Longevity Risk, Annuity Markets, and “Decumulation” of Retirement Wealth

James Poterba
MIT and NBER
1 February 2012
Shifting Focus of Lifecycle Research: Saving to Spending

- Aging of Baby Boomers: Now approaching age of retirement
- Traditional research has focused on accumulation process
- Growing interest in spending behavior – both in academic and practitioner realms
Lecture Outline

- Summary of empirical research on drawdown of retirement assets
- Role of annuities in retirement planning
- Testing for adverse selection in annuity markets
- Policy applications
  - Removing mandatory annuitisation for UK pension pots
  - Ban on gender-based annuities
Recent work uses panels of older households: Hurd, PVW (2011)

Households in good health and stable circumstances (US) show rising median wealth

Loss of spouse, period of poor health triggers sharp draw-down of assets (especially housing)
Figure 1-1. Mean assets by year, all persons in continuing two-person households age 51-61 in 1992

Long-Standing Economist’s Question: Why so Few Annuities?

- Yaari (1965): Stochastic life length, no bequest motive, no other sources of uncertainty: annuitisation is optimal choice
- Brown/Davidoff/Diamond (2005): optimal to obtain some annuity protection for broad class of market environments
- Private, non-compulsory annuity markets are very small. Why?
Simple Answer: Some Households are Already Annuitised

- Low income households: High replacement rate from state pension / Social Security
- High wealth households: Is longevity risk an important financial risk?
- Key question: how large is the “middle group,” with lower replacement rate and enough wealth to purchase an annuity
## Share of Household Wealth that is Annuitised, US Retirees, 2000

<table>
<thead>
<tr>
<th>Group</th>
<th>Married Couples</th>
<th>Single Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, College +</td>
<td>50.9%</td>
<td>45.2%</td>
</tr>
<tr>
<td>White, High School</td>
<td>60.3</td>
<td>57.9</td>
</tr>
<tr>
<td>White, &lt; H.S.</td>
<td>67.8</td>
<td>77.5</td>
</tr>
<tr>
<td>Black, College +</td>
<td>86.8</td>
<td>81.2</td>
</tr>
<tr>
<td>Black, High School</td>
<td>73.1</td>
<td>78.7</td>
</tr>
<tr>
<td>Black, &lt; HS</td>
<td>82.4</td>
<td>86.8</td>
</tr>
</tbody>
</table>

Households with Financial Assets: Costs and Benefits of Annuities

- Private benefit
  - Avoid risk of outliving resources
  - Reduce need for financial decision-making at advanced ages
- Social benefit: Reduce likelihood of becoming dependent on state means-tested benefits
Revealed Preferences for Annuity Income vs. Lump Sum Payouts

- Mottola and Utkus (2007): Choices in DB pension plans: Only 17-27% of participants choose annuity payouts
- Fitzpatrick (2011): DB plan buy-in option for teachers: Pay only $0.18 for $1 PDV annuity
Summary of UK Annuity Market

- Largest, most diversified annuity market in the world
- Cannon and Tonks provide wealth of information (2008)
- Purchases of compulsory pension annuities in 2010: £11.5B
- Income drawdown annuities ≈ £2B
- Voluntary immediate annuities: £72M
# Age-Specific Annuity Payout Rates, UK, January 2012

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>3% Rising</td>
</tr>
<tr>
<td>65</td>
<td>6.0%</td>
<td>4.2%</td>
</tr>
<tr>
<td>65, smoker</td>
<td>7.4</td>
<td>5.5</td>
</tr>
<tr>
<td>75</td>
<td>8.1</td>
<td>6.3</td>
</tr>
<tr>
<td>75, smoker</td>
<td>10.3</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Source: SharingPensions.co.uk, February 1, 2012.
Determinants of Annuity Payouts

- Long-term bond rates (explain most of the volatility)
- Projected mortality rates
- Open question: how would “longevity bonds” affect the pricing of annuities? (Recall discussion of inflation-indexed bonds)
History of Annuity Markets

- Evidence of annuities in Ancient Rome – related to wealth transfer taxes
- Avoided usury rules – many contracts in the Middle Ages
- Late 1600s – first formal studies (Halley, DeWitt)
- Male life expectancy at 65: Ulpianus (AD 230): 5.3; Halley (1693): 9.6; Karlsruhe (1864): 10.3; Current UK: 16.9
Recent Innovations in Annuity Markets

- Market segmentation: Introduction of separate policies for smokers, coal miners, health impaired
- “Longevity insurance”: Deferred annuity that begins payout at age 85
- Open question: How do insurers determine their menu of policies? Role of fixed costs, administrative costs, “informational externalities”
Wealth Equivalent Calculation for Annuity Streams

- Calculate expected PDV of annuity payouts
- SSA life table, independent mortality for spouses in couples

\[ EPDV_A = \sum_{t=1}^{T} \frac{A_t \ast S_t}{\prod_{j=1}^{t} (1 + i_j)} \]
Key Elements of the EPDV Calculation

- Choice of discount rate: judging the risk of potential payouts vs. the risk of assets in the insurance company’s portfolio

- Mortality rate projections
  - Cohort table vs. period table
  - Annuitants vs. population
  - Assumed rate of mortality improvement

- Moneysworth = EPDV/Purchase Price
Mortality Rates, UK Male Annuitants and Population, 1998

### EPDV Calculation, US Annuity Market, July 2011, Age 65

<table>
<thead>
<tr>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.777</td>
<td>0.815</td>
</tr>
</tbody>
</table>
## EPDV Calculation, US Annuity Market, July 2011, Age 65

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.777</td>
<td>0.815</td>
<td>0.784</td>
<td>0.851</td>
<td></td>
</tr>
</tbody>
</table>
Money’s Worth in UK Market: Cannon-Tonks Analysis

- Data for 2009 Compulsory Purchase Annuities
- Male 65, MW using latest mortality rate projections is 0.905
- Note that for plausible utility functions, a household without ANY annuities would annuitise a substantial share of wealth at this moneysworth value
Explaining Low Rates of Voluntary Annuitization

- Households are already heavily annuitized
- Administrative costs: insurance company charges profits and charges offset utility gain
- Regret aversion & behavioral concerns
- Precautionary demand for liquid assets for health shocks, other risks
- Bequest motives
- Adverse selection in annuitant population
Framing and Demand for Annuities

- U.S. “experiments” with presentation of annuity options
- Framed as an investment: low demand
- Framed as insurance product: higher demand
- Annuity purchase requires high confidence in counterparty
Uninsured Late-Life Expenses: Particularly Medical in US

- Marshall, McGarry, Skinner (2010): Medical spending in last year of life
- Median $5061, 95\textsuperscript{th} percentile $49907
- Higher wealth is associated with higher out of pocket spending
- Persistence of medical spending shock is a key issue
Adverse Selection and Annuity Markets

- Attractive venue for studying adverse selection: can measure the population attributes
- Limited moral hazard
- Example of empirical work: Project with Amy Finkelstein that examines mortality patterns of individuals who buy different annuity products
Anecdotal Evidence of Asymmetric Information in Annuity Market

- Holland, England, France sold annuities in 16\textsuperscript{th} and 17\textsuperscript{th} centuries
- Dutch syndicates bought English annuities: moral hazard and adverse selection
- “Trent Demoiselles” contract sold by Swiss speculators
Predictions of Adverse Selection Models

- Positive correlation between (privately known) risk type and features of insurance which has greater marginal value for high risk types (example: backloading, guarantees)
- Equilibrium pricing should reflect self-selection
- Challenge: Moving from evidence of adverse selection to estimates of welfare cost (Einav – Finkelstein analysis)
Data Description

- Complete set of immediate annuities sold by a large U.K. insurer between 1981 and 1998

- All of the company’s information on the annuitant (age, gender, date of death)

- Complete details of the policy characteristics
## Five-Year Survival Rates, 61-65 Year Old Male Annuitants, 1998

<table>
<thead>
<tr>
<th>Policy Type</th>
<th>Compulsory</th>
<th>Voluntary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal, Baseline Policy</td>
<td>0.913</td>
<td>0.951</td>
</tr>
<tr>
<td>Escalating</td>
<td>0.970</td>
<td>0.989</td>
</tr>
<tr>
<td>Guaranteed</td>
<td>0.911</td>
<td>0.940</td>
</tr>
<tr>
<td>Index-Linked</td>
<td>0.962</td>
<td>0.980</td>
</tr>
</tbody>
</table>

Policy Questions that Arise from Adverse Selection Findings

- Should annuitisation be mandatory in retirement saving plans? Mitigating adverse selection vs. preserving individual choice
- Should the annuity menu be restricted?
- Should consumers be educated about annuities? By whom?
- How do public and private insurance markets interact?
Mandatory Annuitisation Regime (Pre-2011)

- Requirement to “secure an income” with pension balances by age 75
- Up to 25% of pension could be withdrawn at retirement
- Most chose to annuitise; “Unsecured Pension Arrangement” and “Alternatively Secured Pension Arrangement” were other options
Post-2011 Retirement Regime

- Must meet a Minimum Income Requirement (MIR) to be annuitisation-exempt
- Blake/Cannon/Tonks (2011): Estimate 28% of pensioners would achieve an MIR of £14K (single) and £20K (couple)
- Some non-annuitising households will claim Pension Credit – could cost £1.7B in PDV
- Higher-income households can now choose flexible draw-down pattern of pension wealth
Consequences of Repealing Mandatory Annuitisation

- Changing composition of annuitant pool
- Slower drawdown of pension assets (effects on tax revenue)
- Greater risk that households will outlive their resources
- Changing redistribution through annuitisation
- Potential effects on defined benefit (DB) pension market
## Life Expectancy at Age 67, by Attributes, US 2000 (Gong & Webb)

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whites, College +</td>
<td>84.4</td>
<td>87.8</td>
</tr>
<tr>
<td>Whites, High School +</td>
<td>83.4</td>
<td>87.3</td>
</tr>
<tr>
<td>Whites, &lt; High School</td>
<td>82.3</td>
<td>86.5</td>
</tr>
<tr>
<td>Blacks, College +</td>
<td>83.4</td>
<td>86.8</td>
</tr>
<tr>
<td>Blacks, High School +</td>
<td>82.2</td>
<td>86.1</td>
</tr>
<tr>
<td>Blacks, &lt; High School</td>
<td>81.0</td>
<td>85.1</td>
</tr>
</tbody>
</table>
Evolving EU Policy: Eliminate Gender-Based Insurance Policies

- Decision of ECJ affects annuities and other insurance products
- Banning gender in annuity pricing redistributes from low-risk (men) to high-risk (women)
- How will policy menu change to induce self-selection?
- What is the efficiency cost of confronting individuals with “wrong” prices?
Pooling vs. Separating Equilibrium

- State 1
- State 0
- High risk
- Low risk
- $H_{sep}$
- $L_{sep}$
- $P$
- $E$
- 45°
Open Issue: Insurance Market Structure & Information Collection

- How do insurers decide what information to collect? Role of cost of collection, ease of verification, improvement in risk classification
- How do exogenous changes in feasible information set affect insurance market? (genetic testing, ban on gender-based prices)
- Frontier research issue: Effect of public interventions on private insurance markets