On a national retirement savings scheme with annuitisation and cross-subsidies: a two-tiered economic model

Benjamin Avanzi\textsuperscript{1} and Sachi Purcal\textsuperscript{1}

\textsuperscript{1}University of New South Wales
Actuarial Studies, Australian School of Business
b.avanzi@unsw.edu.au, s.purcal@unsw.edu.au

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Plan

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Introduction

Annuity puzzle

- economic theory suggests that annuitisation is optimal (Yaari, 1965)
- surprisingly small demand for voluntary lifetime annuities throughout the world (Purcal and Piggott, 2008)
- the U.K. is a big annuities market, but they are mandatory
- most of the "annuity" savings of the U.S. are withdrawn as lump sums
Switzerland

Switzerland is a remarkable exception:

- **Substantial savings**
  - $> \text{annual GDP—more than CHF 600 bio in 2007}$
    - (Gerber and Weber, 2007; OFAS, 2009)
  - tax exonerated, guaranteed (strictly nondecreasing)
  - market risk not transferred to individuals

- **More than half of the Swiss choose to annuitise**
  - $\approx \frac{3}{4}$ annuitise all or part of their capital (Bütler, 2003)
  - 2003: 78% retirees’ income came from annuities (OFS, 2009)

What is the structure of this model?
Setting

Macroeconomic landscape

- organised system of retirement savings
- agents:
  - may contribute during $n$ years of their life
  - have salary $w_k$ in year $k$, $1 \leq k \leq n$
  - proportion $\alpha_k$ of the active population in year $k$, $\sum_{k=1}^{n} \alpha_k = 1$
- market rate is $r^*$ (a constant)

Retirement savings

- we model retirement savings at the macroeconomic level
- government creates an organised system with two components
Two retirement savings components

Mandated component

- contributions rates $\beta_k$ on $w_k$
- interest rate on savings is $r$
- at retirement, capital is converted into an annuity with $\xi$
- $\Delta$ is the excess over the actuarially fair conversion rate
- since $\Delta > 0$, everyone behaves rationally and annuitise (see also Bütler and Teppa (2007) and Avanzi (2009))
- aggregated savings are

$$M = \sum_{k=1}^{n} \alpha_k \sum_{l=1}^{k} \beta_l w_l (1 + r)^{k-l}$$

- $\beta_k$, $r$ and $\xi$ are chosen by the government
Two retirement savings components

Non-mandated component

- contribution rate $\gamma$ on $w_k$
- interest rate on savings is $r'$
- aggregated savings are

$$NM = \sum_{k=1}^{n} \alpha_k \sum_{l=1}^{k} \gamma w_l (1 + r')^{k-l}$$

- $\gamma$ and $r'$ are endogenous and inter-related
We have a closed, autarkic system:

\[ r^* (M + NM) = rM + \Delta \rho M + r' NM, \]

where \( \rho M \) are the mandated savings that are converted into a lifetime annuity each year.

We get

\[
\begin{align*}
    r' &= r^* + \frac{1}{\gamma} (r^* - r - \rho \Delta) \cdot f(r') \\
    &= r^* + \frac{\pi}{\gamma} \cdot f(r') \\
    &= r^* + \frac{\pi M}{NM}, \quad \left( f(r') = \gamma \frac{M}{NM} \right)
\end{align*}
\]

where

\[ \pi = r^* - r - \rho \Delta < 0 \quad \Leftrightarrow \quad r' < r^*. \]
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Discussion

The level of retirement savings

The propensity to save in $NM$

- is modelled by $\gamma$
- is highly influenced by $\pi$

$\pi$ is controlled by the government

- $\pi > 0$ or $\pi = 0$ are not an option
- needs to be negative $\implies r$ and/or $\Delta$ must be high enough
- $r$ is a short term decision variable
- $\Delta$ and $\beta_k$ are long term decision variables
- the $\beta_k$ define who has mandated savings, and thus who profits from the internal transfers
- we have $d\gamma/d\pi > 0 \implies$ trade-off
Advantages of the model

▶ controlled by the government
  ▶ can be finely monitored by the government (*who* is subsidised and *at what level*)
  ▶ costs nothing and is completely outsourced!
▶ liquid market for annuities
  ▶ critical mass is reached with annuitisation of *M*
  ▶ interesting then for insurers to propose annuitisation of *NM*, as it further mitigates their risk
▶ security and stability
  ▶ accumulation and decumulation of *M* largely predictable
  ▶ guarantee on both *M* and *NM*: no need to worry about market alterations (as in today’s financial crisis)
▶ this is not a purely theoretical model, it is implemented and works in reality..!
References


