

Pensions for Whom?

Redistribution of Public Pension With an Endogenous
Income-Longevity Gradient

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Presentation Agenda

The agenda is as follows:

- 1 Motivation
- 2 Literature review
- 3 Model setup and results

Motivation

The Welfare Reform of 2006 stipulates that Danes should expect to live 14.5 years in retirement

Expected lifetime, however, varies systematically with income:

- See e.g. Cairns et. al (2016) and Chetty et. al (2016)
- Causality, reverse causality, spuriousity

Combined, the positive gradient and the universal retirement age imply:

- A mitigation of the redistribution achieved by public pensions
- Maybe even redistribution from poor to rich?

Literature Review

Davies & Kuhn (1992) identify two effects of mortality-contingent claims:

- Incentive: Incentivize the pursuit of a longer life
- Postponement: The opportunity set of the young shrinks
- These effects matter only for the borrowing-constrained

Blackburn & Cipriani (1998), Chakraborty (2004), Fanti & Gori (2014):

- Endogenous survival probabilities in life-cycle models

Bommier et. al (2011) and Bishnu et. al (2019):

- Redistribution of public pension schemes
- Exogenous income and longevity differences

Academic Contribution

Introduce exogenous income heterogeneity but endogenous longevity to an otherwise standard OLG model with a PAYG pension system

Conduct a positive experiment to address two research questions:

- 1 How do the redistributive properties of public pension schemes depend on the income-longevity gradient?
- 2 How do such schemes affect private decisions and social welfare?

Heterogeneity implies an additional income effect:

- 1 Arises through redistribution and interacts with other effects
- 2 The only direct effect for those to whom policy is intramarginal

A Two-Period OLG Model

The objective of the atomistic consumer is to:

$$\max_{\{s^i \geq 0, v^i \geq 0\}} u(c_y^i) + \beta \cdot \pi(v^i) \cdot u(c_o^i) \text{ st.}$$

$$c_y^i = (1 - \tau)y^i + z - s^i - v^i$$

$$c_o^i = Rs^i + b$$

y^i : exogenous individual labor income

$s^i \geq 0$: endogenous and positive individual savings

$v^i \geq 0$: endogenous individual health investment

Basics of The Model

$\pi(v)$ is a function mapping from health investment to survival probs.

- $\pi'(v) > 0$, $\pi(0) \geq 0$, $\lim_{v \rightarrow \infty} \pi(v) \leq 1$
- The survival function need not be concave

Annuity markets are missing and unclaimed savings are redistributed as accidental bequests:

$$z = R \cdot \mathbb{E}[s(1 - \pi(v))]$$

A simple PAYG pension system:

$$b = \phi \cdot \bar{y}, \tau = \phi \cdot \bar{\pi}$$

PAYG may improve welfare by enforcing a pooling annuity contract

An Exploratory Calibration

Levels of utility matter. Therefore a non-standard utility function:

$$u(c) = \frac{(c+1)^{1-\sigma} - 1}{1-\sigma}, \quad u(0) = 0, \quad u'(0) = 1$$

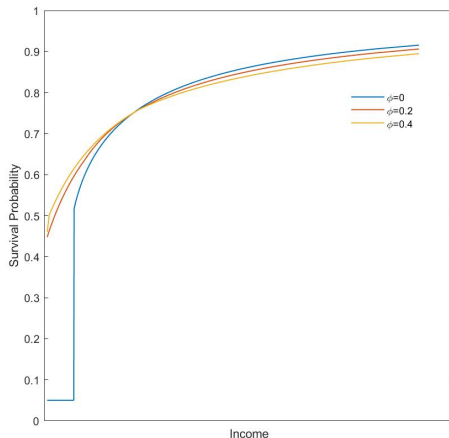
As in Chakraborty (2004), the survival function reads:

$$\pi(v) = \frac{\pi_0 + \pi_1 x v^\delta}{1 + x v^\delta}$$

Parameters are calibrated as:

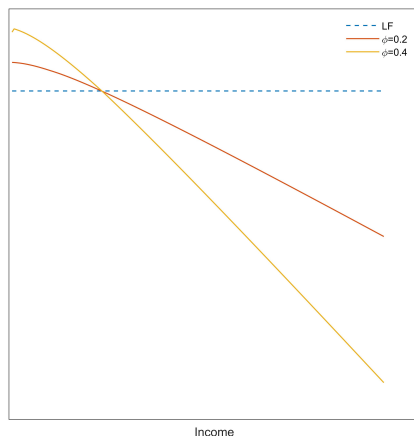
- $R = 1.35$, $\beta = 1$, $\sigma = 2$, $Y \sim B(2, 5)$, $\phi = \{0, 0.2, 0.4\}$
- $\pi_0 = 0.05$, $\pi_1 = 1$, $\delta = 1$
- $x = 7.09$ to ensure knife-edge dynamic efficiency; $R \cdot \bar{\pi} = 1$

Results - Survival Probabilities



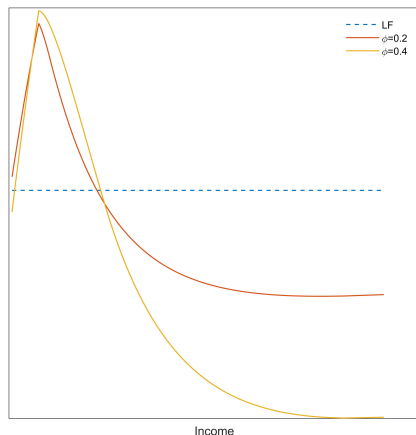
- A pension scheme distorts health investment and longevity
- The rich see a negative income effect and a decrease in longevity
- For the poor and borrowing-constrained there are competing effects

Results - Expected Net Transfer



- The poor have positive pecuniary interactions under both schemes
- The sum of interactions is negative; this is the price of insurance

Results - Expected Utility



- Small system helps the poor, larger system helps the moderately poor
- Large distortions of first-period choices for the very poor

Extensions

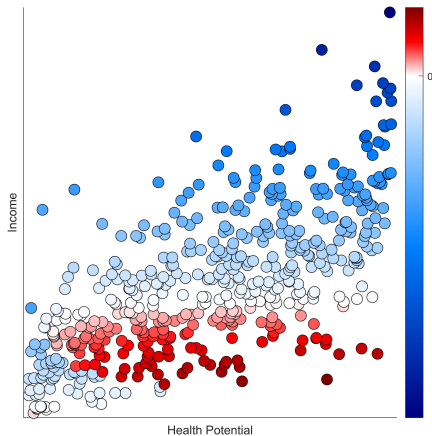
What mechanisms would amplify the mitigation of redistribution?

- Introduce threshold effects in health investment, $\delta = 3$
- Introduce confounded income and longevity:

$$\pi(v, x) = \frac{\pi_0 + \pi_1 x^i v^\delta}{1 + x^i v^\delta}, \quad x^i \sim x \cdot U(0, 1), \quad \text{corr}(y^i, x^i) = \rho_{yx}$$

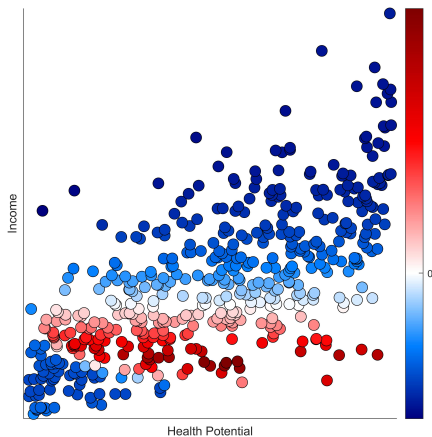
- Requires re-calibration to knife-edge dynamic efficiency
- For $\rho_{x,y} = 0.7$, this requires $x = 66.97$

Extended Model Results - Net Interaction



- Now the poor and the rich suffer, while the lower-middle class benefits

Extended Model Results - Expected Utility Change



- Even more of the poor and unhealthy suffer

Conclusion

- When there is an endogenous income-longevity gradient, the redistributive properties of public pensions are mitigated
- Mitigation is strengthened by distortions of saving and health investment for the poor
- Mitigation is especially pronounced when there are threshold effects and/or income and health are confounded