Adverse Selection in Annuity Markets & the 1956 Finance Act

Edmund Cannon, David DeMeza and Ian Tonks
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Life Annuities

• Life annuity converts a pension pot lump sum (a stock of wealth paid to a life insurer in a single premium) into an income for life (pension)
• Annuity insures individual against out-living his or her wealth in the event of living longer than expected (longevity risk), by efficiently pooling population mortality risk
  – Yaari (1965)
• Until 2015 UK had voluntary and compulsory annuity markets
  – Compulsory annuitisation quid pro quo for tax efficient pension savings during accumulation phase of pension
• March 2014 budget relaxed compulsory annuitisation requirement on tax-privileged pension savings
Structure of UK Annuity Markets

• Largest in the world! Compulsory & voluntary markets
• Types of annuities:
  – Level (flat rate)
  – Joint (last survivor)
  – Real annuities or Escalating (3 or 5%)
    • annuity payments linked to inflation index (7% of market in 2013)
  – Guarantees (5 or 10 year annuity payments to estate)
  – Investment-linked (variable) annuities (invested in equities)
  – Impaired-life/enhanced
    • 28% of market in 2013
• Annuities provided by life insurance companies:
  – 14 providers with 3 main suppliers: Prudential, Aviva, L&G
  – Average size of fund annuitised: mean = £35K; median £20K
• Regulated by
  – Financial Conducts Authority &
  – Prudential Regulatory Authority
Annuity demand in the UK

Around 400,000 policies in 2012

Partial relaxation of Comp

Full relaxation of Comp
Issues facing annuity markets

- Partial abolition of compulsion in 2011
- Full abolition of compulsion from April 2015
  - Guidance guarantee/advice
    - Consumer transparency
    - Open-market option
- If annuities now voluntary, what will be effect on annuity demand?
  - “Annuities are attractive to many” HM Treasury, 2014, p. 2.18
  - “If sold well, annuities have the potential to be a good product and I expect them to continue to play a significant role.” Osborne, HMT, 2014, Intro.
  - Annuity puzzle
- Why are annuities unpopular with consumers?
  - Bequests
    - But people without children don’t like them either
  - Unfairly priced:
    - Selection effects
Does the annuity market exhibit adverse selection?

- Are annuitants people who have private information about their long life expectancy
  - Poterba (2001): active & passive selection

- Three tests for AS:
  1. PCP
  2. MW
  3. Pricing
1. Positive Correlation Property

- PCP is that high risk types buy more insurance
  - Rothschild & Stiglitz (1976)

- Annuity market is compulsory market, so everyone buys, but selection on type of product
  - Annuitants who buy real annuities live longer (lower mortality) than annuitants who buy level annuities (Finkelstein & Poterba, 2004; for one insurance company)
  - Annuitants who buy guaranteed annuities have higher mortality (Einav, Finkelstein & Schrimpfl, 2010; for one insurance company)
2. Money’s worth

- Pricing consequence of PCP
- AS leads to systematic differences in MWs for different products, since calculation of MW uses average mortalities, but insurance companies price by product type:
  \[ MW_{\text{Real}} < MW_{\text{Nominal}} \]
3. Pricing consequence
Predicted effect of price change on annuity demand (Abel, 1986)
1956 Finance Act

• Pre-1956 entire annuity payment treated as income and hence liable for income tax,
  – Although part of an annuity payment represents a rundown of capital
  – Special Deferred Annuities (SDAs)
• Millard Tucker committee reported in December 1953 on a variety of pension issues
  – recommended that only the interest element of annuity payment be taxed
• Implemented in 1956 Finance Act
  – Retrospective (applied to existing contracts)
• Natural experiment: what happened to mortality of annuitants after tax change?
  – Null of AS: were high mortality types sucked-in
Data

• Aggregate data from Institute of Actuaries
  – Continuous Mortality Investigation: Mortality of immediate Annuitants 1949-64
  – Collects data from all insurance companies
  – Anonymous

• Micro-data from one annuity provider
  – Anonymised individual policy-level data on type and quantity of annuity, price, date annuity payment terminated
Numbers of annuitants

New immediate Annuities
(in force at duration 0 on 1st Jan. each year 1949-65)
Females: Ratio of Post 1956 Annuitants' Mortality to Pre 1956 Annuitants' Mortality

Source: Authors’ calculations based on data from the Institute of Actuaries

Ratio <1 decline in mortality

Legend:
- 1971-74
- 1967-70
- 1963-66
- 1975-78

Age

41-60  61-65  66-70  71-75  76-80  81-85  86-90  91-95  96-
Results with Aggregate Data

• Finds that mortalities of both females and males falls after 1956
  – Reject null hypothesis of adverse selection
• However, problems with aggregate data:
  – 1956 tax change is not a pure price effect, since it will have a disproportionate effect on higher rate tax payers
    • But wealth is correlated with mortality
    • Perhaps wealthy have been “sucked-in” to annuity market post-1956, and hence average mortality is lower
  – Aggregate data includes annuities purchased by companies for individuals
    • Part of occupational pension plan
Policy-level data

<table>
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<th>Guarantee period, either explicit or in a split (years)</th>
<th>Pre 1956 Finance Act</th>
<th>Post 1956 Finance Act</th>
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<tr>
<td>Proportion with guarantee</td>
<td>1.6%</td>
<td>36.1%</td>
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Proportional Hazards Model (i)

The hazard is the mortality ($\approx$ one-year death probability) and depends upon age and other factors.

$$q_i(x_i) = q_0(x_i)f(\beta z_i)$$

$q_i$ is the mortality of individual $i$, which changes over time with age $x_i$.

$q_0(x_i)$ is a baseline mortality function determining the relationship between mortality and age.

$f(\beta z_i)$ is a function of a vector of individual $i$’s characteristics.
Proportional Hazards Model (ii)

Details of the model: choose $q_0(x)$ and $f(\beta z_i)$.

$q_0(x) = exp(\gamma x)$ ie Gompertz mortality model

$f(\beta z_i) = exp(\beta z_i)$
## Basic Regression

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<tr>
<th></th>
<th>(1) All</th>
<th>(2) Men</th>
<th>(3) Women</th>
<th>(4) Wives</th>
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Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
### Diff-in-diff

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**Coeficientes gamma**

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**Observations:**

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<td>469</td>
<td>463</td>
<td>373</td>
<td>90</td>
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\[ \mu_i = \beta_1 d_{56} + \beta_2 \text{Ann} + \beta_3 d_{56} \text{Ann} + \ldots \]

Annuitants pre-56 (\text{Ann}=1; d_{56}=0; \text{did}=0)
\[ \mu_i = \beta_2 = -0.236 \]

Pensioners pre-56 (\text{Ann}=0; d_{56}=0; \text{did}=0)
\[ \mu_i = 0 \]

Difference between Anns & Pens pre-56
\[ \beta_2 = -0.236 \]

Annuitants post-56 (\text{Ann}=1; d_{56}=1; \text{did}=1)
\[ \mu_i = \beta_1 + \beta_2 + \beta_3 = 0 \]

Pensioners post-56 (\text{Ann}=0; d_{56}=1; \text{did}=0)
\[ \mu_i = \beta_1 = 0.432 \]

Difference between Anns & Pens post-56
\[ \beta_2 + \beta_3 = -0.430 \]

\Delta \text{Annuitant Mortality} = \beta_1 + \beta_3 = 0.238
Results

- Annuitant mortality tends to be higher than pensioner mortality.
  - mildly consistent with adverse selection
- Effect is largest for married women, middling for men and smallest for single women.
  - Also mildly consistent with theory:
  - Single women have no risk pooling with spouse so have strongest gains from annuitisation: less selection
  - Married women get the least benefits because they can risk pool with spouse: more selection
  - “Men" includes both married and unmarried (we cannot distinguish) and so should be in the middle.
- Annuitant mortality tends to go up post-1956.
  - The price test.
  - But results are not statistically significant.
Regression with guarantees & age

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Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
Discussion

• Complicating factor is presence of SDAs (special deferred annuities or "splits") before 1956 as a means to avoid tax.
  – These are a nuisance, since if tax was avoided before 1956, the price change is made smaller.
  – But at another level, they are useful.

• Before 1956 very few annuities were sold with a guarantee (less than 2%): after 1956 the number of annuities with a guarantee goes up to about 18%
  – for pensioner-annuities the proportion of annuities with a guarantee changes less and seems to be dependent on employer
  – publicity given to guarantees pre and post 1956 is identical, so the change is probably not due to marketing/framing effects.

• Why did guarantees become more important after 1956?
  – Answer is that the payment stream for a SDA is identical to that of a guaranteed annuity.
  – Annuitants who have high mortality might try to signal that by buying an annuity with a guarantee.
  – But the tax benefits of an SDA (designed for richer taxpayers) would swamp any differences in mortality premium, pre-1956 and so impossible to get a separating equil.
  – Post-1956 annuitants can use guarantee as a signal of higher mortality and hence the market splits.
  – Evidence that mortality higher for annuitants with guarantee.
Effect of price change on annuity demand
Conclusions

• Compulsion made UK annuity market largest in the world
  – Post-2015, UK annuity market is voluntary, and so issue of selection effects is important

• 1956 Finance Act provides a natural experiment of change in price on annuity demand and evidence on AS

• We find some evidence in support of AS
  – Guarantees to separate out high mortality types

• Further work will expand sample to (hopefully) increase degree of significance