What Matters for Annuity Demand: Objective Life Expectancy or Subjective Survival Pessimism?

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Introduction
Motivation

• Individuals are pessimistic about their survival when they make irreversible annuitization decisions.
  o A standard life-cycle model predicts that this should be quantitatively important (O’Dea and Sturrock 2023).

• Question:
  o Can we find empirical evidence that survival pessimism affects annuitization?
Data

- *Health and Retirement Study (HRS)*
  - We use subjective mortality questions to calculate subjective life expectancy
  - Focus on ages 55 to 64
  - In total 32,179 person/year observations

  - Objective life expectancies
    - based on gender, cohort, race, education
Subjective mortality is higher than objective before age 70.

Source: Authors’ calculations using the Health and Retirement Study (HRS) (2000-2016).
This pattern is similar for females.

Objective and Subjective Probabilities for Females

Source: Authors’ calculations using the HRS (2000-2016).
Methods
The HRS asks respondents their subjective mortality probabilities.

- The expectations module of the HRS asks participants:
  - “What is the percent chance that you will live to be age [X] or more?”

- Everyone in our sample answers two questions per wave
  - We assume that they answer a third question (age 110) according to the life tables
  - In total we have three answers: \( R_i(\alpha, t) \), for \( \alpha \in \{\alpha_1, \alpha_2, \alpha_3\} \)
Given subjective survival to three ages, a curve is fitted.

- We assume that subjective survival curves follow a two parameter Weibull distribution:

\[ S(a, \lambda_i, \kappa_i) = \exp\left[-\left(\frac{a - z_i}{\lambda_i}\right)^{\kappa_i}\right], \quad \lambda_i, \kappa_i > 0 \]

- We estimate the curves for every individual using NLS, and calculate the subjective life expectancy:

\[ (\hat{\lambda}_i, \hat{\kappa}_i) = \arg\min_{\lambda_i, \kappa_i} \sum_{a \in A_i} (R_i(a, z_i) - S(a, \lambda_i, \kappa_i))^2 \]
Objective vs. subjective life expectancy

Objective and Subjective Life Expectancies in the HRS

<table>
<thead>
<tr>
<th></th>
<th>Everyone</th>
<th>Subjective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objective</td>
<td>Subjective</td>
</tr>
<tr>
<td>Ages 55-59</td>
<td>Total</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>28.2</td>
</tr>
<tr>
<td></td>
<td>Low education</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>24.0</td>
</tr>
<tr>
<td>Ages 60-65</td>
<td>Total</td>
<td>21.1</td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td>Low education</td>
<td>19.7</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>20.9</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Source: Author’s estimates from the HRS (2000-2016).
Regressions link subjective and objective survival to annuitization rates.

- We estimate equations of the form:

\[ A_{i,t} = \beta_0 + \beta_1 \times LE_{i,t}^{obj} + \beta_2 \times (LE_{i,t}^{obj} - LE_{i,t}^{subj}) + \beta_3 \times X_{i,t} + \varepsilon_{i,t} \]

- \( A_{i,t} \) is an indicator for annuity income

- \( LE_{i,t}^{obj} \) and \( LE_{i,t}^{subj} \) are objective and subjective life expectancy

- Subjective survival pessimism is: \( LE_{i,t}^{obj} - LE_{i,t}^{subj} \)

- \( X_{i,t} \) is a vector of controls
## Results

Regression Results for the Effect of Life Expectancy and Pessimism on Owning a Commercial Annuity

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short</td>
<td>Intermediate</td>
<td>Main</td>
</tr>
<tr>
<td>Objective LE</td>
<td>0.00204***</td>
<td>0.00193**</td>
<td>0.00128*</td>
</tr>
<tr>
<td></td>
<td>(0.000760)</td>
<td>(0.000784)</td>
<td>(0.000725)</td>
</tr>
<tr>
<td>Pessimism</td>
<td>-0.000233*</td>
<td>-0.000259*</td>
<td>-0.000224*</td>
</tr>
<tr>
<td></td>
<td>(0.000130)</td>
<td>(0.000133)</td>
<td>(0.000129)</td>
</tr>
<tr>
<td>Male</td>
<td>0.000951</td>
<td>0.00109</td>
<td>-0.00230</td>
</tr>
<tr>
<td>Health controls</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Wealth &amp; family controls</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Author’s estimates from the HRS (2000-2016).
Alternative regressions

• We also consider:
  o $A_{i,t}$: Share of Wealth annuitized
  o $A_{i,t}$: Share of Income from an annuity
  o Including individual fixed-effects
  o Controlling for planning horizon
  o Controlling for financial literacy

• Results are similar.
  o $\beta_2 < 0.1\%$ (coefficient of subjective survival pessimism)
Conclusion

- We assess whether survival pessimism affects annuitization
- We find a small effect (0.1 p.p. / per year reduction)
- Objective life expectancy coefficient is over 5 times larger
- This result is robust to alternative specifications
- Study is descriptive / annuitization is irreversible
Thanks!