Rich Dad, Smart Dad:

Decomposing the Intergenerational Transmission of Income

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Research Question

- Why is income correlated between fathers and sons?
- In particular…
- How much of the intergenerational income elasticity (IIE) can be attributed to the *causal* impact of fathers' income and how much can be attributed to the transmission of his human capital?

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How do we study these questions?

- 2-factor model consistent with Becker & Tomes (1979)
  1. Fathers invest $ in child quality
     - child quality ≈ child's $
  2. Fathers transfer human capital to their children
- We propose an IV method for bounding the structural parameters of this model

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Estimating the IIE

- Equation (1)

$$inc_{son} = \beta_0 + \beta_1 inc_{father} + \varepsilon_{son}$$

- Estimates of the IIE for the U.S. ≈ 0.4-0.6 (Solon 1992, Mazumder 2005)
- Estimates of the IIE for Sweden ≈ 0.25 (Björklund et al. 1997, 2003, forthcoming)

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The 2-factor model

- Equation (2)

$$inc_{father} = \gamma + HC_{father} + \eta_{father}$$

- Equation (3)

$$inc_{son} = \pi_0 + \pi_1 inc_{father} + \pi_2 HC_{father} + \nu_{son}$$

- Substituting (2) → (3) yields Equation (4)

$$inc_{son} = \pi_0 + \pi_1\gamma + (\pi_1 + \pi_2)HC_{father} + \pi_1\eta_{father} + \nu_{son}$$

The empirical approach

- Given this model, the OLS slope estimator for equation (1), converges to:

$$p\lim\left(\hat{\beta}_1^{OLS}\right) = \pi_1 + \pi_2 \frac{\text{var}\left(HC_{father}\right)}{\text{var}\left(HC_{father}\right) + \text{var}\left(\eta_{father}\right)}$$

- Suppose that there exists a correlate of paternal income Z_{father}

$$p\lim\left(\hat{\beta}_1^{IV}\right) = \pi_1 + \pi_2 \frac{\operatorname{cov}\left(HC_{father}, Z_{father}\right)}{\operatorname{cov}\left(HC_{father}, Z_{father}\right) + \operatorname{cov}\left(\eta_{father}, Z_{father}\right)}$$

- Different correlates identify a potentially different weighted combination of the structural parameters

The empirical approach: estimating <u>bounds</u> for π_1 and π_2 (method #1)

- Imagine a set of correlates of paternal income (instruments) that are correlated with luck and with human capital to varying degrees and satisfy the monotonicty condition that cov(HC, Z) and cov(η, Z) have the same sign
- The min IV estimate → upper bound for π_1
- The max IV estimate → lower bound for $\pi_1 + \pi_2$
- Max – min → lower bound for π_2

The empirical approach: estimating <u>bounds</u> for π_1 and π_2 (method #2)

- Imagine a set of variables that are correlated with human capital and **not** correlated with luck
- IV estimate identifies $\pi_1 + \pi_2$
- Recall that

$$p\lim\left(\hat{\beta}_1^{OLS}\right) = \pi_1 + \pi_2 \frac{\text{var}\left(HC_{father}\right)}{\text{var}\left(HC_{father}\right) + \text{var}\left(\eta_{father}\right)}$$

method #2…contd.

- With an estimate of var(HC)/[var(HC)+var(η)] we can recover π_1 and π_2
- Mincer R^2 yields a lower bound for this variance share
- With mincer R^2 + OLS estimate + IV estimate in hand we can recover a lower bound for π_2 and an upper bound for π_1

Data sources

- Sweden's multigenerational register → identifies fathers and their sons
- Tax register → pre-tax total factor income 1968 – 2005
- Census data; 1960, 65, 70, 75, 80, 85, 90
  - Employment status
  - Municipality of residence
  - Occupation
  - Education (for some older fathers)
- Education register

Measuring permanent income

- Fathers
  - Log average income age 30 – age 60
  - At least 10 non-missing observations

- Sons
  - Log average income age 30 – age 40
  - At least 10 non-missing observations

Our Instruments

- Human capital
  - Education; years of schooling or 7 categories
  - Occupation; initial occupation in 1970 or occupation 1970 - 1990
- Luck
  - Employment status; dichotomous variable indicating good or bad state
  - Employment residuals; employment status $\perp$ education and past income

Baseline estimate of father-son IIE

- Log average income
- IIE = 0.286 (0.010)

IV estimates

- Human capital
  - Years of education = 0.416 (0.020)
  - Education category = 0.414 (0.020)
  - Occupation 1970 = 0.400 (0.014)
  - Occupation 1970-90 = 0.335 (0.011)
- Luck
  - Father employment status = 0.205 (0.017)
  - Father employment residuals = 0.106 (0.065)

Decomposition: method #1

- OLS IIE = 0.286
- π_1 = 0.106
  - from employment residuals IV
- $\pi_1 + \pi_2$ = 0.414
  - education category IV
- $\boldsymbol{\pi_2}$ = 0.307
  - implied by model

Decomposition: method #1

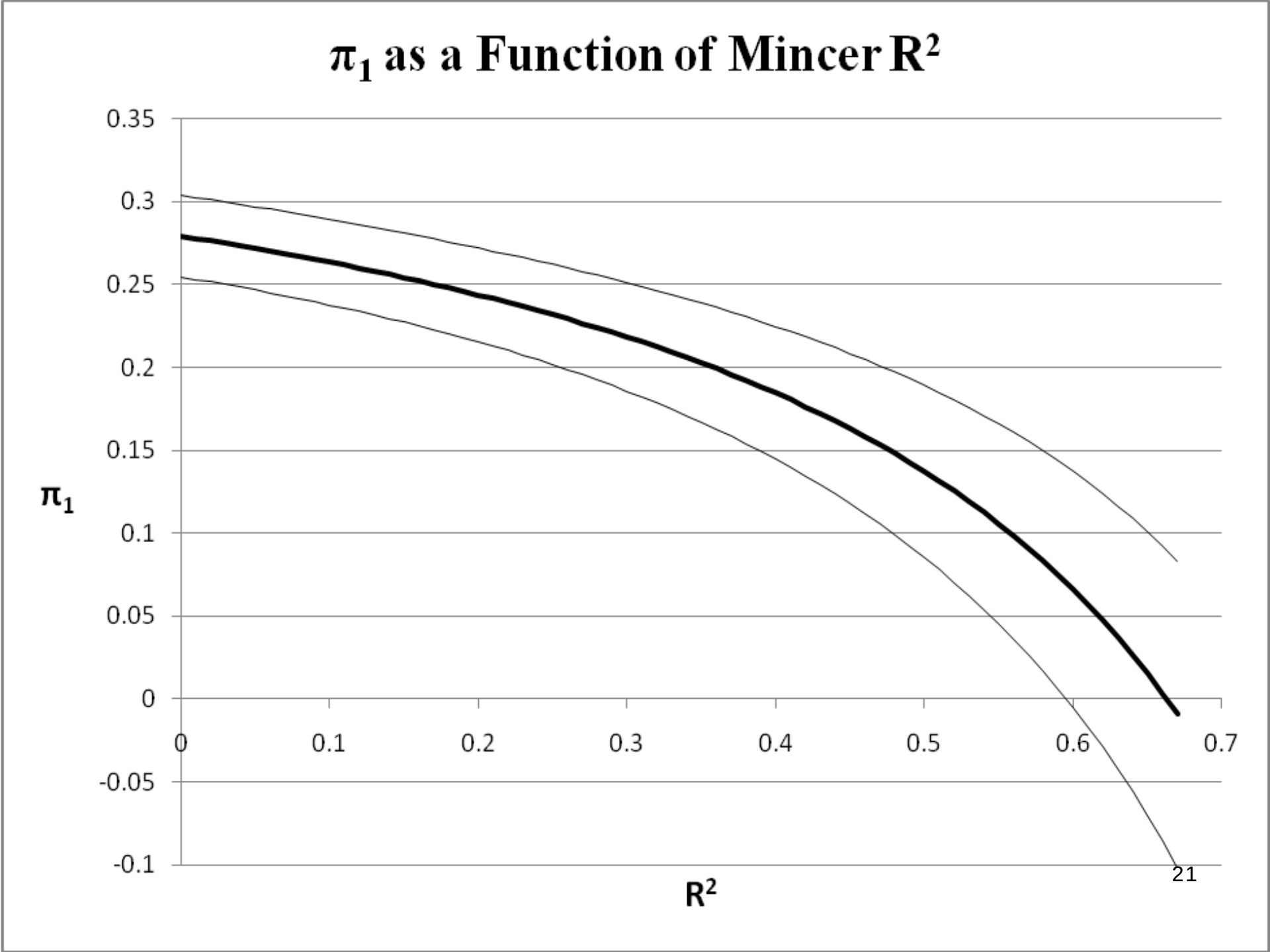
- At most 37% of the IIE reflects the *causal* effect of fathers' financial resources
  - Upper bound
- The remainder captures the impact of fathers' human capital

Decomposition: method #2

- OLS IIE = 0.286
- $\pi_1 + \pi_2 = 0.414$
  - education category IV
- Mincer $R^2 = 0.376$
  - estimated from sample
- $\pi_1 = 0.209$
  - implied by model
- $\pi_2 = 0.205$
  - implied by model

Decomposition: method #2

- At most 72% of the IIE reflects the *causal* effect of fathers' financial resources
  - Upper bound
- The remainder captures the impact of fathers' human capital


π1 as a Function of Mincer R2
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
π1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
R2

Robustness checks

- Alternative income measures
- Spatial correlations + regional price indices
- Non-linearities
- 3-factor model

Conclusion

- Summary of results
  1. Swedish IIE = 0.286
  2. At most, 37% is due to the *causal* impact of fathers' financial resources
  3. The remainder is due to the transmission of fathers' human capital
- Possible extensions
  1. Cross-country comparisons
  2. Extend to a 3-factor model; $, genetic HC, non-genetic HC
  3. …with and without assortative mating