Lifetime Income Inequality: quantile treatment effect of retirement on the distribution of lifetime income.

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September 29, 2023
Life cycle, social security and inequality

- **Human Capital Earnings Function (HCEF)**
  - Fanning out of earnings profiles across education groups as the cohort ages.

- **Permanent Income Hypothesis (PIH)**
  - Within cohort inequality evolves over life-cycle, reaching the highest levels in the old age.
  - Disparities in earnings between groups with different schooling levels grow in retirement age.
  - Reducing the share of income that is transferred through Social Security Systems increases life cycle inequality.

- **Social Welfare Theory (SW)**
  - By Pigou-Dalton Principal of Transfers any (mean-preserving) progressive transfer decreases inequality.
Research questions

- What is the impact of staying longer in labor force on distribution of lifetime income?

- What is the impact of postponing retirement age on lifetime income inequality?
Survey of Health Aging and Retirement

- Multidisciplinary cross-country longitudinal survey that collects micro data on individuals aged 50+.


- This study covers 16 European countries: Austria, Germany, Sweden, The Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Finland, Luxembourg, Portugal, Malta and Cyprus.

- The sample is constrained to males who at the moment of the interview are retired.
Measure of lifetime income

\[ Y_i = \sum_{j=1}^{R_i} \omega_j W_{ij} + \sum_{R_i+1}^{110} s_{j+1} \omega_j P_{ij} \]

where:

- \( Y_i \) - total lifetime income
- \( W_{ij} \) - lifetime earnings from work at age \( j \)
- \( P_{ij} \) - lifetime retirement pension at age \( j \)
- \( R_i \) - retirement age
- \( s_{j+1} \) - probability of surviving to age \( j+1 \), predicted based on Lee-Carter model
- \( \omega_j \) - discount rate (2% to age 50)
Deriving lifetime earnings from SHARE

Earnings model:

\[ \ln w_{it} = \alpha_0 + \rho S_i + \beta_1 E_{it} + \beta_2 E_{it}^2 + \beta_3 E_{it}^3 + \beta_4 E_{it}^4 + \varepsilon_{it} \]

where:

- \( \ln w_{it} \) - log of earnings
- \( S_i \) - years of schooling
- \( E_{it} \) - number of years of experience

Prediction equation:

\[ \widehat{\ln w_{i+1}} = \ln w_{it} + b_1 (E_{i+1} - E_{it}) + b_2 (E_{i+1}^2 - E_{it}^2) + b_3 (E_{i+1}^3 - E_{it}^3) + b_4 (E_{i+1}^4 - E_{it}^4) \]

Retransformation of predictions of earnings in logarithm to predictions in levels:

\[ Q^{(p)}(y|x) = \exp\{Q^{(p)}[\ln(y)|x]\} \]
Kernel density estimates

Distribution of Log of lifetime income

Austria

Germany (BRD)

Sweden

Netherlands

Spain

Italy

France

Denmark

Greece

Switzerland

Belgium

Luxembourg

Portugal

Cyprus

Finland

Malta

<table>
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<tr>
<th>Histogram</th>
<th>Kernel density</th>
<th>Median</th>
<th>q5 q95</th>
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Kernel density estimates by retirement age

Kernel density estimate

Austria

Germany (BRD)

Sweden

Netherlands

Spain

Italy

France

Denmark

Greece

Switzerland

Belgium

Luxembourg

Portugal

Cyprus

Finland

Malta

Life time income

63+ 62- q5 q95 q95 q5 q95

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Model specification

Specification of the model in a cross-country setting:

\[ Y_i = \alpha_0 + \alpha_1 R_i + \beta^\top X + \varepsilon_i \]
\[ Q_\tau(Y_i) = \alpha_{0\tau} + \alpha_{1\tau} R_i + \beta_{\tau}^\top X \]

where:
- \( Y_i \) - personal lifetime income
- \( R_i \) - binary indicator taking value 1 if an individual retired exactly at age 63 or later, and 0 if an individual retired by age 62
- \( X \) - set of country and cohort dummies and education.
Estimation and identification

- Issues: Endogeneity

- Identification: Quantile Instrumental Variables techniques
  - Abadie, Angrist & Imbens (2002)
  - Chernozukov & Hansen (2005)

- Instruments: legislated early and normal retirement ages differenced with age:

\[
Z = \begin{cases} 
1, & \text{if } A_i - leg_{ER} \geq 3 \\
0, & \text{if } A_i - leg_{ER} < 3 
\end{cases}
\]

where:
- \(A_i\) is the actual age of an individual in the year of the interview,
- \(leg_{ER}\) is the earliest legal retirement age that an individual is eligible for.
Ordinary Least Squares Estimates vs. Ordinary Quantile Regression

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Quantile Regression vs. Quantile Treatment Effect (AAI)
Quantile Treatment Effect by the two estimators QTE-AAI and QIV-ChH
Conclusions

- Clearly heterogenous, redistributive effect of postponing retirement to later ages across the quantiles of lifetime income in the overall sample.
- Extending working lives spreads out inequality in lifetime resources.