Discussion on "Earnings Dynamics in Norway and Its Intergenerational Transmission" by Halvorsen, Ozkan, and Salgado

Youngmin Park

Bank of Canada

April 30, 2021

The views expressed in this presentation are the authors' and do not necessarily represent those of the Bank of Canada.

This Paper

- Explores intergenerational relationship in earnings using Norweigian administrative data
- Key contributions
  - how earnings *growth* is related across generations
  - *higher-order moments* of earnings growth
- Lots of new summary statistics are presented, but I'll focus on 5 facts
- What do they imply for the stochastic process of earnings?

Earnings Process for Two Generations

- Let $\varepsilon_{i,j,t}$ be log earnings "residual" for individual in family i, generation $j \in \{p, k\}$, and age t
- Consider an unobserved component model of $\varepsilon_{i,j,t}$:

$$\varepsilon_{i,j,t} = \underbrace{\psi_{i,j}}_{\text{initial skill}} + t \times \underbrace{\delta_{i,j}}_{\text{skill growth}} + \underbrace{\eta_{i,j,t}}_{\text{shock}}$$

  - skills can be intergenerationally correlated, while shocks are not: $\text{Cov}(\eta_{k,t}, \eta_{p,t'}) = 0$
  - Heterogeneous Income Profile (HIP) model of skill (e.g., Lillard & Weiss 1979, Guvenen 2007)
- First-differencing gives "earnings growth"

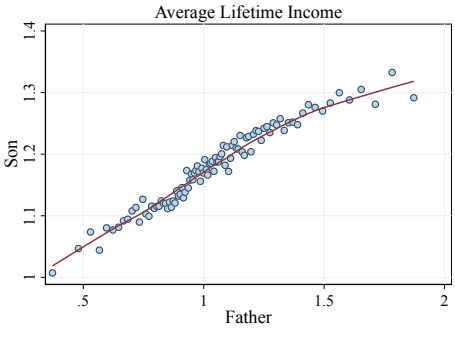
$$\Delta\varepsilon_{i,j,t} = \delta_{i,j} + \Delta\eta_{i,j,t}$$

- Averaging over T years yields "lifetime" measures

$$\bar{\varepsilon}_{i,j} := \frac{1}{T}\sum_{t=1}^{T} \varepsilon_{i,j,t} \approx \psi_{i,j} + \bar{t}\delta_{i,j}, \quad \text{where } \bar{t} := \frac{T(T+1)}{2}$$

$$\frac{\varepsilon_{i,j,T} - \varepsilon_{i,j,0}}{T} = \frac{1}{T}\sum_{t=1}^{T} \Delta\varepsilon_{i,j,t} = \delta_{i,j} + \frac{\eta_{i,j,T} - \eta_{i,j,0}}{T}$$

Fact 1: $\mathrm{Cov}(\bar{\varepsilon}_k, \bar{\varepsilon}_p) > 0$



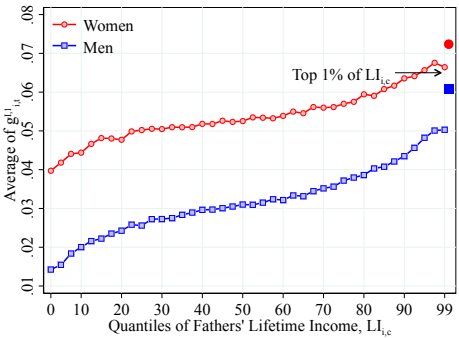
- Lifetime earnings are positively correlated across generations
  - well established in the intergenerational mobility literature (e.g., Solon 1999)
- According to the HIP model,

$$\begin{aligned}\mathrm{Cov}(\bar{\varepsilon}_k, \bar{\varepsilon}_p) = \mathrm{Cov}(\psi_k, \psi_p) + \bar{t}^2\,\mathrm{Cov}(\delta_k, \delta_p) \\ + \bar{t}\big[\,\mathrm{Cov}(\psi_k, \delta_p) + \mathrm{Cov}(\delta_k, \psi_p)\big]\end{aligned}$$

- Role of initial skill vs. skill growth?
  - not well understood in the literature
  - next few facts are helpful, but it would be interesting to see

$$\begin{aligned}\mathrm{Cov}(\bar{\varepsilon}_k, \bar{\varepsilon}_p) = \mathrm{Cov}(\varepsilon_{k,0}, \varepsilon_{p,0}) + \mathrm{Cov}(\bar{\varepsilon}_k - \varepsilon_{k,0}, \bar{\varepsilon}_p - \varepsilon_{p,0}) \\ + \mathrm{Cov}(\varepsilon_{k,0}, \bar{\varepsilon}_p - \varepsilon_{p,0}) + \mathrm{Cov}(\bar{\varepsilon}_k - \varepsilon_{k,0}, \varepsilon_{p,0})\end{aligned}$$

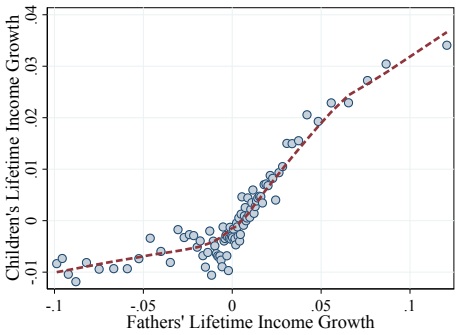
Fact 2: $\text{Cov}(\Delta\varepsilon_{k,t}, \overline{\varepsilon}_p) > 0$



- Parents' lifetime earnings are positively correlated with earnings *growth* of children
- Again, does this reflect the importance of initial skill or skill growth of parents?

$$\text{Cov}(\Delta\varepsilon_{k,t}, \overline{\varepsilon}_p) = \text{Cov}(\delta_k, \psi_p) + \overline{t}\,\text{Cov}(\delta_k, \delta_p)$$

Fact 3: $\text{Cov}(\varepsilon_{k,T} - \varepsilon_{k,0}, \varepsilon_{p,T} - \varepsilon_{p,0}) > 0$



- Lifetime earnings *growth* is positively correlated across generations

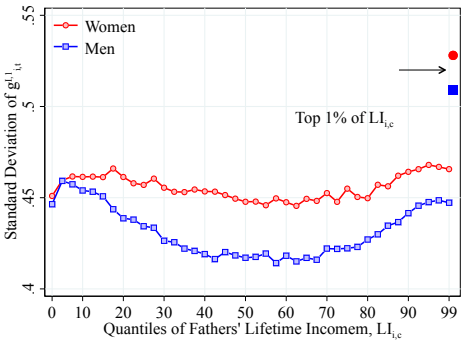
$$\text{Cov}(\varepsilon_{k,T} - \varepsilon_{k,0}, \varepsilon_{p,T} - \varepsilon_{p,0}) = T^2 \,\text{Cov}(\delta_k, \delta_p)$$

- Contrasts with Canadian evidence by Lochner & Park (2020)

$$\text{Cov}(\Delta\varepsilon_{k,t}, \Delta\varepsilon_{p,t'}) = 0, \quad \forall (t, t')$$

- What explains the difference?
  - Norway vs. Canada
  - variation in age range?
    - e.g., ages 41–60 for the oldest cohort and 20-39 for the youngest
    - may want to hold the age range fixed (e.g., 30 to 50) for everyone

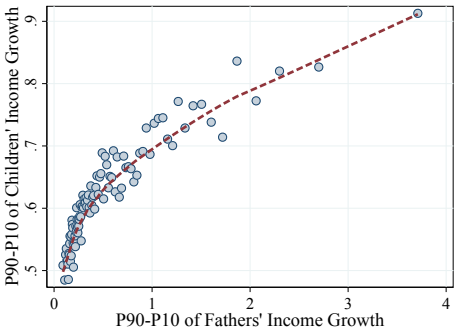
Fact 4: U-Shaped $\text{Var}(\Delta\varepsilon_{k,t}|\bar{\varepsilon}_p)$



- Children's earnings growth is more dispersed among those with low or high parental lifetime earnings
  - Little evidence on heteroskedasticity
- Difficult to think about it in terms of the earnings process
  - $\text{Var}(\Delta\varepsilon_{k,t}|\bar{\varepsilon}_p)$ does not depend on $\bar{\varepsilon}_p$ when jointly normal
- Driven by heterogeneity (δ_k) or volatility ($\Delta\eta_{k,t}$)?
- High level of $\text{Var}(\Delta\varepsilon_{k,t}|\bar{\varepsilon}_p)$ suggests that differences in earnings growth by parental earnings are not so important for overall earnings growth dispersion

$$\underbrace{\text{Var}(\Delta\varepsilon_{k,t})}_{\approx 0.23} = \underbrace{\text{E}\big[\,\text{Var}(\Delta\varepsilon_{k,t}|\bar{\varepsilon}_p)\big]}_{\approx 0.18} + \text{Var}(\text{E}[\Delta\varepsilon_{k,t}|\bar{\varepsilon}_p])$$

Fact 5: $\text{Cov}\left(\text{Var}(\Delta\varepsilon_{i,k,t}), \text{Var}(\Delta\varepsilon_{i,p,t})\right) > 0$



- *Individual-specific* dispersion of earnings growth is positively correlated across generations
  - evidence by Shore (2011) and Jäntti & Lindahl (2012)
  - individual-specific variance defined as

$$\text{Var}(\Delta\varepsilon_{i,j,t}) \coloneqq \frac{1}{T}\sum_{t=1}^{T}\left[\Delta\varepsilon_{i,j,t} - \left(\frac{\varepsilon_{i,j,T} - \varepsilon_{i,j,0}}{T}\right)\right]^2$$

- Could reflect intergenerational transmission of volatility
  - assuming $\eta_{i,j,t} = \sigma_{i,j}\xi_{i,j,t}$, where $\xi_{i,j,t}$ is iid across (i, t):

$$\text{Var}(\Delta\varepsilon_{i,j,t}) \approx \sigma_{i,j}^2 2\,\text{Var}(\xi_j)$$

  - so $\text{Cov}(\sigma_k^2, \sigma_p^2) > 0$ could drive Fact 5

- But skill growth transmission could also play a role
  - skill growth varies over the lifecycle (Lochner & Park 2020)

$$\Delta\varepsilon_{i,j,t} = \lambda_{j,t}\delta_{i,j} + \Delta\eta_{i,j,t}$$

$\Rightarrow$ $\text{Cov}(\delta_k^2, \delta_p^2)$ also matters for $\text{Cov}(\text{Var}(\Delta\varepsilon_{i,k,t}), \text{Var}(\Delta\varepsilon_{i,p,t}))$

Minor Comments

- Few details are provided in the paper
  - Who are included in the data? Tax filers?
  - How are parents linked to their children?
- It is not clear how the data issues have been addressed
  - inconsistent top codings, changes in income definitions
- Age range (20–60) seems too wide
  - differences in schooling and retirement could drive differences in lifetime earnings growth

Conclusion

- Many interesting facts!
- Some of the facts deepen our understanding of the earnings process for two generations
  - intergenerational transmission of skill growth
  - intergenerational transmission of earnings volatility
- Other facts are more difficult to understand & interpret
  - need a new way to think about them