Huggett, Ventura & Yaron (2007): “Sources of Lifetime Inequality”

Prof. Sargent’s Reading Group

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Question of the paper

Questions:

- To what degree is lifetime inequality due to differences across people established early in life as opposed to differences in luck experienced over the lifetime?
- Among initial conditions, which ones are the most important?

What to do with answers:

- Evaluate policies aimed at insuring people against risk

Problems with incomplete-markets view

Storesletten et al. (2004), e.g.: Use incomplete-markets models with exogenous risky income stream to study inequality. Problems:

- Importance of idiosyncratic earnings risk may be overestimated: There is evidence for differences in permanent earnings growth rates (learning ability!)
- Rise in U.S. within-cohort consumption dispersion is too low in data compared to predictions
- Since earnings are exogenous, the model is silent on sources of earnings inequality and policies affecting it.

Model

$$\max E\left[\sum_{j=1}^{J} \beta^j u(c_j)\right]$$

subject to

$$c_j + k_{j+1} = k_j(1+r) + e_j \qquad \text{(budget constraint)}$$

$$k_{J+1} \geq 0 \qquad \text{(borrowing constraint)}$$

$$e_j = I\{j \leq J_R\} R_t h_j L_j \qquad \text{(labor earnings)}$$

$$h_{j+1} = z_{j+1}\left[h_j + a(h_j l_j)^\alpha\right] \qquad \text{(human capital)}$$

$$L_j + l_j = 1 \qquad \text{(time budget)}$$

given $k_1(1+r)$, h_1, a

Notation and assumptions

- R_t: rental rate for labor at time t, grows deterministically at rate g
- J: Age of (certain) death
- J_R: retirement age
- $F_h > 0$, $F_l > 0$, $F_a > 0$
- z_j takes a finite number of states
- Distribution of z_j is age-independent

Properties of the model

- No aggregate uncertainty: Aggregate statistics over cohorts deterministic
- Sources of ex-ante inequality:
  - initial human capital h_1
  - initial wealth $(1+r)k_1$
  - learning ability a
- Two sources of growth in earnings dispersion:
  - Different learning ability a
  - Different shock histories z^j
  - “Nature of shocks to human-capital can be identified from wage-rate data [towards] the end of the working life.” (human-capital accumulation tends to zero)

Data

- PSID (1969-2005)
- Male household heads
- Ages 21-62

Measure the following:

- Mean earnings and earnings dispersion (Gini coefficient and variance in log wages)
- Estimate process for shocks to human capital from earnings process for old individuals: $\log z \sim N(\mu, \sigma^2)$. Get: $\sigma \sim 0.10$, $\mu \sim -0.08$.

Calibration (1)

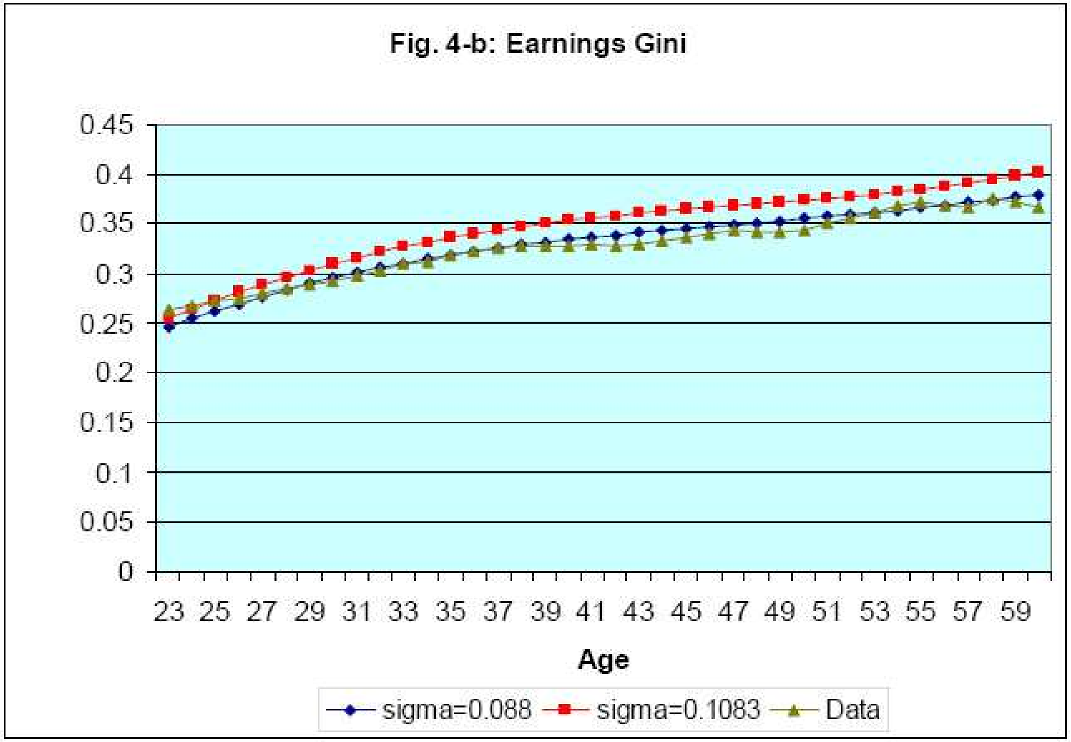
1. Fix some parameters (other studies):

- Shock to human capital: see before
- $J = 56$: Agents live from 20 to 75
- $J_R = 42$: Agents retire at 61
- $r = 0.042$, $\beta = (1 + r)^{-1}$
- CRRA: $\rho = 2$
- $g = 0.19$: growth of rental rate for human capital, chosen to match average male earnings growth in U.S.
- Human-capital production: $F(h, l, a) = h_{t+1} = h_t + a(h_t l_t)^{\alpha}$, where $\alpha = 0.7$.

Calibration (2)

2. Choose initial distribution of k_1, a and h_1 to get best match of model to

- age profile of mean earnings
- age profile of earnings dispersion

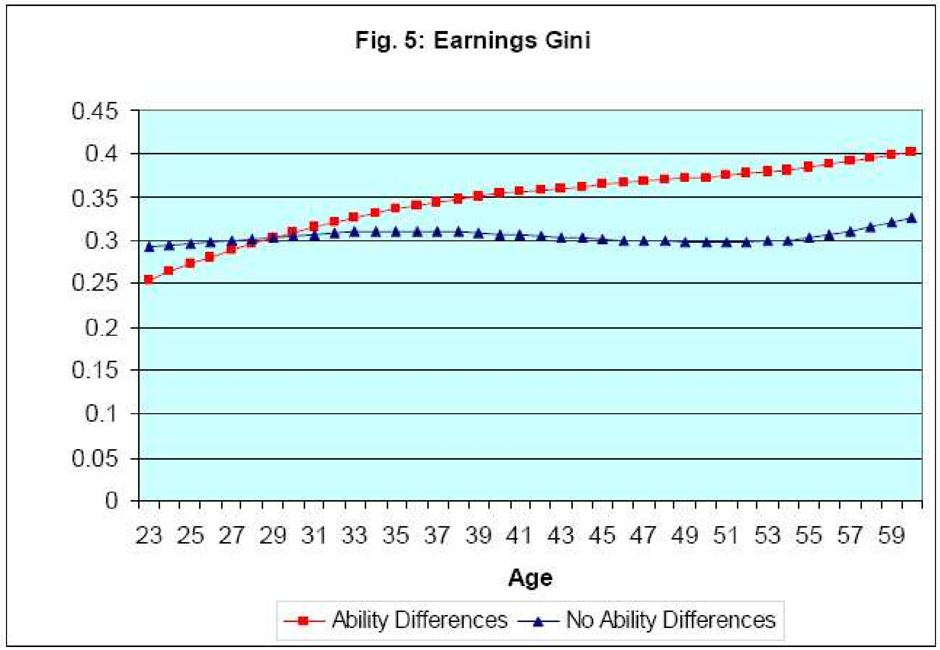


Some results

- Agents with higher learning ability have steeper age-earnings profiles
- At young ages, initial conditions are very important, but less so at higher ages.
- At age 20, variation in initial human capital is most important.

Counterfactual experiment 1

Eliminate differences in ability:



All agents accumulate the same human capital always under certainty. “Thus measures of earnings that respect the Lorenz order decrease for a cohort as the cohort ages”.

Counterfactual experiment 2

Eliminate shock to human capital:

- Human-capital accumulation becomes more attractive as opposed to capital (risk aversion!)
- U-shape: overtaking

Decomposition of inequality

Exploit orthogonality of residual:

$$W_t = E[W_t|h_0] + \epsilon$$

$$Var(W_t) = Var\big(E[W_t|h_0]\big) + Var(\epsilon)$$

Results: Roughly **60-70% of lifetime inequality** due to **initial conditions**; measures are

- Lifetime utility: $\sum_{j=1}^{J} \beta^{j-1} u(z^J, \cdot)$
- Lifetime wealth: $k_1(1+r) + \sum_{j=1}^{J} \beta^{j-1} e(z^J, \cdot)$

Comparing the different initial conditions

"Equivalent variation": Choose ev such that the following two quantities yield the same expected lifetime utility for an average agent:

- a one standard-deviation change in one of the initial conditions
- percentage change ev in consumption in each period in each state of the world

Results:

Human capital	h_1	$\sim$ 30%
Learning ability	a	$\sim$ 8%
Initial wealth	k_1	$\sim$ 3%

Potential criticism/further research

- Identification of shock variance to human capital: Do old agents really have the same sources of risk as young agents?
- Leisure vs. off-the-job learning: How would we recognize the two in the data?