Bequest Motives and the Annuity Puzzle

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Annuity puzzle

Life annuities

- Pay premium(s), receive income for life
  65-year-old man: $100,000 premium buys $6,300/year
- Theory: annuitize planned spending
- Simulations: big, robust gains ($wtp \approx \frac{N}{4}$)
- Behavior: almost no voluntary annuitization ($\approx 5\%$)

Importance

- Apparent failure of life cycle model
- Policy: require or encourage additional annuitization, e.g. Germany and UK
Bequest motives and annuities

Outline

1. Why bequest motives were rejected
2. Test rejection
3. Rough: How much do bequest motives explain?
Rejection of bequest motives

- Perfect markets: annuitize all but bequest
  - Consumption and bequests insured
  - Only people who wish to bequeath all non-annuity wealth don’t buy annuities
- Actual markets imperfect, but seem close enough
- Doubtful that most people want to bequeath all wealth
  → Bequest motives don’t explain lack of annuitization
Rejection of bequest motives

- Perfect markets: annuitize all but bequest
  - Consumption and bequests insured
  - Only people who wish to bequeath *all* non-annuity wealth don’t buy annuities
- Actual markets imperfect, but seem *close enough*
- Doubtful that most people want to bequeath all wealth

→ Bequest motives don’t explain lack of annuitization

I test whether annuity markets are close enough

- Participation depends on potential gains
- *Bequest motives likely significantly reduce gains*
Simulation model: Preferences and Constraints

\[ EU = \sum_{t=65}^{T} \beta^{t-65} S_t u(c_t) + \sum_{t=66}^{T+1} \beta^{t-65} p_t v(b_t) \]

\[ b_t = (1 + r)^{t-65} (N - \Pi) - \sum_{s=1}^{t-65} (1 + r)^s (c_{t-s} - y) \geq 0, \quad \forall t \]

Annuities:

\[ \Pi(a, \lambda) = \sum_{t=65}^{T} \frac{S_t a}{(1 + r)^{t-65}} / (1 - \lambda) \]
Parameterization

- \( u(c) = \frac{c^{1-\sigma}}{1-\sigma}, \sigma = 2 \)
- \( \beta = \frac{1}{1+r} = \frac{1}{1.03} \)
- 2003 US SS Administration male life table, \( T = 110 \)
Bequest motives

\[ v(b) = \theta_1 \left( \theta_2 + b \right)^{1-\theta_3} \]

\[ \theta_2 = T_h \sum_{i=1}^T y_h (1 + r) (i - 1), \]

\[ y_h = y_{\text{full}}, \quad T_h = 40, \]

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Bequest motives

\[ v(b) = \theta_1 \frac{(\theta_2 + b)^{1 - \theta_3}}{1 - \theta_3} \]

1. Linear:
\[ v(b) = \theta_1 b \quad (\theta_3 = 0) \]

2. Homothetic:
\[ v(b) = \theta_1 \frac{b^{1-\sigma}}{1-\sigma} \quad (\theta_2 = 0, \theta_3 = \sigma) \]

3. Threshold:
\[ v(b) = \theta_1 \frac{(\theta_2 + b)^{1-\sigma}}{1-\sigma} \quad (\theta_2 > 0, \theta_3 = \sigma) \]

\[ \theta_2 = \sum_{i=1}^{T_h} \frac{y_h}{(1+r)(i-1)}, \quad y_h = y_{\text{full}}, \quad T_h = 40, 10 \]
Should people who wish to leave bequests buy annuities?

- 10% load (loads in US 10–15%)
- 1/2 wealth already annuitized (9th decile of wealth dist of 65-year-olds in US)
- $\frac{b^*}{N} \equiv$ fraction of non-annuity wealth individual would bequeath with perfect markets; annuitize rest
- $\frac{WTP}{N} \equiv$ fraction of non-annuity wealth individual is willing to pay for access to annuities
Should people who wish to leave bequests buy annuities?
Why bequest motives reduce annuity gains

Components of annuity gains

- Consumption smoothing: welfare-equivalent flat c path
  \[ CS \equiv EDV \left( \left\{ c_t(\text{no ann}) \right\}_{t=65}^T \right) - EDV \left( \left\{ \bar{c} \right\}_{t=65}^T \right) \]

- Bequest insurance: welfare-equivalent certain bequest
  \[ BI \equiv EDV \left( \left\{ b_t(\text{no ann}) \right\}_{t=66}^{T+1} \right) - EDV \left( \left\{ \bar{b} \right\}_{t=66}^{T+1} \right) \]

- Trade bequests for consumption:
  \[ TBC \equiv WTP(\text{fair}) - CS - BI \]
Components of annuity gains
Average bequests

EDV( \{b_t\} \}/N

- With fair annuities
- No bequest motive
- Linear
- Threshold, \(T_h=40\)
- Threshold, \(T_h=10\)
- Homothetic

Fraction of wealth bequeathed with fair annuities, \(b^*/N\)
Do bequest motives explain annuity puzzle?

Bequest motives widespread, important

- Too much saving before retirement (Scholz, Seshadri, and Khitatrakun 2006)
- Too little dissaving after retirement (Palumbo 1999)
- Rich save more (Dynan, Skinner, and Zeldes 2004)
- Wealth distribution (De Nardi 2004)
- Big inter-household transfers (Gale and Scholz 1994)
Bequest motive estimates and annuity gains

- What’s demand for annuities if everyone has “typical” bequest motives?
- Bequest motives estimates:
  1. De Nardi (2004): in OLG model, matches wealth distribution, transfer share of wealth, share of small bequests
  3. Hurd and Smith (2002): bequest motive consistent with their anticipated bequests measure
Bequest motive estimates and annuity gains

- No bequest motive: deciles 3–10 buy, upper deciles gain a lot: decile 8 wtp about $18k, 10% of N.
- With any of 3 bequest motives, few buy and they gain little
  - De Nardi (2004): deciles 9–10 buy, wtp $1,310 and $12,310
  - Ameriks et al (2008): 3 deciles buy, wtp less than $3,000
  - Hurd and Smith (2002): deciles 3–6 buy, wtp less than $600

(Strong precautionary motive can eliminate demand but predicts counterfactually high demand for long-term care insurance [Ameriks et al].)
Bequest motive proxies have little predictive power for annuitization decisions.

<table>
<thead>
<tr>
<th>Importance of leaving an inheritance</th>
<th>Children</th>
<th>No children</th>
<th>Own annuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important</td>
<td></td>
<td></td>
<td>4.5%</td>
</tr>
<tr>
<td>Somewhat important</td>
<td></td>
<td></td>
<td>5.0%</td>
</tr>
<tr>
<td>Not at all important</td>
<td></td>
<td></td>
<td>5.1%</td>
</tr>
<tr>
<td>Spouses disagree</td>
<td></td>
<td></td>
<td>3.3%</td>
</tr>
<tr>
<td>Own annuity</td>
<td>4.8%</td>
<td>5.7%</td>
<td></td>
</tr>
</tbody>
</table>
Direct tests of bequest motives and annuitization

Bequest motive proxies have little predictive power for annuitization decisions.

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<th>Children</th>
<th>No children</th>
<th>Own annuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important</td>
<td>22.8%</td>
<td>20.4%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>44.2%</td>
<td>34.4%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Not at all important</td>
<td>28.6%</td>
<td>42.8%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Spouses disagree</td>
<td>4.5%</td>
<td>2.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Own annuity</td>
<td>4.8%</td>
<td>5.7%</td>
<td></td>
</tr>
</tbody>
</table>

- Issues with proxies
  - Children: little effect on saving, giving, reported importance
  - Importance: some say not important but choose guarantee (Laitner and Juster 1996), precautionary risks may dominate

- Issues with annuity ownership: tax incentives (Johnson, Burman, and Kobes 2004), not life-contingent, etc.
Conclusion

- People who wish to leave bequests likely better off with available annuities
- Bequest motives likely play central role in lack of annuitization
Strength of bequest motives: exhaust wealth

argmin{b_{t=0}}

No bequest motive
Linear
Altruistic, T_h = 40
Altruistic, T_h = 10
CRRA

Fraction of wealth bequeathed with fair annuities, b*/W_{65}
Strength of bequest motives: consumption path

Consumption ($1,000s)

Age

No bequest motive
$b^*/W_{65} = 0$

$b^*/W_{65} = 0.25$

$b^*/W_{65} = 0.50$

$b^*/W_{65} = 0.75$

$b^*/W_{65} = 1.0$

[Diagram showing consumption paths for different bequest motives, with age on the x-axis and consumption ($1,000s$) on the y-axis.]
Annuity puzzle explanations

- Family risk sharing
- Medical spending risk
- Pre-existing annuities
- Annuity loads
- Limited annuity options
- Default risk
- Lifespan predictability
### Bequest Motives and the Annuity Puzzle

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#### Introduction

#### Simulations

#### Model

#### Results

#### Conclusion

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**Table 1**

Distribution of estates (thousands), AHEAD decedents

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Single</th>
<th>Married</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>30</td>
<td>2.0</td>
<td>35.0</td>
<td>20.0</td>
</tr>
<tr>
<td>50</td>
<td>40.0</td>
<td>62.5</td>
<td>62.2</td>
</tr>
<tr>
<td>70</td>
<td>80.0</td>
<td>168.2</td>
<td>120.0</td>
</tr>
<tr>
<td>90</td>
<td>187.6</td>
<td>200.0</td>
<td>200.0</td>
</tr>
<tr>
<td>95</td>
<td>250.0</td>
<td>500.0</td>
<td>300.0</td>
</tr>
<tr>
<td>98</td>
<td>600.0</td>
<td>600.0</td>
<td>600.0</td>
</tr>
</tbody>
</table>

*Mean estate*: 82.0, 117.0, 104.5

*Wave 1 wealth*: 81.6, 193.7, 133.7

*Wave 1 non-housing wealth*: 42.7, 108.8, 73.4
Table 2
Division of bequests (percent), AHEAD wave 2 exit interview

<table>
<thead>
<tr>
<th>bequest targets</th>
<th>characteristics of decedent</th>
<th>spouse</th>
<th>no spouse</th>
<th>all</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>spouse</td>
<td>children</td>
<td>no children</td>
<td>children</td>
</tr>
<tr>
<td>spouse</td>
<td>76.1</td>
<td>0.0</td>
<td>80.3</td>
<td>0.0</td>
</tr>
<tr>
<td>children</td>
<td>22.6</td>
<td>91.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>charity</td>
<td>0.2</td>
<td>0.6</td>
<td>17.6</td>
<td>5.5</td>
</tr>
<tr>
<td>siblings</td>
<td>0.2</td>
<td>0.6</td>
<td>0.7</td>
<td>39.1</td>
</tr>
<tr>
<td>other relatives</td>
<td>0.8</td>
<td>5.4</td>
<td>1.2</td>
<td>44.5</td>
</tr>
<tr>
<td>friends</td>
<td>0.0</td>
<td>9.6</td>
<td>0.1</td>
<td>1.7</td>
</tr>
<tr>
<td>other</td>
<td>0.1</td>
<td>1.2</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

number of observations:
- 302
- 17
- 284
- 58

wave 1 wealth (1000):
- 209.9
- 188.3
- 82.8
- 110.6

Note: Excludes estates that had no value.
Wealth allocation

<table>
<thead>
<tr>
<th>Total household wealth ($)</th>
<th>Annuity wealth (%)</th>
<th>Non-annuity wealth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social Security</td>
<td>Employer pensions</td>
</tr>
<tr>
<td>80,323</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td>167,764</td>
<td>39</td>
<td>11</td>
</tr>
<tr>
<td>277,050</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>461,376</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>1,437,654</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

Table: Averages for adults age 65+ in 2000. Other assets include businesses, real estate other than primary and secondary residences, and vehicles. Source: Johnson, Burman, and Kobes (2004), HRS.