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

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Outline

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The Decision (Not) to Annuitize Pension Wealth ...

- 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.
- But in reality, nobody annuitizes (Hurd, Lillard, & Panis (WP Rand, 1998), Brown (JPubE 2001))
  (well, almost nobody, the Swiss still do ...)

This discrepancy is widely known as the Annuity Puzzle

Theoretical Literature

- 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:
  - Hurd, Lillard, & Panis (WP Rand, 1998): Cash-out rates lower for older, male and high income workers.
  - Brown (JPubE 2001): Intention to annuitize increases with retirement wealth. No evidence for bequest motive.
    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

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)

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Focus of paper: 2nd pillar

The 2nd pillar in a nut shell

- Fully Funded. Mandatory $>$ 25'000 CHF. Replacement rate: $50-70\%$ of labor income (including first pillar benefits)
- Insured salary:
  - Mandatory part: $\approx$25'000 CHF $<$ salary $<$ $\approx$75'000 CHF
  - Super-mandatory part: salary $>$ $\approx$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): $B = \gamma K$ (γ=conversion factor, K=accumulated capital stock)
- Crucial factor in the annuitization decision: γ
  - Before 2004: $\gamma_{mandatory} = \gamma_{super-mandatory} = 7.2\%$
  - After 2004: Some large insurance companies reduced $\gamma_{super-mandatory}$ (not directly regulated!)

The Policy Change: Reduction in Conversion Factor

- 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

  $\Rightarrow$ Big loss in net present value and consumption possibilities during retirement.

Conjecture

Reduction in conversion factor constitutes exogenous policy change $\Rightarrow$ value of annuity $\Downarrow \Rightarrow$ 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 ($\approx$ 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 $\leq$ 1'500'000 CHF (not very important)

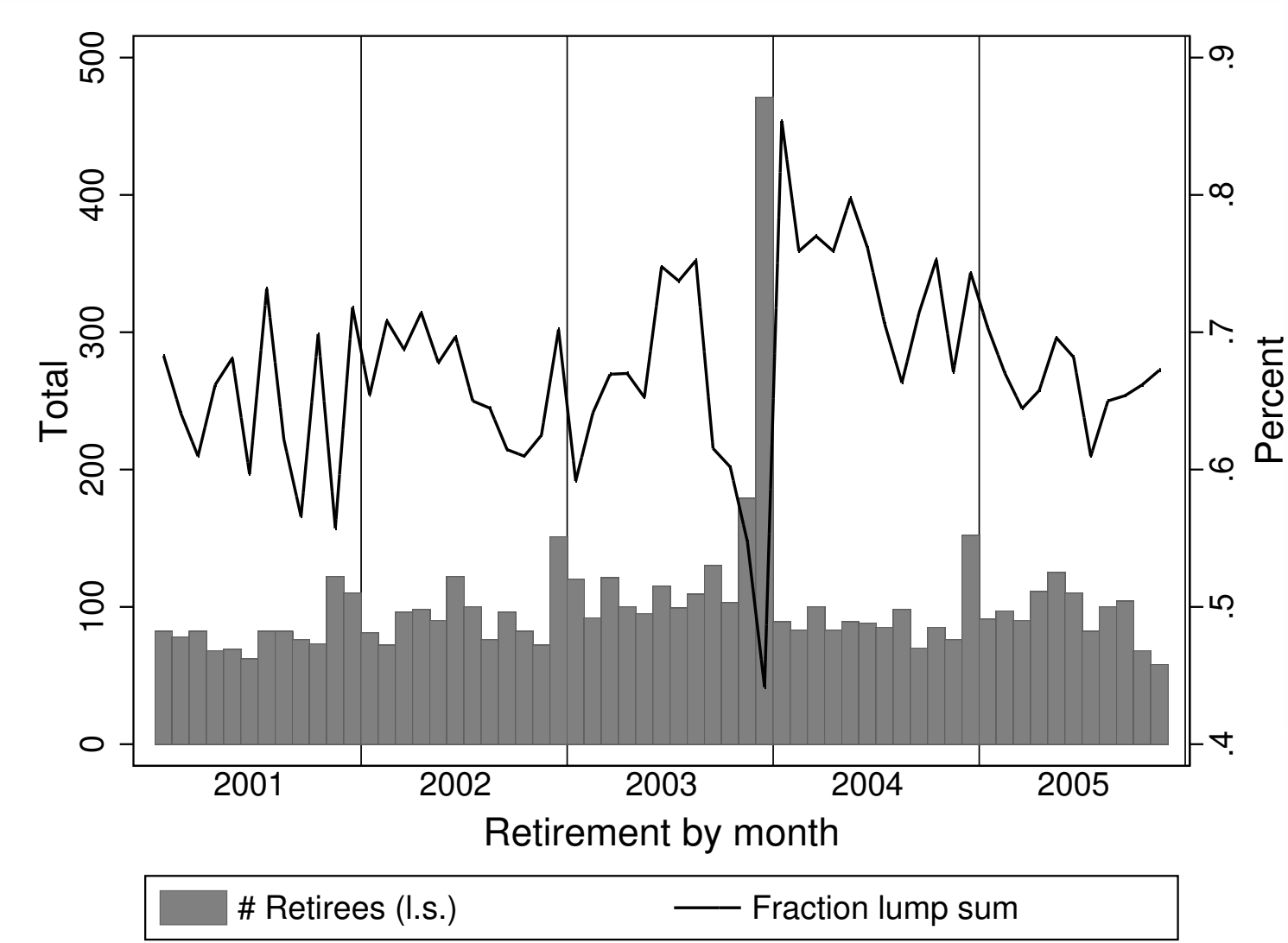
	period not affected				*reform announced*		*reform implemented*			
	2001		**2002**		**2003**		**2004**		**2005**	
Variable	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Age at retirement	64.7	1.1	64.5	1.2	64.3	1.3	64.5	1.3	64.5	1.2
Conversion rate										
Mandatory Part	7.136	0.210	7.104	0.231	7.059	0.256	7.071	0.288	7.029	0.280
Supermandatory Part	7.136	0.210	7.104	0.231	7.059	0.256	5.774	0.153	5.780	0.139
Last Wage	76,232	56,462	78,050	70,853	88,673	86,457	79,687	65,699	79,922	65,133
Capital at retirement	238,850	200,431	235,799	189,342	282,198	225,018	228,548	178,182	238,914	181,249
Mandatory Capital	127,306	52,506	128,695	55,417	137,681	58,344	132,047	63,161	134,952	69,028
Super-mand. Capital	111,515	173,218	107,088	158,011	144,705	193,272	96,380	154,462	103,962	156,075
Annuity	0.353	0.478	0.330	0.470	0.407	0.491	0.251	0.434	0.334	0.472
Lump Sum	0.616	0.487	0.632	0.482	0.548	0.498	0.730	0.444	0.632	0.482
Mixed	0.031	0.173	0.038	0.191	0.045	0.208	0.019	0.138	0.033	0.180
Observations	976		1,104		1,678		1,080		1,017	

Outline

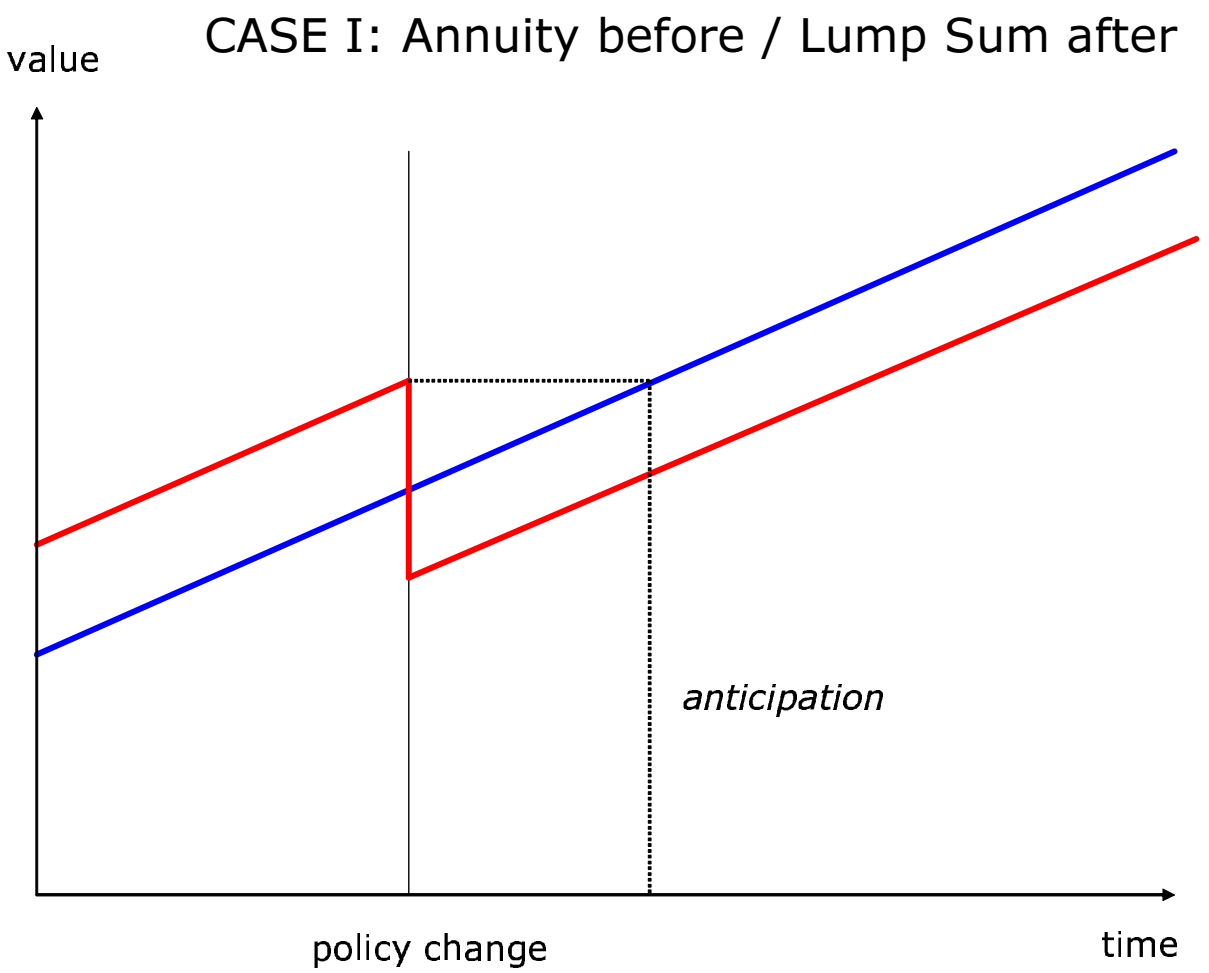
Empirical Strategy

- Treatment group: people retiring 2004/2005, and control group: people retiring 2001-2003.
  - 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 $\Rightarrow$ 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



Who anticipates retirement?



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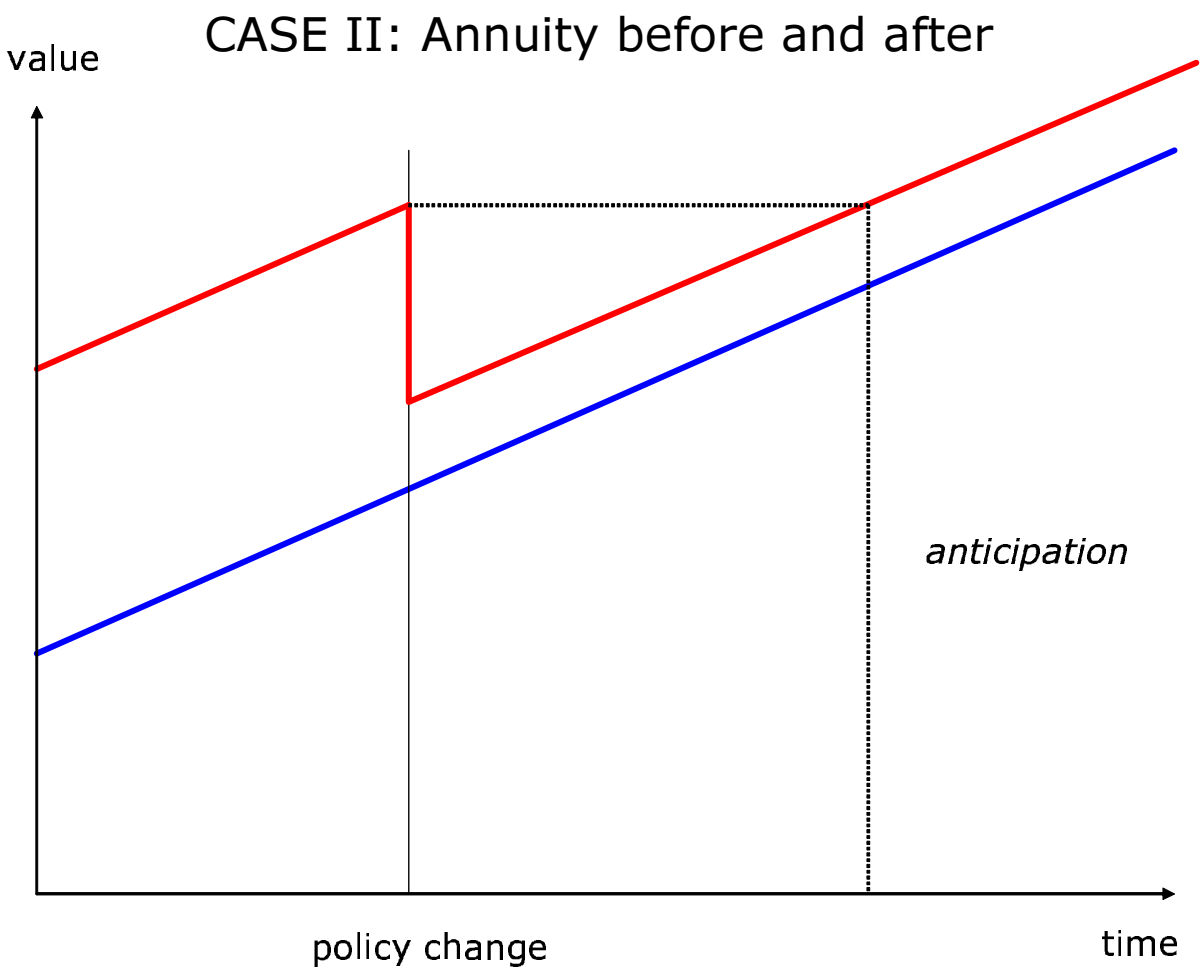

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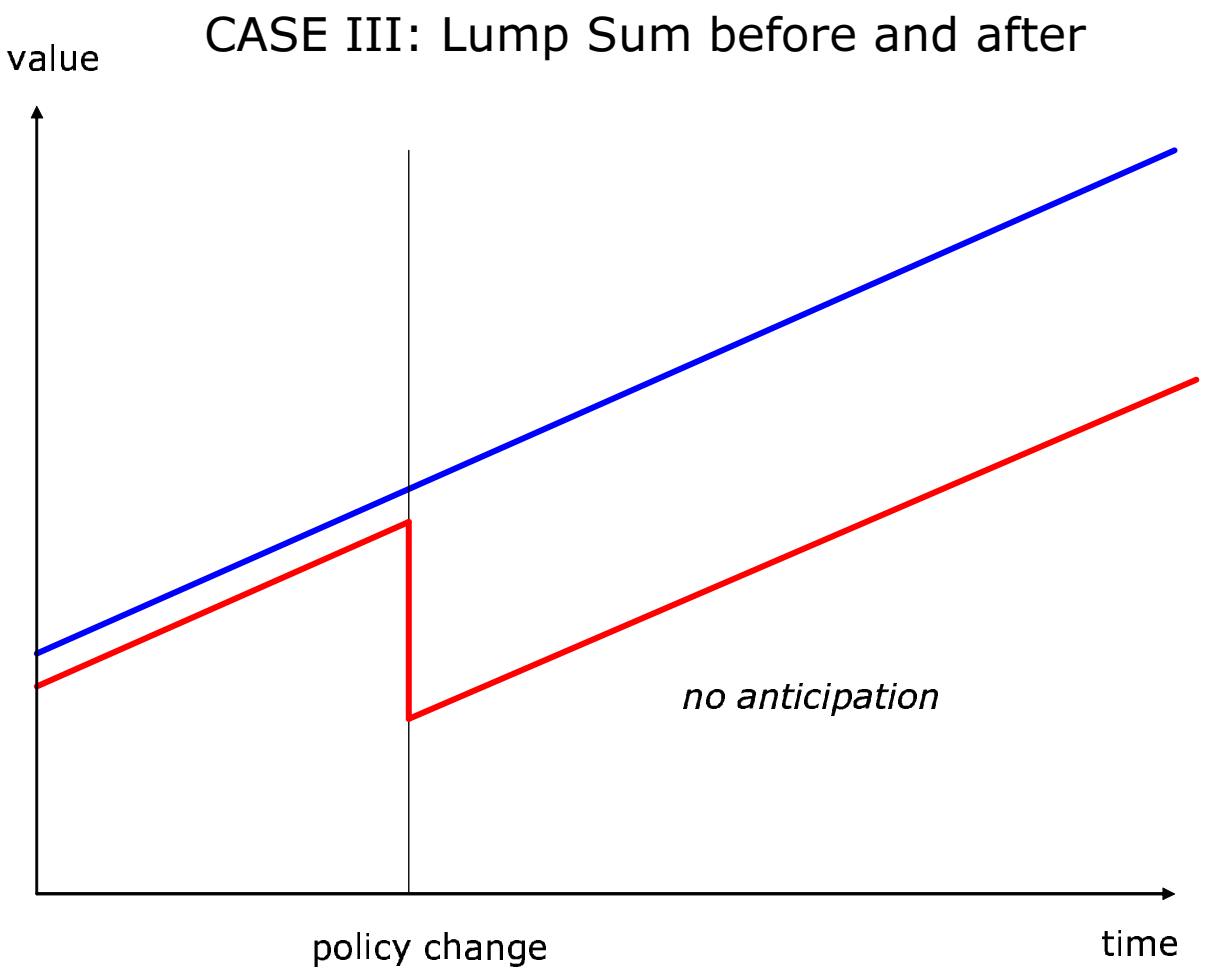

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Ad-hoc correction for anticipation effects

potential anticipaters strategy: retirement date strategy: imputed choice Variable	*none* as observed No correction (A0)	*retire in dec 2003* shifted to age 65 lump-sum (A1)	 annuity (A2)	*retire in dec 2003* shifted to year 2004 lump-sum (A3)	 annuity (A4)	*retire in nov/dec 2003* shifted to age 65 lump-sum (A5)	 annuity (A6)
No. pot. anticipaters	241	241	241	241	241	303	303
No. shifted 2003 $\longrightarrow$ 2004	0	92	92	241	241	115	115
No. shifted 2003 $\longrightarrow$ 2005	0	53	53	0	0	66	66
$\overline{LU}_{2004} - \overline{LU}_{2003}$	0.119*** (0.019)	0.091*** (0.018)	0.034* (0.018)	0.113*** (0.018)	-0.023 (0.018)	0.069*** (0.018)	0.011 (0.018)
$\overline{LU}_{2004} - \overline{LU}_{2002}$	0.099*** (0.025)	0.120*** (0.024)	0.059** (0.025)	0.140*** (0.024)	-0.011 (0.025)	0.125*** (0.024)	0.052** (0.025)
$\overline{LU}_{2003} - \overline{LU}_{2002}$	-0.037 (0.024)	0.018 (0.025)	0.018 (0.025)	0.018 (0.025)	0.018 (0.025)	0.059** (0.024)	0.059** (0.024)
$\overline{LU}_{2005} - \overline{LU}_{2004}$	-0.020 (0.043)	0.045 (0.035)	-0.162*** (0.036)	-0.020 (0.042)	-0.027 (0.045)	0.054 (0.033)	-0.183*** (0.035)

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%.

Before-after comparison, by wealth percentiles

Variable	comparison 2004-2003 (W1)	comparison 2004-2002 (W2)	comparison 2005-2004 (W3)	comparison 2003-2002 (W4)
Sample: all men				
LU_i, 0-25 perc.	0.072**	0.041	-0.106**	-0.031
	(0.035)	(0.038)	(0.041)	(0.034)
LU_i, 25-50 perc.	0.057	0.002	-0.053	-0.054
	(0.036)	(0.039)	(0.041)	(0.037)
LU_i, 50-75 perc.	0.131***	0.046	-0.100**	-0.085***
	(0.038)	(0.040)	(0.042)	(0.038)
LU_i, 75-100 perc.	0.352***	0.212***	-0.086**	-0.140***
	(0.037)	(0.041)	(0.042)	(0.037)
cut-off values	2002	2003	2004	2005
min	5,603	5,663	0	0
25th	29,013	31,631	8,896	11,514
50th	42,536	45,506	37,968	47,068
75th	116,945	181,553	116,870	130,675
max	1,224,305	1,278,186	1,282,853	1,172,339

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%.

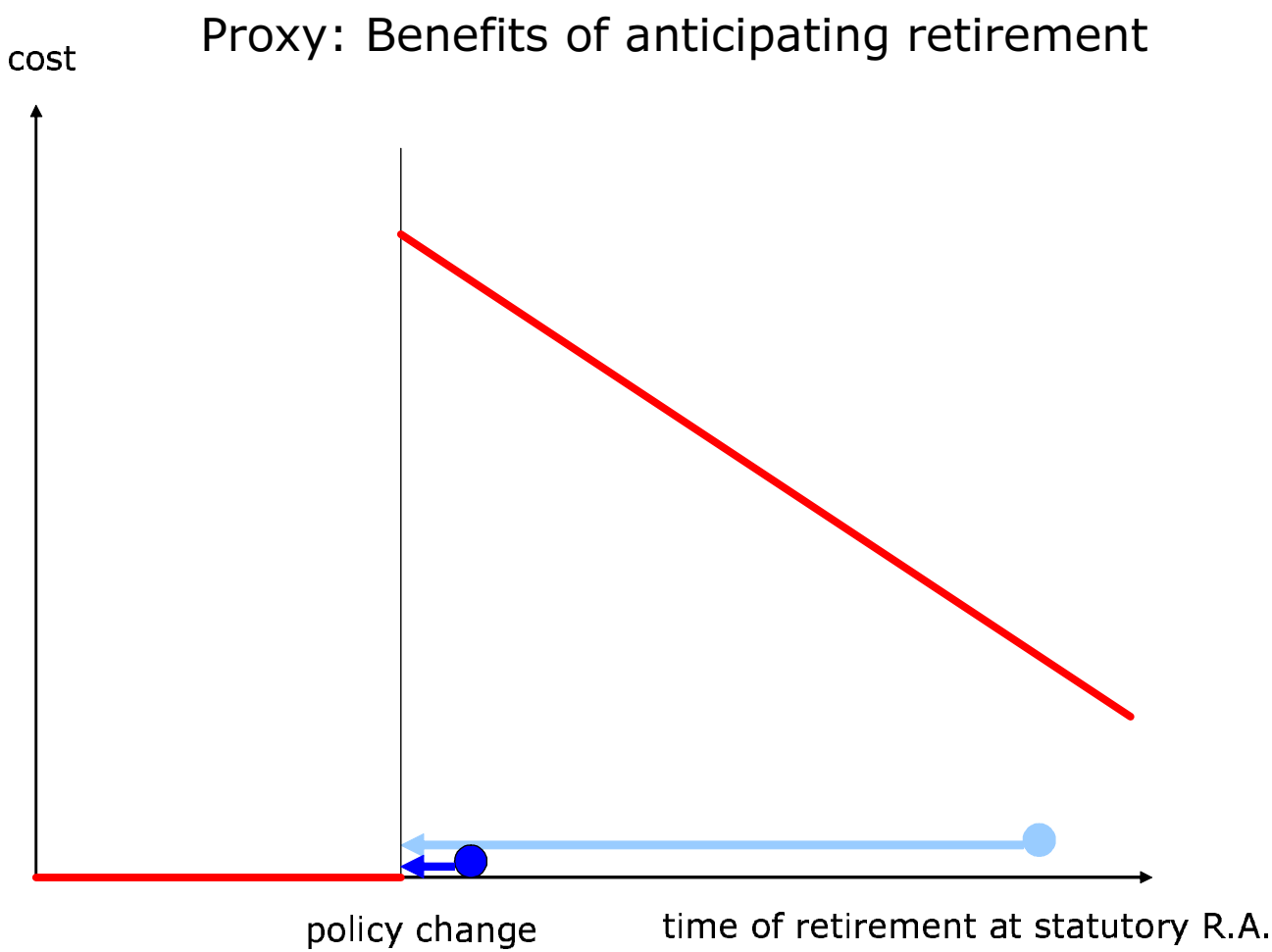
Strategy to deal with anticipation effects

- To avoid lower annuity, some people anticipate retirement to 2003.
- If we knew who anticipates we could simply estimate

$$\text{LS} = \text{f}(x, \text{treatment}, \text{anticipation})$$

- 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



Anticipation probability proxied

Option LS	*uncorrected* Coef.	(Std.) p (P0)	*proxy* Coef.	(Std.) p (P1)	*proxy interacted* Coef.	(Std.) p (P2)
Capital (100k)	-.088	(.008) ***	-.086	(.008) ***	-.085	(.008) ***
Capital sq	.005	(.001) ***	.005	(.001) ***	.006	(.001) ***
Wage (100k)	.029	(.020) ***	.029	(.010) ***	.029	(.010) ***
R.A. 60	.033	(.037)	.064	(.037) *	.060	(.037)
R.A. 61	.062	(.035) *	.105	(.034) ***	.106	(.033) ***
R.A. 62	.031	(.029)	.086	(.030) ***	.078	(.029) ***
R.A. 63	-.006	(.025)	.062	(.026) **	.048	(.025) *
R.A. 64	-.106	(.024) ***	-.013	(.028)	-.014	(.028)
R.As. 66-70	YES		YES		YES	
Post2003	.129	(.019) ***	.076	(.020) ***	.077	(.020) ***
Y01	.011	(.027)	-.051	(.029) *	-.052	(.029) *
Y02	.043	(.022) *	-.022	(.024)	-.022	(.024)
Y05	-.058	(.028) **	-.037	(.028)	-.038	(.028)
PV(Income)	-.021	(.024)	-.047	(.024) **	-.049	(.024) **
Proxy Anticip			-.026	(.004) ***	-.003	(.005)
Proxy*Sup65					-.016	(.003) ***
Proxy*Sup65sq					.001	(.000) ***
Annuity max	808k		786k		739k	
R squared	0.048		0.057		0.064	
No. Obs	5677		5677		5677	

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: $V_t(W_t) = \max_{C_t} \left[\sum_{t=1}^{T-age+1} \frac{\Pi_{j=1}^{t}(1-q_j)U(C_t)}{(1+\rho)^t} \right]$
- 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: $W_{t+1} = (W_t - C_t + S_t)(1 + i_t)$, $W_0 =$ accumulated wealth
- $V(W_0 + \Delta W | \text{no annuities}) = V^* \Rightarrow \text{AEW} = \frac{W_0 + \Delta W}{W_0}$
- $P(lumpann = 1) = \Phi(\alpha + \beta AEW + \mathbf{x}\gamma)$, $\mathbf{x} = savings, savings^2, age, year\ dummies$

Parameterized model - results

	Option LS	*uncorrected* Coef. (Std.) p (V0)	*proxy* Coef. (Std.) p (V1)	*proxy interacted* Coef. (Std.) p (V2)
none	Post2003	.128 (.018) ***	.076 (.020) ***	.077 (.020) ***
	Y01	.011 (.027)	-.060 (.029) **	-.062 (.029) *
	Y02	.043 (.022) *	-.023 (.024)	-.024 (.024)
	Y05	-.058 (.028) **	-.037 (.028)	-.037 (.028)
	AEW0	-1.117 (.170) ***	-.993 (.171) ***	-.883 (.172) ***
CRRA=0	Post2003	.049 (.022) **	.011 (.023)	.018 (.023)
	Y01	.008 (.027)	-.056 (.029) *	-.057 (.029) **
	Y02	.040 (.022) *	-.020 (.024)	-.021 (.024)
	Y05	-.071 (.028) **	-.051 (.028) *	-.049 (.028) *
	AEW2	-1.013 (.141) ***	-.925 (.141) ***	-.877 (.142) ***
CRRA=2	Post2003	.050 (.021) **	.010 (.022)	.013 (.022)
	Y01	.010 (.027)	-.055 (.029) *	-.056 (.029) *
	Y02	.041 (.022) *	-.019 (.024)	-.020 (.024)
	Y05	-.072 (.028) **	-.052 (.028) *	-.051 (.028) *
	AEW4	-.860 (.122) ***	-.795 (.122) ***	-.775 (.122) ***
CRRA=4	Post2003	.061 (.021) ***	.018 (.022)	.020 (.022)
	Y01	.011 (.027)	-.055 (.029) *	-.056 (.029) *
	Y02	.043 (.022) *	-.019 (.024)	-.019 (.024)
	Y05	-.071 (.028) **	-.051 (.028) *	-.051 (.028) *

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