Accounting for non-annuitization

Svetlana Pashchenko

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Annuity puzzle

Standard life cycle model:

In the presence of lifespan uncertainty people value annuities

Reality:

Participation in annuity market for people aged 70 years and older

Income quintile	Percentage
All	7.8
1	0.8
2	1.5
3	3.7
4	5.7
5	15.9

Source: HRS/AHEAD dataset

Why don't people buy annuities?

Traditional explanations

- Bequest motive (Lockwood,2008)
- Social Security and DB pension plan (Dushi, Webb, 2004)
- Adverse selection (Mitchell, Poterba, Warshawsky, 1997)
- Medical expenses uncertainty (Turra, Mitchell, 2004)

Other possible explanations

- Consumption minimum floor
- Difficulties with annuitizing housing wealth
- Minimum purchase requirement

This paper

Question:

How quantitatively important is each of the factors behind non-annuitization?

Approach:

Quantitative model of savings after retirement that nests all major impediments to annuitization

Findings

- Medical expenses makes puzzle harder to explain
- Factors, reducing demand for annuities:
  - Social Security and Defined Benefit plans (**big** effect)
  - Actuarial unfairness (**small** effect)
  - Bequest motive (**small** effect)
  - Consumption floor (**big** effect)
  - Minimum purchase requirement (**big** effect)
  - Illiquidity of housing wealth (**big** effect)

Methodology: households

- Saving model of single retirees
- Two assets: risk-free bonds and annuities
- Bequest
- Exogenously preannuitized wealth
- Medical expense uncertainty
- Several dimensions of heterogeneity:
  - Wealth
  - Existing annuity income
  - Life expectancy
  - Health
  - Medical expenses

Model (households)

$$E_0 \sum_{t=1}^{T+1} \beta^{t-1} \left(\prod_{j=0}^{t-2} s_j \right) \{ s_{t-1} u(c_t) + (1 - s_{t-1}) v(k_t) \}$$

s.t.

$$c_t + z_t + k_{t+1} + q_t \Delta_{t+1} = k_t(1 + r) + n_t$$

$$n_{t+1} = \Delta_{t+1} + n_t$$

$$k_{t+1}, \Delta_{t+1} \geq 0$$

Preferences

Utility function:

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma}$$

Bequest motive

$$\upsilon(k) = \eta \frac{(\phi + k)^{1-\sigma}}{1-\sigma}$$

Health uncertainty: De Nardi, French, Jones (2009)

Health costs:

- Lognormally distributed
- Persistent

Survival probability and mean of medical expenses depends on

- Age
- Health
- Permanent income

Methodology: insurers

- Act competitively
- Two scenarios

* Insurers observe all relevant state variables (full information)
* Insurers observe only age (asymmetric information)

Calibration

Parameter	Value
σ	4
β	0.97
r	2%
$c_{\min}$	2,663

- Maximum issue age: 88
- Administrative load: 10%
- Initial wealth and preexisting annuity holdings are calibrated from AHEAD dataset

Road map

- Simple model
  * Effect of Social Security and DB plans
  * Effect of medical expenditures
- Add elements to try to explain the puzzle
  * Adverse selection
  * Bequest
  * Minimum consumption floor
  * Illiquidity of housing
  * Minimum purchase requirement

No impediments to annuitization

Participation by income quintile

Income quintile	Percentage
All	91.0
1	85.3
2	100.0
3	100.0
4	100.0
5	100.0

All but the poorest buy annuity

Social Security and DB plans

Participation by income quintile

Income quintile	Percentage
All	75.3
1	51.0
2	86.7
3	78.6
4	81.3
5	75.5

The effect is big but annuity demand is still high

The effect of medical expenditures

	Percentage of retirees who bought annuity		
Income quintile	None	Deterministic	Uncertain
All	75.3	86.1	76.3
1	51.0	32.4	40.7
2	86.7	90.2	80.7
3	78.6	100.0	83.8
4	81.3	100.0	85.9
5	75.5	99.6	84.8

Medical expenses do not help to explain annuity puzzle

Effect of adverse selection

Percentage change in price in pooling equilibrium compared to full information equilibrium

Income quintile	Bad health	Good health
1	73.2	25.7
2	53.5	14.0
3	35.7	3.7
4	20.1	-5.3
5	6.8	-13.1

Effect of adverse selection

Income quintile	Baseline	Adverse selection
All	76.3	72.5
1	40.7	30.8
2	80.7	63.1
3	83.8	74.7
4	85.9	89.9
5	84.8	93.5

Adverse selection does not contribute much to the puzzle

Effect of bequest: $\eta = 2360$, $\phi = 27.3$

Income quintile	Baseline	Bequest
All	76.3	71.9
1	40.7	40.6
2	80.7	79.7
3	83.8	83.2
4	85.9	85.7
5	84.8	69.0

Bequest does not contribute much to the puzzle

Effect of consumption minimum floor

Income quintile	Baseline	$c_{\min} = \$6000$
All	76.3	53.1
1	40.7	8.6
2	80.7	28.8
3	83.8	61.5
4	85.9	73.5
5	84.8	82.9

Consumption floor explains low participation of low-income quintiles

Effect of minimum purchase requirement of $ 2500

Income quintile	Baseline	Minimum purchase	
		Liquid housing	Illiquid housing
All	76.3	39.9	24.2
1	40.7	23.9	11.2
2	80.7	32.5	16.1
3	83.8	35.4	18.6
4	85.9	43.1	23.7
5	84.8	57.4	36.4

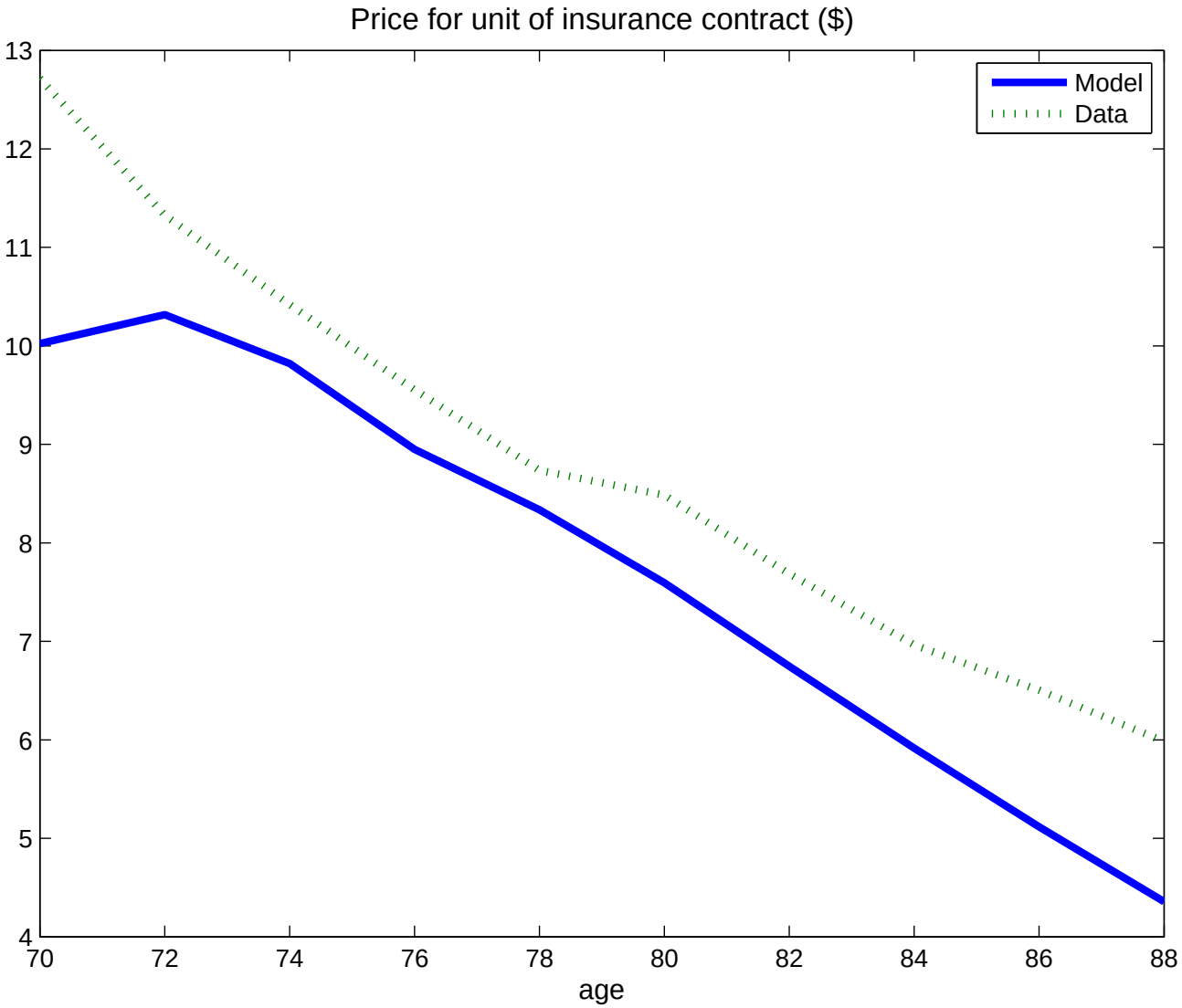
Minimum purchase requirement has substantial effect on the puzzle especially when combined with illiquidity of housing

Combined effect: bequest, adverse selection, consumption floor illiquid housing, minimum purchase requirement

Income quintile	Baseline	Full version	Data
All	76.3	19.6	6.2
1	40.7	1.9	1.2
2	80.7	6.5	1.3
3	83.8	12.8	2.7
4	85.9	20.8	4.5
5	84.8	35.3	13.0

Overall participation is 4 times lower than in the baseline but still higher than in the data

Annuity prices



Conclusion

- The following factors have the biggest effect on the annuity market participation rates:
  * Preannuitized wealth
  * Consumption minimum floor
  * Minimum purchase requirement combined with illiquidity of housing wealth
- Medical expense uncertainty does not help to explain the puzzle
- Adverse selection has opposite effect on different income quintiles thus its overall effect is small
- Bequest motives significantly decrease demand for annuities only for people in the highest quintile