

Adverse Selection in Annuity Markets & the 1956 Finance Act

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Life Annuities

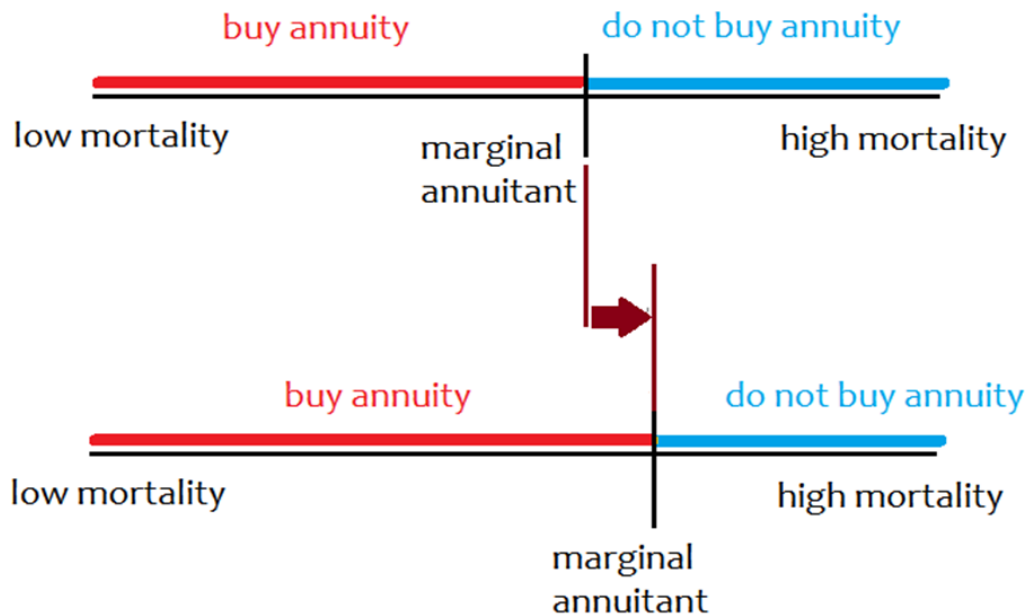
- Life annuity converts a pension pot lump sum (a stock of wealth paid to a life insurer in a single premium) into an income for life (pension)
- Annuity insures individual against out-living his or her wealth in the event of living longer than expected (longevity risk), by efficiently pooling population mortality risk (Yaari, 1965)
- Many different product types:
 - level, real, escalating, with guarantees
- 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
- If annuities now voluntary, what will be effect on annuity demand?
 - “If sold well, annuities have the potential to be a good product and I expect them to continue to play a significant role.” 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 (high risk types buy more insurance)
 - Moral hazard or adverse selection?
 - De Meza & Webb (2016)
 2. MW (pricing consequence of PCP)
 - Cannon & Tonks (2016)
 3. Pricing

3. Pricing consequence

Predicted effect of price fall on annuity demand (Abel, 1986): Mortality of pool increases



Note that in part this test depends on the type of equilibrium pre-price change: separating (Rothchild-Stiglitz/Eckstein et al) vs pooling (Abel)

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 run-down of capital
- 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
 - So pool of annuitants post-1956 should have higher mortality
- However
 - Tax, rather than price change: disproportionate effect on wealthy
 - Pre-1956: Special Deferred Annuities (SDAs)
 - Combination of term-certain and deferred annuity
 - SDA payment stream identical to a guarantee, but with tax advantages

Data & Methods

- Two data sources:
 - Annuity contracts from one annuity provider, 1952-1962
 - Anonymised individual policy-level data on type and quantity of annuity, price, date annuity payment terminated
 - Annuity rate data across annuity providers from *Insurance Policy Weekly*
- Estimate via Proportional Hazards Model:
 - 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: $q_0(x) = \exp(\gamma x)$ (ie Gompertz mortality model)
- $f(\beta z_i)$ is a function of a vector of individual i 's characteristics (including annuitant's age and y.o.b.): $f(\beta z_i) = \exp(\beta z_i)$

Policy-level data

	Pre 1956 Finance Act			Post 1956 Finance Act		
Guarantee period, either explicit or in a split (years)	Ordinary annuity	Special deferred annuity	Pension annuity	Ordinary annuity	Special deferred annuity	Pension annuity
0	316		225	225		48
5	4	2	109	12		14
10	1	247	14	18	6	3
15		134		1	4	
20		43				
other		7	4			
Proportion with guarantee	1.6%		36.1%	12.1%		26.2%

Post-1956 Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Annuitants	All	All	All	All	Men only	Women only	Single women only
Multiple purchase	✓		✓				
<hr/>							
_t							
dgtee	0.634** (0.223)	0.535* (0.264)					
dgtee short			0.408 (0.356)	0.422 (0.416)	0.0629 (0.691)	0.653 (0.414)	0.0051 (0.875)
dgtee long			0.810** (0.285)	0.613+ (0.324)	1.885*** (0.461)	-0.168 (0.510)	0.878+ (0.524)
lninc	0.0129 (0.083)	0.0412 (0.089)	0.0101 (0.084)	0.0405 (0.090)	0.0642 (0.162)	0.167 (0.126)	0.286 (0.187)
female	0.0424 (0.296)	0.238 (0.304)	-0.0166 (0.310)	0.207 (0.318)			
femsing	-0.361 (0.284)	-0.584+ (0.307)	-0.310 (0.295)	-0.560+ (0.313)		-0.792* (0.355)	
N	199	153	199	153	51	102	81
Deaths	159	119	159	119	43	76	59

Mortality of person with g'tee = $\exp(0.634) = 1.88x$ mortality of person without

Standard errors in parentheses. Specifications (1) and (3) include policies where an annuitant has made multiple purchases and in these cases the standard errors are clustered. All specifications include the age and age-squared at time of purchase and dummies for the quinquennium of annuitant's birth (q.1860-64, ..., q.1905-10). A guarantee is short if it is between three and five years and long if it is more than five years.

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results I

- Post-1956m strong evidence of selection effects:
 - Mortality of person with g'tee = $\exp(0.634)=1.88x$ mortality of person without
 - Effect twice as large as in F&P (2004)
 - Very strong for males purchasing 10-year g'tees
- Effect on annuity rates
 - Annuity provider offers lower rates to g'tees (incentive compatibility) but pays out with certainty for g'tee-period
 - Under AS, $MW_{ng} < MW_g$
 - Since we estimate MW using average mortality rates
 - But life insurers price g'tees with high mortalities, & non-g'tees with low mortalities
 - However, finding is the MW is same
 - So no evidence that annuity providers price the selection effects

Annuity rate analysis (post-1956)

Annuity rates based on a(55) tables (assume actuarially fair pricing)				
Annuity	Interest rate, %	no g'tee	5-year gtee	10-year g'tee
Male, 65	6	11.4%	11.1%	10.3%
Female, 60	6	8.9%	8.8%	8.6%
Average actual annuity rates from <i>Policy Insurance Weekly</i>				
Annuity	Year	no g'tee	5-year gtee	
Male, 65	1956	10.5%	10.2%	
	1957	10.7%	10.4%	
	1958	10.8%	10.5%	
Female, 60	1956	7.9%	7.9%	
	1957	8.2%	8.1%	
	1958	8.3%	8.2%	
Money's worth calculations (assuming interest rate = 6%)				
		no gtee	5-year gtee	
Male, 65	1956	0.9190	0.9190	
	1957	0.9419	0.9421	
	1958	0.9460	0.9457	
Female, 60	1956	0.8964	0.8964	
	1957	0.9253	0.9255	
	1958	0.9322	0.9293	

G'tees have slightly lower rates

Under AS,
 $MW_{ng} < MW_g$
However, MW is the same

Separating equilibrium with g'tees?

$W\%$ for G and $Z\%$ for NG

- Fair annuity rate for G=11.1%, for NG=11.4%
- $U^{\text{long}}(11.4, \text{NG}) > U^{\text{long}}(11.1, \text{G})$ IC
- $U^{\text{long}}(11.4, \text{NG}) \leq U^{\text{long}}(11.4, \text{G})$

- $\exists Z: \begin{cases} 11.1\% < Z \leq 11.4\% \\ U^{\text{long}}(Z, \text{NG}) \geq U^{\text{long}}(Z, \text{G}) \end{cases}$

- Also for shorts $Z > W \geq 11.1\%$
- Conditions for separating equilibrium:
 $11.1\% < W < Z < 11.4\%$

Pre-1956 Regression

	(1)	(2)	(3)	(4)	(5)
	All policies	No mult purch	Men	Women	Single women
Guarantee dummy	-0.0309 (0.3671)	-0.0132 (0.3597)	-0.271 (0.3884)	1.115** (0.3965)	1.031* (0.4371)
SDA dummy	0.0223 (0.1030)	0.00789 (0.1046)	0.0661 (0.1803)	-0.0502 (0.1258)	0.0512 (0.1361)
age	0.0493 (0.1188)	-0.0607 (0.1166)	0.0599 (0.1688)	0.151 (0.2246)	-0.189 (0.2561)
agesq	0.000123 (0.0009)	0.000983 (0.0008)	-0.0000925 (0.0012)	-0.000602 (0.0017)	0.00209 (0.0019)
lninc	0.0529 (0.0463)	0.0457 (0.0471)	-0.0239 (0.0748)	0.0979+ (0.0584)	0.0868 (0.0638)
female	-0.538*** (0.1593)	-0.554*** (0.1668)			
femsing	0.104 (0.1568)	0.154 (0.1648)		0.0786 (0.1605)	
Decade of birth dummies	✓	✓	✓	✓	✓
Multiple policy dummies	✓		✓	✓	✓
gamma	0.000238*** (0.0000)	0.000242*** (0.0000)	0.000231*** (0.0000)	0.000248*** (0.0000)	0.000257* (0.0000)
N	642	585	244	398	322
Deaths	555	509	226	329	272

Effects of the 1956 Act

	(1) No mult purch	(2) Men	(3) Women	(4) Single wo
d1956FA	-0.104 (0.1288)	-0.0772 (0.2088)	-0.115 (0.1659)	-0.300 (0.1838)
age	0.0326 (0.1002)	-0.0935 (0.1520)	0.0728 (0.1361)	-0.101 (0.1418)
agesq	0.000348 (0.0007)	0.00124 (0.0011)	0.000113 (0.0010)	0.0014 (0.0010)
lninc	0.0466 (0.0362)	0.0258 (0.0580)	0.0600 (0.0468)	0.0667 (0.0506)
female	-0.439** (0.1503)			
femsing	0.0157 (0.1459)		0.00229 (0.1491)	
Decade of birth dummies	✓	✓	✓	✓
gamma	0.000248*** (0.0000)	0.000273*** (0.0001)	0.000240*** (0.0000)	0.000244 (0.0000)
N	745	269	476	390
Deaths	633	246	387	321

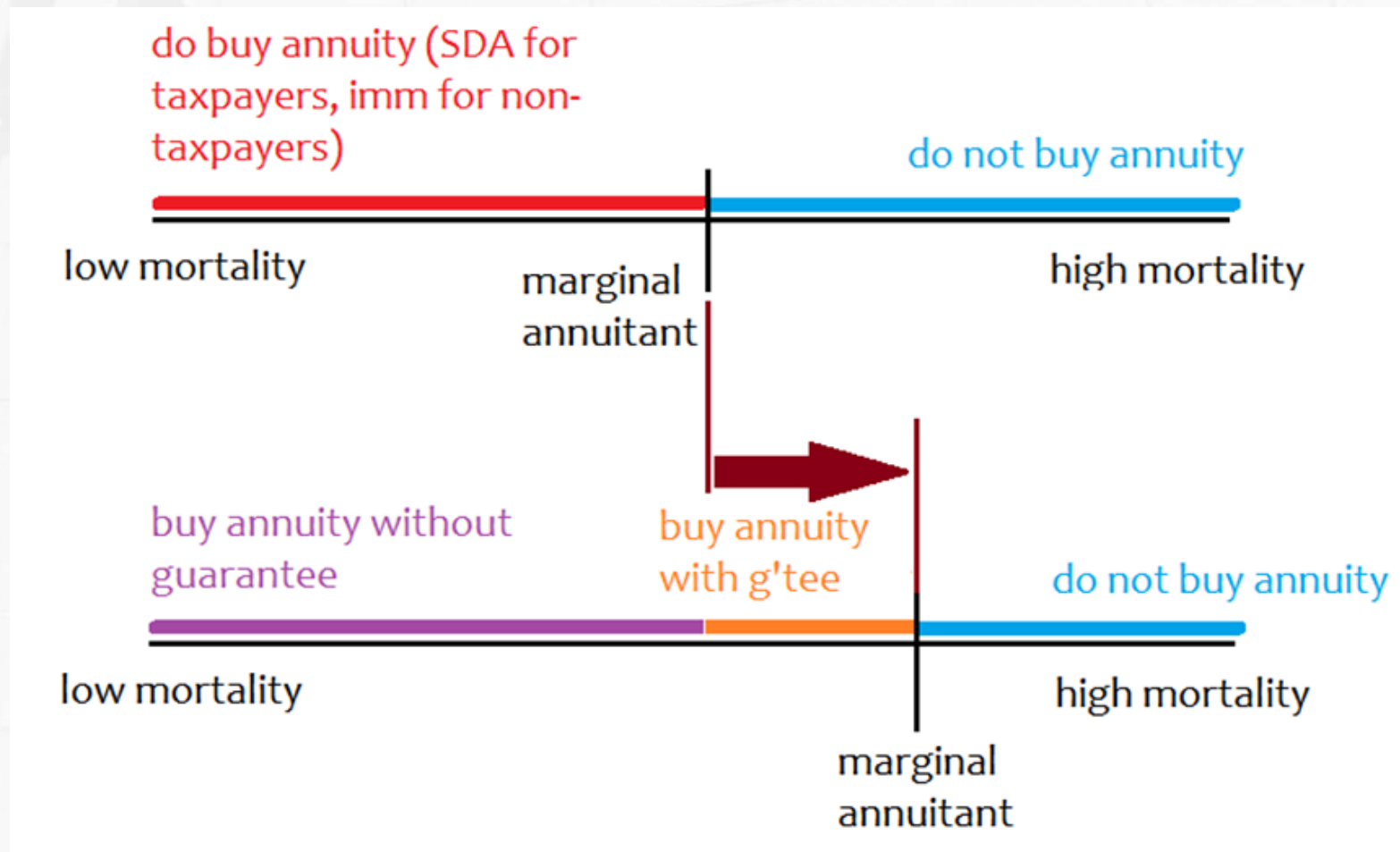
Results II

- Annuitant mortality tends to go down post-1956.
 - The price test: evidence against adverse selection
 - But results are not statistically significant, except single women
- Effect is largest for single women,
 - Single women have no risk pooling with spouse so have strongest gains from annuitisation: less selection

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.
- Pre-1956 very few annuities sold with g'tee (less than 2%):
- Post-1956 # of annuities with g'tee increases $\approx 18\%$
- Why did guarantees become more important after 1956?
 - Answer: payment stream for SDA identical to that of guaranteed annuity.
 - Annuitants with high mortality may signal by buying annuity with guarantee.
 - Pre-1956 tax benefits of an SDA (designed for richer taxpayers) swamp any differences in mortality premium, so no separating equilibrium
 - Post-1956 annuitants 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
 - But confounded by SDAs
- We find:
 - Post-1956 importance of guarantees: selection effects at internal margin
 - No evidence these selection effects were priced
 - No evidence of selection effects at external margin