

What matters for annuity demand: Objective life expectancy or subjective survival pessimism?

Introduction

Since 1965, academics have argued that, under a broad set of assumptions, individuals should annuitize a large part of their assets (Yaari 1965). For nearly as long, it has also been documented that annuitization rates fall short of what seem to be optimal levels, a fact known as the “annuity puzzle.”¹

One proposed explanation is adverse selection: annuity prices are set to compensate insurers for the higher average life expectancy of those who voluntarily purchase annuities, thereby making annuities less attractive to potential consumers (Mitchell et al. 1999). An implication of this explanation is that objective life expectancy should predict annuity purchases. Another proposed explanation is subjective survival pessimism: evidence from multiple studies suggests that individuals in their 50s and 60s underestimate their life expectancies. Such pessimism makes them underestimate the years they have to live and therefore their lifetime payouts from an annuity.² An implication of this explanation is that subjective survival pessimism (defined as the difference between objective and subjective life expectancy) should predict annuity purchases. The question this paper addresses is: how do these two (non-contradictory) explanations contribute to annuitization decisions in practice?

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1 For examples of recent work exploring this puzzle, see Laitner, Silverman, and Stolyarov (2018), Lockwood (2018), and Brown et al. (2021). In the 2018 *Health and Retirement Study*, around 5% of respondents reported receiving annuity income.

2 For an early discussion of the impact of subjective mortality on annuitization decisions, see Hamermesh (1985).

The analysis explores this question using the *Health and Retirement Study* (HRS) to estimate regression models that control for objective life expectancy, subjective survival pessimism, and other characteristics that are linked to annuitization decisions. By conducting a horse race between the objective and subjective measures, the contribution of objective life expectancy to annuity demand can be controlled for and, holding objective life expectancy constant, the incremental effect of pessimism can be estimated.

One impediment to this type of estimation is that, in practice, objective life expectancy is heterogeneous across individuals and correlated with pessimism.³ A key innovation in the current project is that it captures objective life expectancy heterogeneity by using mortality tables that account for race, gender, cohort, age, and education. The analysis also uses detailed controls for diagnosed health conditions that might impact individuals' objective life expectancy.⁴ By incorporating the reasonable drivers that make objective life expectancy deviate from the population-level life expectancy, the analysis arbitrates between low objective life expectancy and pessimism as impediments to the purchase of annuities.

Background

Of the many possible explanations for the annuity puzzle, irrational pessimism on the part of potential consumers regarding future life expectancy is appealing. Naturally, no one can learn about their own life expectancy from personal experience. Further, the decision to buy an annuity is itself usually made once and for all, a situation in which individuals never get the chance to learn from their own mistakes—and so mistakes can persist.

Furthermore, assessing to what extent *objective* life expectancy, versus *subjective* survival pessimism, drives demand for annuities is important for annuity providers and policymakers. If demand for annuities is depressed largely because of irrational pessimism, perhaps such pessimism can be reduced through interventions that simply inform the public regarding mortality rates. Conversely, if adverse selection based on objective life expectancy is the main reason for low annuitization rates, other policies such as a more public role in annuity provision could be considered to reduce the price of annuity products.⁵

Theoretical work has shown that annuitization rates can be substantially depressed in a lifecycle model due to pessimistic survival expectations (O'Dea and Sturrock

2021).⁶ However, the impact of such survival pessimism on annuitization in practice has not been empirically demonstrated.

Studying the topic is complicated since, in reality, individual objective mortality expectations may vary from full-population life tables that differ only by gender and birth year for perfectly rational reasons: information on race, socioeconomic status (SES), and health conditions may reasonably inform individuals' assessments of their life expectancy above and beyond irrational pessimism. Both low objective life expectancy expectations and pessimism may reduce demand for annuities priced for annuitants with high life expectancies. The next sections describe how the current analysis distinguishes the objective life expectancy and subjective pessimism of potential annuity consumers.

Data

The analysis draws on data from the HRS, a nationally representative, biennial longitudinal survey of adults in the United States. The survey started in 1992, and it is based on a steady-state sampling design with a new cohort ages 51-56 entering every six years. The HRS asks questions about a wide range of topics broadly used in retirement research, including education, income, wealth, health, cognition, expectations, and demographics.

The expectations module of the survey asks participants about their self-reported probability of living to older ages. These questions take the form: “*What is the percent chance that you will live to be age [X] or more?*” Participants answer this question with a number between 0 and 100, where 0 means that they think that there is

3 Hurd and McGarry (1995) show that subjective mortality correlates with SES and responds to new diagnoses of disease. Elder (2013) shows that subjective mortality expectations are predictive of realized future mortality for the same individual.

4 Chetty et al. (2016) provide evidence of income gradients in mortality. Leive and Ruhm (2021) and Wettstein et al. (2021) find large race and education mortality differentials.

5 The literature suggests that effective private annuity mandates may be hard to devise; see Einav, Finkelstein, and Schrimpf (2010) and Hurwitz, Sade, and Winter (2020). However, mandated publicly provided annuities, such as Social Security in the United States, are common.

6 Prior research has also shown that subjective mortality expectations are relevant to decision making in several other related contexts, such as timing of retirement and Social Security claiming (Hurd, Smith, and Zissimopoulos 2004; Bloom et al. 2006) and savings (Post and Hanewald 2013; Heimer, Myrseth, and Schoenle 2019).

no chance that the event will happen, and 100 means that they think that the event is certain. We use these answers to estimate the individual subjective survival curves and *subjective* life expectancies.

To calculate *objective* life expectancies, the analysis uses the life tables estimated by Wettstein et al. (2021). They estimate mortality rates by gender, cohort, race, age, and education, combining data from the 2020 Social Security Trustees Report, the National Vital Statistics System, and the American Community Survey.

Methodology

To assess the relative importance of objective life expectancy and subjective survival pessimism, a regression model that controls for objective life expectancy, pessimism, and the information that insurers use to price annuities is estimated. Then, this estimation is repeated, adding controls for various diagnosed health conditions that could affect objective life expectancy and other forms of income and assets that might substitute for annuitized wealth, such as whether someone has a defined benefit (DB) pension plan, how much Social Security wealth they have, or whether they own a home.

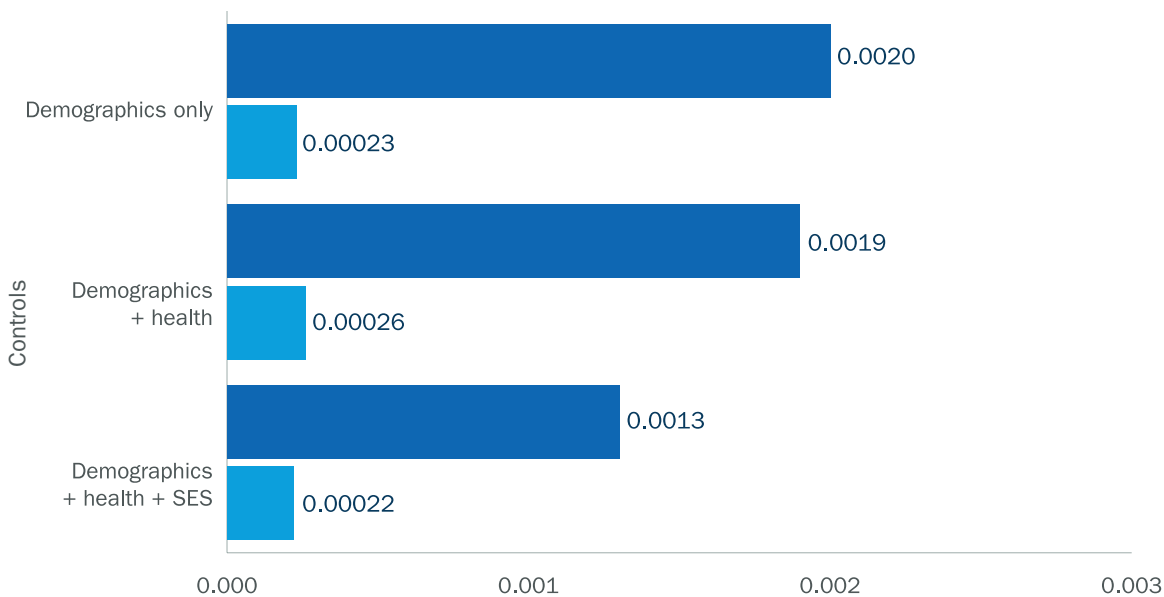
In addition, controls for marital status and children are included, as these demographic variables have been shown to be related to both the theoretical value of annuities and their take-up empirically.

Finally, the analysis is repeated, replacing the dependent variable with the share of financial wealth held in an annuity, which is defined by dividing the present discounted value of all annuities by current net financial wealth (including this annuitized wealth).

Results

The results, displayed in Figure 1, show that both coefficients for objective life expectancy and pessimism are statistically significant, implying that they both affect the choice of whether to purchase an annuity. The estimates in the top cluster of Figure 1 indicate that a one-year increase in objective life expectancy increases the probability of holding an annuity by 0.20 percentage points (a 2% change relative to the share who ever buy an annuity, 8.8%), while a one-year decline in pessimism increases the probability of holding an annuity by 0.023 percentage points (a 0.2% change).

Figure 1. Selected regression results for the effect of the life expectancy on owning a commercial annuity



Note: All bars are statistically significant at least at the 10% level.

Source: Authors' estimates from the University of Michigan Health and Retirement Study (HRS) (2000-2016).

When we include additional controls, such as objective physician-diagnosed health conditions, marital status, whether the individual has children, and the presence of a DB pension plan, we still find that objective life expectancy and pessimism are statistically significant, although the magnitude and significance of objective life expectancy declines as more controls are added. However, when we repeat the analysis replacing the dependent variable with the share of financial wealth held in an annuity, we find little evidence of any effect of objective life expectancy once controlling for health conditions.⁷

Taken at face value, the results on holding any annuity are consistent with objective life expectancy having a much stronger effect on the decision of whether to buy an annuity than pessimism. The coefficient on objective life expectancy is an order of magnitude larger than that on pessimism.

Conclusion

This paper assessed the relative importance of objective life expectancy and subjective survival pessimism in annuitization decisions. Regression models were estimated that control for objective life expectancy, subjective survival pessimism, and other characteristics that are linked to annuitization decisions. Results suggest that both objective life expectancy and subjective pessimism are correlated with the presence of a commercial annuity.

However, the estimates indicate that objective life expectancies are more important than pessimism in the decision of whether to annuitize. A one-year increase in objective life expectancy increases the chance of buying a commercial annuity by 0.20 percentage points. Meanwhile, a one-year decline in pessimism is associated with an increase of 0.023 percentage points in the probability of having an annuity, nearly nine times smaller than the coefficient on objective life expectancy.

One limitation of our methods is that, although objective life expectancy and pessimism can predict having a commercial annuity, the relationship does not have to be causal. Pessimism about life expectancy may be correlated with pessimism about other variables that affect annuity purchases. These variables include pessimism about medical expenditures and pessimism about market risk. Hence, our results on the importance of subjective life expectancies may capture an overall measure of pessimism rather than a causal effect.

A final caveat to the straightforward interpretation of the results here is that subjective beliefs are inherently more difficult to measure than observable objective characteristics. Measurement error may lead to attenuation of the correlation of subjective pessimism and annuitization, which could in turn give an advantage to the objective measure in the horse race regressions. This analysis represents a best effort at measuring beliefs, but future work may improve on these methods.

⁷ Finding selection in one contract dimension but not in another is not unusual. Finkelstein and Poterba (2004) also find evidence of selection on some contract dimensions, and no evidence on others.

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