creates differences, but is part of family background.

Raising the lower bound: MZ-twins?

1. They share all (initial) genes (GOOD)

2. They share more environment and more ”shocks” (GOOD)

3. They might interact more and affect each other in ways that have no counterpart in the general population (BAD)

Because of (3), an MZ-correlation might be an upper bound of family background

Sibling correlations for MZ-twins vs. full siblings: Swedish results

Outcome	Sibling type	Full sibling	MZ-twins
Earnings	Brothers	.22	.73
Schooling	Brothers	.44	.75
Schooling	Sisters	.40	.73

Raising the lower bound: differential treatment

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Birth order is one candidate: see below

Summing up about sibling correlations:

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1. Sibling correlations reveal a large role for something in the family (or the neighborhood). Unobserved factors, not captured by IGM-estimates, must be quite important.

2. Candidate unobserved factors:
   a. Parental skills, uncorrelated with parental income
   b. Sibling interaction effects
   c. Genes

3. And yet sibling correlations are lower bounds. MZ-twin-correlations are possibly upper bounds, but not necessarily so. They suggest a very big role for family background

3. Equality of opportunity approach

A very stylized version:

$Y_i = \alpha C_i + \beta E_i + \varepsilon_i$

$E_i = \delta C_i + \nu_i$

C: set of circumstances: factors beyond individual control, for which individuals should not be held responsible (such as parental resources)

E: set of effort variables: all choices for which society holds the individual accountable (such as labor supply). ”Justifiable” inequality.

Reduced form: $Y_i = (\alpha + \beta\delta) C_i + \beta\nu_i + \varepsilon_i$

EO-approach: implementation

- Estimate the reduced form above
- Measure:
  - Derive the inequality (according to a suitable measure of inequality) that is generated by circumstances. Compare this inequality with total inequality.: *Ineq*(due to circ.)/*Ineq*(total).
  - Or the fraction of variance which is explained by circumstances: R^2
- Claim in the field:
  - lower bound of such inequality since only a subset of circumstances are observed in available data
- Some empirical approaches consider the role of luck. Some try to measure effort and control for it in the outcome equation. Also other nice tricks.

Pros and cons of the EO-approach

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Pros

1. Recognizes that ineq. of opp. cannot be measured by one SES-indicator as the IGM-app. does
2. Can include multiple measures of SES (cf. Clark). ***Mothers too!***
3. Can include grandparents that belong to a general IGM-model
4. Can include factors not shared by siblings, e.g., birth order.
5. Can include assortative mating as interactions.
6. Flexible about the measure of inequality

Cons

1. Ideally requires a multivariate causal model. Otherwise must assume that the omitted-variables bias variables also capture circumstances.
2. Cannot account for unobserved family background variables as the sib-corr app. can
3. Requires rich data and large sample sizes

A Swedish illustration, men only

	Gini	GE(0)	GE(1)	CV2	R-sq
Overall inequality	0.258	0.156	0.166	1.280	
Model	**Circumstances' share of overall inequality**				
A. Linear income, log.	0.186			0.023	0.023
B. Linear income, level.	0.203	0.032	0.029	0.008	0.023
C. Linear+quadratic income, level	0.226	0.038	0.037	0.010	0.026
D. C+Par occ+par educ	0.282	0.055	0.052	0.014	0.038
E. D+grand parents' education	0.283	0.055	0.053	0.014	0.038
F. E+birth order	0.283	0.055	0.053	0.014	0.038
G. F+ own IQ and Noncognitive skills at age 18.	0.418	0.114	0.108	0.029	0.080

The last result motivates my second point above

2. Childhood interventions to promote social (or intergenerational) mobility take 40-45 years to evaluate. Other indicators are needed to follow up such interventions within a shorter period of time.

How do the results compare to those from sibling correlations? Has the gap between IGM-estimates and the sib corr estimates been filled?

- In general clearly lower explanatory power than what sibling correlations predict (but the latter never reported).
- And yet sibling correlations are lower bounds of the importance of family background. Note the omitted genetic influence captured by MZ-twins: clearly a circumstance according to Roemer!
- But are <u>all</u> factors shared by siblings really circumstances in the normative sense?

Circumstance variables that have not been used

- School and teacher quality
- Health indicators from early childhood, including birth weight
- Explicit genetic information. Difficult though.

What we have learnt and need to learn more about:

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- Intergenerational income associations are not that strong. Suggest much room for individuals' opportunities
- Sibling correlations reveal a much larger role for family and neighborhood background. And yet it is a lower bound.
- There is a gap between IGM-estimates and the sibling correlations that we don't understand.
- The equality-of-opportunity approach addresses the underlying question in a good way. The approach can in principle fill the gap between sibling correlations and IGM-estimates and raise the lower bound. But empirical applications have (so far) failed to do so.
- Is this gap a source of inequality of opportunity?