The Role of the Annuity’s Value on the Decision (Not) to Annuitize: Evidence from a Large Policy Change

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(joint with Stefan Staubli and Maria Grazia Zito)

September 2008
Motivation and Idea
Outline

1. Motivation and Idea
2. Data Description
Outline

1. Motivation and Idea
2. Data Description
3. Results
   - Empirical Strategy
   - Results
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1 Motivation and Idea

2 Data Description

3 Results
   - Empirical Strategy
   - Results

4 Conclusion
Economic Theory predicts that pension wealth should be annuitized to a large extent

- Insurance against financial consequences of longevity (Davidoff, Brown & Diamond, AER 2005)
- Large utility gains (Brown, JPubE 2001): A 65 year old with population average mortality would be willing to give up 1/3 of his wealth to gain access to actuarially fair annuity market.

(well, almost nobody, the Swiss still do ...)

This discrepancy is widely known as the Annuity Puzzle
Annuity provides insurance against longevity (Brown, JPubE 2001; Davidoff, Brown & Diamond, AER 2005), but only a small minority of individuals voluntarily purchase an annuity.

Potential reasons for this lack of annuitization (Brown, NBER WP, 2007):

- **Price** of an annuity may be too high due to administrative costs and/or information asymmetries.
- Desire to annuitize may be weakened by bequest motives (Leockwood, WP 2008) and precautionary savings to cover spending boosts.
- Intra-family risk sharing and income support programmes act as substitutes for the insurance implied by an annuity.
- Behavioural reasons such as framing (Brown, Kling, Mullainathan & Wrobel, NBER WP 2008), default options and peer effects.
Empirical Literature

- Little empirical evidence on annuitization decisions:
  - Variations due to mortality differences, marital status
  - Bütler & Teppa (JPubE 2007, administrative micro-data) *annuity price* and *company’s default option* most important determinants, indirect evidence of bequest motive.
    + Variations due to differences in plan details

- Main reason for limited evidence: lack of reliable data.
  - Very little voluntary annuitization.
  - Survey data lack detailed pension plan information.
  - High misreporting in survey data.
An Extraordinary Policy Change...

A sudden 20% price increase for some annuities in 2004...

- with hardly any change in economic conditions (interest rates, employment, etc).
- affecting the super-mandatory part of the employer-based 2nd pillar, or approximately 15 to 25% of total retirement wealth on average.

Question

Increase in price likely to decrease annuitization rates.
Main question: Price/value elasticity of annuitization
The Swiss pension system is based on 3 pillars

- **1st pillar**: mandatory pay-as-you-go system, provides an essentially flat-rate annuity income (for an uninterrupted contribution history, maximal annual benefits for singles and couples are 25’800 and 38’700 CHF for couples, respectively)

- **2nd pillar**: employer-based, fully funded occupational pension scheme, mandatory if yearly earnings > 25’000 CHF.

- **3rd pillar**: non-mandatory private pension scheme (preferential tax treatment up to a certain level)
The Swiss pension system is based on 3 pillars

- **1st pillar**: mandatory pay-as-you-go system, provides an essentially flat-rate annuity income (for an uninterrupted contribution history, maximal annual benefits for singles and couples are 25’800 and 38’700 CHF for couples, respectively)

- **2nd pillar**: employer-based, fully funded occupational pension scheme, mandatory if yearly earnings > 25’000 CHF.

- **3rd pillar**: non-mandatory private pension scheme (preferential tax treatment up to a certain level)

Focus of paper: 2nd pillar
The 2nd pillar in a nutshell:

- Fully Funded. Mandatory > 25’000 CHF. Replacement rate: 50 – 70% of labor income (including first pillar benefits)

- Insured salary:
  - Mandatory part: ≈25’000 CHF < salary < ≈75’000 CHF
  - Super-mandatory part: salary > ≈75’000 CHF

- At retirement: choice between annuity and lump-sum

- Mixed option possible: annuity paid from mandatory capital and lump sum from capital that is left.

- Annual pension \( B \) (in case of annuity): \( B = \gamma K \) (\( \gamma \)=conversion factor, \( K \)=accumulated capital stock)

- Crucial factor in the annuitization decision: \( \gamma \)
  - Before 2004: \( \gamma_{\text{mandatory}} = \gamma_{\text{super-mandatory}} = 7.2\% \)
  - After 2004: Some large insurance companies reduced \( \gamma_{\text{super-mandatory}} \) (not directly regulated!)

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The Decision (Not) to Annuitize

September 2008 9 / 26
January, 1, 2004 (announced mid 2003): Reduction of the conversion factor in the super-mandatory part from 7.2% to 5.835% for men and 5.454% for women

How much super-mandatory capital do I need to get a yearly annuity of 8’200 CHF (= pre-reform median)?

- before the policy change: 113’886 CHF
- after the policy change: 140’531 CHF

⇒ Big loss in net present value and consumption possibilities during retirement.

Conjecture

Reduction in conversion factor constitutes exogenous policy change ⇒ value of annuity ↓ ⇒ we should observe fewer annuity and more lump-sum choices after the policy change.
Our data

- Administrative data from several Swiss insurance companies.
  - All individuals who retire between 2001-2005 (≈ 10’000 individuals)
- Repeated cross-section data: observe each individual only once
- Concentrate on men...
  - For women: increase in statutory retirement age from 62 to 63 (2001) and from 63 to 64 (2005)
  - Women have much smaller capital stocks on average
- Capital stock ≤ 1’500’000 CHF (not very important)

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<tr>
<td></td>
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</table>
1 Motivation and Idea

2 Data Description

3 Results
   - Empirical Strategy
   - Results

4 Conclusion
Empirical Strategy

  - **Before-after comparison**: Mean comparisons before and after the policy change
  - **Parameterized model**: Calculate annuity equivalent wealth (AEW). Regress _lumpann_ (LS = 1) on AEW and other covariates.

- **Potential problems**...
  - Simultaneous changes in other factors relevant for the annuitization decision.
  - **Anticipation effects**: Individuals who wanted to retire after 2003 and take the annuity may have retired in 2003 to “escape” the policy change ⇒ comparing choices before and after the policy change leads do a bias of the effect even if potential anticipators are left out.

- **Solution**...
  - **Ad-hoc correction**: Upper/lower bounds for before-after comparison.
  - Use an appropriate proxy for the probability to anticipate retirement.
Options chosen across years

The Decision (Not) to Annuitize

September 2008 14 / 26
Who anticipates retirement?

CASE I: Annuity before / Lump Sum after

value

policy change

anticipation

time
Who anticipates retirement?

CASE II: Annuity before and after

value

policy change

time

anticipation
Who anticipates retirement?

CASE III: Lump Sum before and after

value

policy change

no anticipation

time
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1 Motivation and Idea

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Ad-hoc correction for anticipation effects

<table>
<thead>
<tr>
<th>potential anticipators</th>
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<th>retire in dec 2003</th>
<th>retire in nov/dec 2003</th>
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<td>shifted to age 65 lump-sum</td>
<td>shifted to year 2004 lump-sum</td>
<td>shifted to age 65 lump-sum</td>
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<td>241</td>
<td>241</td>
<td>303</td>
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<td>No. shifted 2003 → 2004</td>
<td>0</td>
<td>92</td>
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<td>115</td>
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<tr>
<td>No. shifted 2003 → 2005</td>
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<td>53</td>
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<th>(A3)</th>
<th>(A4)</th>
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<td>LU2004 − LU2003</td>
<td>0.119*** (0.019)</td>
<td>0.091*** (0.018)</td>
<td>0.034* (0.018)</td>
<td>0.113*** (0.018)</td>
<td>-0.023 (0.018)</td>
<td>0.069*** (0.018)</td>
<td>0.011 (0.018)</td>
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<td>LU2004 − LU2002</td>
<td>0.099*** (0.025)</td>
<td>0.120*** (0.024)</td>
<td>0.059** (0.025)</td>
<td>0.140*** (0.024)</td>
<td>-0.011 (0.025)</td>
<td>0.125*** (0.024)</td>
<td>0.052** (0.025)</td>
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<tr>
<td>LU2003 − LU2002</td>
<td>-0.037 (0.024)</td>
<td>0.018 (0.025)</td>
<td>0.018 (0.025)</td>
<td>0.018 (0.025)</td>
<td>0.018 (0.025)</td>
<td>0.059** (0.024)</td>
<td>0.059** (0.024)</td>
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<tr>
<td>LU2005 − LU2004</td>
<td>-0.020 (0.043)</td>
<td>0.045 (0.035)</td>
<td>-0.162*** (0.036)</td>
<td>-0.020 (0.042)</td>
<td>-0.027 (0.045)</td>
<td>0.054 (0.033)</td>
<td>-0.183*** (0.035)</td>
</tr>
</tbody>
</table>

Table: Potential anticipaters: annuitants with capital in the super-mandatory part retiring early in December (and November) 2003.

Lower bound: anticipaters annuitize after the policy change.

Upper bound: anticipaters take lump sum after the change.

Additional controls: retirement capital and its square, summary measure for interest rates, retirement age dummies.

Significance levels: *** = 1%, ** = 5%, * = 10%.

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The Decision (Not) to Annuitize
September 2008 19 / 26
### Before-after comparison, by wealth percentiles

<table>
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<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Sample: all men</td>
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<tr>
<td>$LU_i$, 0-25 perc.</td>
<td>0.072** (0.035)</td>
<td>0.041 (0.038)</td>
<td>-0.106** (0.041)</td>
<td>-0.031 (0.034)</td>
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<td>$LU_i$, 25-50 perc.</td>
<td>0.057 (0.036)</td>
<td>0.002 (0.039)</td>
<td>-0.053 (0.041)</td>
<td>-0.054 (0.037)</td>
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<tr>
<td>$LU_i$, 50-75 perc.</td>
<td>0.131*** (0.038)</td>
<td>0.046 (0.040)</td>
<td>-0.100** (0.042)</td>
<td>-0.085*** (0.038)</td>
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<tr>
<td>$LU_i$, 75-100 perc.</td>
<td>0.352*** (0.037)</td>
<td>0.212*** (0.041)</td>
<td>-0.086** (0.042)</td>
<td>-0.140*** (0.037)</td>
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<tr>
<td>min</td>
<td>5,603</td>
<td>5,663</td>
<td>0</td>
<td>0</td>
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<tr>
<td>25th</td>
<td>29,013</td>
<td>31,631</td>
<td>8,896</td>
<td>11,514</td>
</tr>
<tr>
<td>50th</td>
<td>42,536</td>
<td>45,506</td>
<td>37,968</td>
<td>47,068</td>
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<td>75th</td>
<td>116,945</td>
<td>181,553</td>
<td>116,870</td>
<td>130,675</td>
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<td>max</td>
<td>1,224,305</td>
<td>1,278,186</td>
<td>1,282,853</td>
<td>1,172,339</td>
</tr>
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</table>

**Table:** Before-after comparisons by super-mandatory retirement capital for men aged 60 and above (no covariates). For 2002 and 2003, super-mandatory retirement capital has been imputed.  
Significance levels: *** = 1%, ** = 5%, * = 10%.
Strategy to deal with anticipation effects

- To avoid lower annuity, some people anticipate retirement to 2003.
- If we knew who anticipates we could simply estimate
  \[ LS = f(x, \text{treatment, anticipation}) \]

**Strategy:** Proxy to handle *unobserved* anticipation \( a \).

Proxy \( z \) has to satisfy **two conditions**:

1. \( z \) must be *redundant*, i.e., in a conditional sense \( z \) is irrelevant for explaining \( LS \), once anticipation \( a \) and other covariates \( x \) have been controlled for.
2. \( z \)'s relation to the anticipation \( a \) should be close enough so that once \( z \) is included in the estimation equation, the covariates \( x \) are not partially correlated with \( a \).

**Candidate:** **Cost of non-anticipation**

- Number of years for which higher annuity benefit can be obtained (0 for people turning 65 before the policy change).
- The cost is directly proportional to the size of the capital stock in the super-mandatory part: \( \Rightarrow \) interaction term proxy.
Proxy: Cost of Non-Anticipation

Proxy: Benefits of anticipating retirement

- **Cost**
- **Policy Change**
- **Time of Retirement at Statutory R.A.**
### Table: Linear probability estimates of the lump-sum / annuity decision.
Significance levels: *** = 1%, ** = 5%, * = 10%.
Parameterized model

- Calculate **Annuity Equivalent Wealth**, utility based annuity value measure:  
  \[ V_t(W_t) = \max_{C_t} \left[ \sum_{t=1}^{T-age+1} \frac{\prod_{j=1}^{t}(1-q_j)U(C_t)}{(1+\rho)^t} \right] \]

- crucial: budget constraint
  - world with annuities:  \( W_{t+1} = (W_t - C_t + S_t + A_t^{mand} + A_t^{sup})(1 + i_t) \),  
    \( W_0 = 0 \Rightarrow V^* \)
  - world without annuities:  \( W_{t+1} = (W_t - C_t + S_t)(1 + i_t) \),  
    \( W_0 = \text{accumulated wealth} \)

-  \( V(W_0 + \Delta W|\text{no annuities}) = V^* \Rightarrow \text{AEW} = \frac{W_0 + \Delta W}{W_0} \)

-  \( P(\text{lumpann} = 1) = \Phi(\alpha + \beta \text{AEW} + x\gamma) \),  
  \( x = \text{savings, savings}^2, \text{age, year dummies} \)
<table>
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<td>.076 (.020) ***</td>
<td>.077 (.020) ***</td>
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<td>- .060 (.029) **</td>
<td>- .062 (.029) *</td>
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<td>- .023 (.024)</td>
<td>- .024 (.024)</td>
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<tr>
<td>Y05</td>
<td>-.058 (.028) **</td>
<td>- .037 (.028)</td>
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<td>- .993 (.171) ***</td>
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<td>Post2003</td>
<td>.049 (.022) **</td>
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<tr>
<td>Y01</td>
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<td>- .056 (.029) *</td>
<td>- .057 (.029) **</td>
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<td>Y02</td>
<td>.040 (.022) *</td>
<td>- .020 (.024)</td>
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<td>Y05</td>
<td>-.071 (.028) **</td>
<td>- .051 (.028) *</td>
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<td>-.071 (.028) **</td>
<td>- .051 (.028) *</td>
<td>- .051 (.028) *</td>
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</table>

Table: AEW with coefficients of relative risk aversion of 0, 2, and 4.
Other covariates: capital and its square, the individual’s last wage and retirement age dummies.
Significance levels: *** = 1%, ** = 5%, * = 10%.
Conclusions

- Strong effects of policy change on cash-out behaviour
  Prices and interest rates can well explain the evolution of annuitization rates over time.

- Value-elasticity of annuity demand similar to previous studies (Brown, 2001; Bütler & Teppa, 2007), despite very different sources of exogenous variations.

- Effects driven mainly by richer individuals
  - Much more affected by policy change
  - Potentially more sophisticated decisions