

## Motivation

- Equality of Opportunity theory (EOp; Roemer, 1998):
    - Dichotomous distinction of characteristics into circumstances & effort
    - "Canonical moment" from which on indiv. responsible for choices
  - Empirics: mainly cross-sectional more recent cohort-based analysis
- ⇒ Resolving this distinction and abstracting from canonical moment
- ⇒ **Income opportunities available to individual across life-cycle**
- "Contingent" circumstances (i.e., contingent on past decisions/shocks)
  - Outcome of interest: future (life-time) income opportunities
- ⇒ How opportunities change across life-cycle? At what ages do opportunities narrow down? When do circumstances "hit"?

## Related Literature

- Lifecycle income: lifecycle bias of using current as proxy for lifetime income; heterogeneous profiles & income mobility (Haider and Solon, 2006; Blundell et al., 2015)
- Intergenerational mobility: confirm sizeable bias due to heterogeneity in profiles by parental background (Mello et al., 2022; Nybom and Stuhler, 2016; Björklund and Jäntti, 2020)
- Inequality of Opportunity:
  - permanent vs. period-specific (Aaberge et al., 2011)
  - aggregation of opportunity gaps (Moramarco et al., 2020)

## Conceptual Framework

- Panel of finite population  $i \in \{1, \dots, N\}$ , observed across lifecycle  $t \in \{0, \dots, L\}$
- At  $t$ , each  $i$  is characterized by outcome  $y_t^i$ , characteristics  $X_{t-1}^i$
- Individual's lifetime outcome (e.g., income) is given by

$$Y_L^i = G(y_0^i, \dots, y_L^i)$$

where function  $G$  aggregates individual's outcomes across life-cycle

- At  $t \in [0, L - 1]$ , individual's lifetime outcome is described by a distribution of potential lifetime outcomes, i.e., future distribution of lifetime outcome is given by the CDF function

$$\hat{Y}_t^i(z) = \text{Prob}(Y_L^j \leq z | X_{t-1}^j = X_{t-1}^i)$$

where  $X_{t-1}^i$  are the attributes partitioning the population into types

- ⇒ Partition gets finer over time if types sharing same  $X_{t-1}^i$  in  $t$  split into different subtypes in later periods
- ⇒ Given such partition of population into types, the full population can, at time  $t$ , be characterized by type-specific CDFs

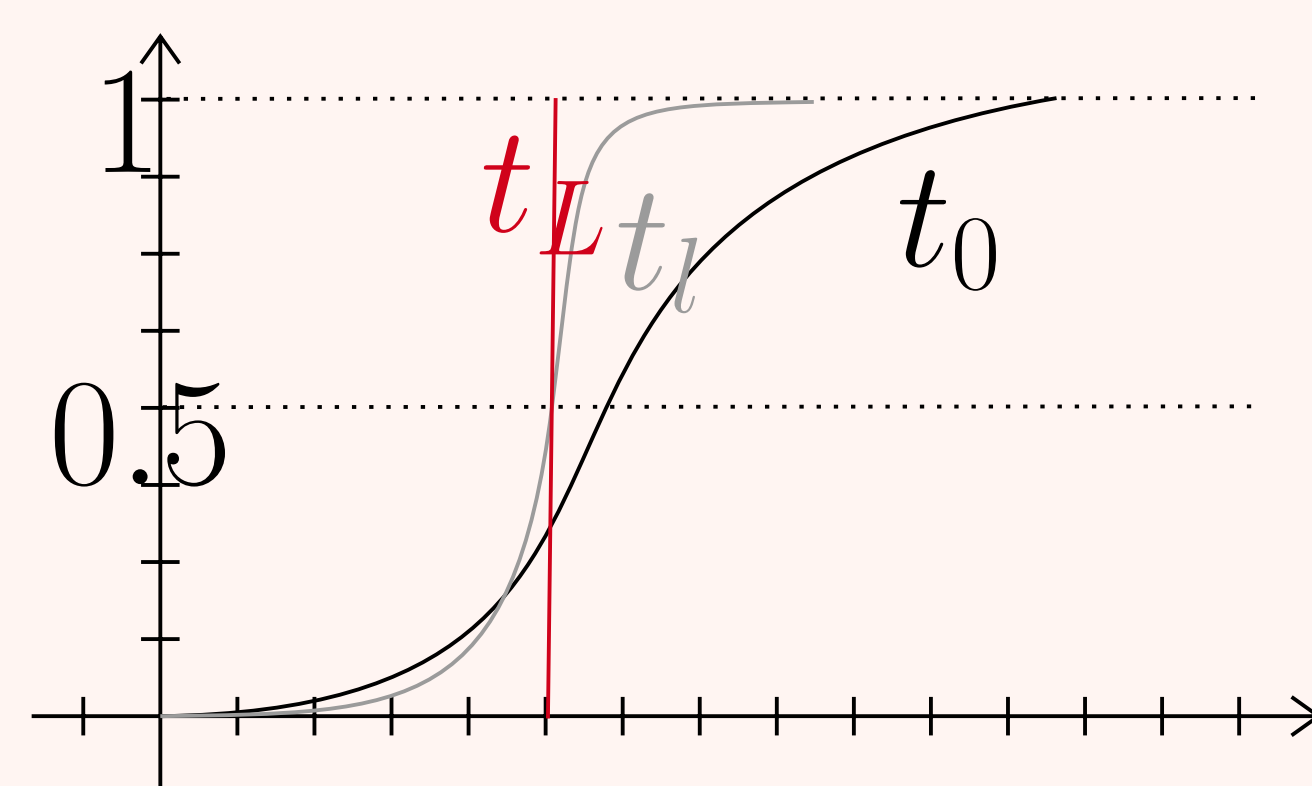


Figure 1. CDF of  $Y_L$  across lifecycle

- Evolution across lifecycle of CDF of  $Y_L$  can reveal at what stages of life the individual's fate is determined
- CDF of potential LT income = income opportunities attainable by the individual of a given type at a given  $t$

## Empirical Description of the Income Process

- Prediction of heterogeneous lifecycle income profiles (Blundell et al., 2015; Mello et al., 2022)
    - permanent vs. transitory components
- ⇒ interactions with parental background (Jäntti and Lindahl, 2012)

$$y_{i,a}^c = \alpha_i^c + \beta^c A_{i,a}^c + \gamma^c A_{i,a}^c Z_i^c + \delta^c A_{i,a}^c P_i^c + u_{i,a}^c \quad \text{with} \quad u_{i,a}^c = \underbrace{v_{i,a}^c}_{\text{permanent AR}(1)} + \underbrace{\tau_{i,a}^c}_{\text{transitory MA}(1)}$$

$A_{i,a}^c$  age, age<sup>2</sup>;  $Z_i^c$  indiv. factors;  $P_i^c$  parental factors

## Challenge: Inequality Assessment

- From start of life  $t_0$  to completion of lifecycle  $t_L$ , type-specific  $Y_L$  distribution becomes successively more compressed as we are moving from **ex-ante** to **ex-post** outcomes.
- ⇒ Intermediate steps  $t_i$  enable **ex-interim** assessment across types:
- Between-type inequality via **population-weighted distances** btw type-specific pairs of outcome distributions (Bhattacharyya distance) and aggregating these pairwise distances to summary measure
  - Distinguish how **mean** (E) and **variance** (V) of distributions evolve over time by types, e.g. among different types with identical LT outcome ⇒ usage of Markowitz expected utility approximation ( $EU \cong U(E) + .5U''(E)V$ )
  - Aggregation of **income risks** (Coefficient of variation, Arellano et al. (2022)) across future lifecycle in the spirit of opportunity gaps (Fleurbaey and Schokkaert, 2009; Moramarco et al., 2020)
  - Expected present discounted value** of LT income (Eshaghnia et al., 2022) = mean outcome of a given type
- Aggregation of (expected) future income flow relies on prediction of those profiles for cohorts that have not fully completed their lifecycle
  - Relate measures to income process components

## Work Agenda

- Goal:** Describe development of opportunities across social groups
  - when type-specific lifetime outcome distributions start to compress
  - for which types such compression hits earlier
- Empirical implementation using Swedish Multi-generational register (Björklund and Jäntti, 2020)
- Derive proxys for more scarce data sources to be used in cross-country analysis
- Prediction exercise from older to younger cohorts

## References

- Aaberge, R., Mogstad, M., and Peragine, V. (2011). Measuring long-term inequality of opportunity. *Journal of Public Economics*, 95(3-4):193–204.
- Arellano, M., Bonhomme, S., De Vera, M., Hospido, L., and Wei, S. (2022). Income risk inequality: Evidence from Spanish administrative records. *Quantitative Economics*, 13(4):1747–1801.
- Björklund, A. and Jäntti, M. (2020). Intergenerational mobility, intergenerational effects, sibling correlations, and equality of opportunity: A comparison of four approaches. *Research in Social Stratification and Mobility*, 70:100455.
- Blundell, R., Graber, M., and Mogstad, M. (2015). Labor income dynamics and the insurance from taxes, transfers, and the family. *Journal of Public Economics*, 127:58–73.
- Eshaghnia, S., Heckman, J. J., Landersø, R., and Qureshi, R. (2022). Intergenerational Transmission of Family Influence. *NBER Working Paper Nr. 30412*.
- Fleurbaey, M. and Schokkaert, E. (2009). Unfair inequalities in health and health care. *Journal of Health Economics*, 28(1):73–90.
- Haider, S. and Solon, G. (2006). Life-Cycle Variation in the Association between Current and Lifetime Earnings. *American Economic Review*, 96(4):1308–1320.
- Jäntti, M. and Lindahl, L. (2012). On the variability of income within and across generations. *Economics Letters*, 117(1):165–167.
- Mello, U., Nybom, M., and Stuhler, J. (2022). A Lifecycle Estimator of Intergenerational Income Mobility. *IFAU Working Paper 2022:21*.
- Moramarco, D., Palmisano, F., and Peragine, V. (2020). Inter-temporal Inequality of Opportunity. *SSRN Electronic Journal*.
- Nybom, M. and Stuhler, J. (2016). Heterogeneous Income Profiles and Lifecycle Bias in Intergenerational Mobility Estimation. *Journal of Human Resources*, 51(1):239–268.
- Roemer, J. E. (1998). *Theories of Distributive Justice*. Harvard University Press, Boston, MA.