

Subjective Health Status and Annuity Participation

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Abstract

This study examines subjective health evaluation and its association with annuity participation. In the event of a health shock, individuals may face high liquidity needs during a reduced longevity period. Consequently, subjective health status may serve as a form of intertemporal risk calibration when assessing the subjective discount factor at which the present value of an annuity benefit is estimated. The findings suggest that individuals who subjectively evaluate their health status as better than average are more likely to own an annuity compared to those who subjectively evaluate their health status as lower than average.

Introduction and Literature Review

Global mortality improvements have resulted in increased longevity risk for individuals exiting the labor market and entering retirement. Individuals can now expect to experience a longer retirement period than at any other point in history (Shiri et al., 2021). While longer retirement periods are generally viewed as a positive societal improvement, one negative externality of longer retirement periods is the growing concerns related to financing retirement consumption. In addition to other non-labor income sources, such as pension income or government transfers, annuities provide a solution to hedge against longevity risk. However, the literature has observed a low adoption rate for annuity products, despite the increasing longevity risk faced by individuals exiting the labor market (Benartzi et al., 2011; Scott, 2015). This has been defined in the literature as the “Annuity Puzzle” (Peijnenburg et al., 2016).

One explanation for the low annuity participation rate has been individuals’ consideration of their own mortality when deciding to participate in annuity ownership. The results from four experiments have shown that lower-than-average mortality expectations are related to decreased annuity participation (Salisbury & Nenkov, 2016). The results from these experiments suggested that choosing an annuity is an anxiety-provoking process and increases mortality salience. Under the framework of terror management theory, the increase in mortality salience motivates individuals to remove mortality-related thoughts by avoiding the decision to purchase an annuity altogether.

Unlike mortality expectation, subjective health evaluation provides a salient condition to measure potential longevity without the consideration of mortality (Pearson, 2021; Pearson, 2022). Moreover, subjective mortality expectations have been shown to be delusive substitutes for understanding objective behavior. For instance, Khwaja et al. (2007) utilized the Health and Retirement Study to show that current smokers have increased optimism regarding their mortality expectations when compared to those who never smoked. Using a latent-factor model, Elder (2013) showed subjective mortality forecasts lack the properties of senescence. Subjective health status has also been shown to be a key determinant of longevity and subjective survival probabilities (Hurd et al., 2001; Pearson & Lee, 2022). The resulting liquidity constraints from an annuity purchase have been offered by the literature as a reason for the observed low annuity adoption rate (Kojien et al., 2016; Zhao, 2015).

The authors posit that an explanation for the low annuity adoption rate is related to individuals’ intertemporal risk calibration when assessing health consumption needs and the decision to participate in annuity ownership. Health shocks have a synchronized effect on health expenses and expected longevity. As a result, individuals with a low subjective health evaluation may be reluctant to purchase an annuity when considering the liquidity constraints resulting from future health expenditures. Moreover, a low subjective health evaluation may increase the saliency of individuals’ longevity, resulting in a lower perceived annuity benefit. On the other hand, if individuals’ subjective evaluation of their current health is

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perceived as above average, individuals may anticipate lower future health costs and longer longevity expectations when compared to individuals whose current health is perceived as lower than average. Thus, the authors hypothesize that individuals with low (high) subjective health evaluation will be less (more) likely to purchase an annuity.

Methods

Data

This study examines longitudinal data that are collected from The Health and Retirement Study (HRS). The HRS is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan biennially. Specifically, the 2018 RAND HRS Longitudinal File is used. This version includes panel data from the 1992 to 2018 waves of the HRS. The sample size is 245,572.

Household Annuity Participation = 1 if respondent or spouse owns an annuity; 0 otherwise

Total Household Annuity Income = $\Sigma(Aincome_r + Aincome_s)$

Total Household Relative Annuity Income = $\frac{\Sigma(Aincome_r + Aincome_s)}{Total\ Household\ Income}$

Total Household Relative Annuity Income Among Annuity Owners = $\frac{\Sigma(Aincome_r + Aincome_s)}{Total\ Household\ Income}$

Variables

The dependent variable of interest is annuity participation. For the empirical analyses, annuity participation is measured in two ways. The first measurement is a binary variable, which is investigated for whether study participants own an annuity. This variable is coded as a “1” if the study participant owns an annuity and a “0” is coded otherwise. A continuous variable measuring annuity income amount is also investigated among the total sample and among current annuity owners.

The key explanatory variable of interest is subjective health status. Subjective health status is measured as study participants’ self-reported general health status. Subjective health status is measured as 1 (Poor), 2 (Fair), 3 (Good), 4 (Very Good), and 5 (Excellent). Age, age², wealth, non-annuity income, and respondents’ self-reported probability of living to 75 and probability of living to 85 are also examined.

Analytic Model

Three separate analytical models are estimated to measure the subjective evaluation of individuals’ health and the association with annuity participation. The first model was estimated on the binary variable measuring whether the study participant owns an annuity. This model is examined utilizing a random-effects probit regression. Average marginal effects are computed post-estimation.

The second and third models utilized the annuity income amount variable and were estimated utilizing two fixed-effects regressions. The second model is estimated utilizing the entire sample. The third model is estimated in the same capacity on the subset of study participants who own an annuity (n = 7,906). Hausman tests were conducted to ensure model fit.

The subjective health status variable enters all three empirical models as a categorical variable, with “Poor” serving as the reference category to which other subjective health statuses are compared. Age, Age², Wealth, and Non-Annuity Income enter the models as continuous variables. Married enters the models as a binary variable, coded as a “1” if the study participant is married. A “0” is coded otherwise.

Results

Main Results

Table 1 provides a frequency distribution of annuity ownership rates and average annuity income amount by subjective health status. It is observed that annuity ownership remains relatively low among all subjective health statuses: 2.23% (Poor), 2.81% (Fair), 3.39% (Good), 3.71% (Very Good), and 3.07% (Excellent). Only slight mean annuity income amount differences are observed among the total sample (annuity owners). Poor: 334.22 (15,004.12), Fair: 412.91 (14,702.33), Good: 462.39 (13,654.51), Very Good: 552.68 (14,894.93), and Excellent: 451.19 (14,707.26).

Table 2 provides a description of the sample. *This table is removed per ACCI submission guidelines regarding manuscript length.*

Table 3 provides the results of the three estimated empirical models. The random-effects probit average marginal effects reveal that, when compared to the “Poor” subjective health status, the “Fair,” “Good,” “Very Good,” and “Excellent” subjective health statuses are associated positively with annuity ownership ($p < 0.001$). Increasing magnitudes are observed as the subjective health status increases; however, the magnitudes remain relatively modest: 0.0045 (Fair), 0.0088 (Good), 0.0125 (Very Good), and 0.0146 (Excellent).

The annuity income amount fixed-effects regressions resulted in no statistically significant associations between the “Poor” subjective health status and the “Fair,” “Good,” “Very Good,” and “Excellent” subjective health statuses.

The correlation between respondents’ subjective health status and their self-reported probability of living to 75 and probability of living to 85 reveal correlation coefficients of 0.3523 and 0.2920, respectively. The table is not provided for brevity.

Discussion

While this study finds that higher degrees of subjective health evaluation are associated positively with the decision to purchase an annuity, the magnitude of the results suggests little economic significance. For instance, when compared to study participants who reported their health as poor, those who reported their health as excellent were on average only 0.0146 more probable to purchase an annuity. Given the level of the economic significance of the annuity ownership results, subjective health evaluation appears to be a somewhat negligible consideration in the decision to own an annuity.

No statistically significant relationship was observed between subjective health status and the amount of annuity income among both the full sample and those currently receiving annuity income, even when controlling for age, wealth, and non-annuity income. This result suggests that individuals’ level of annuity income is not dependent on subjective health evaluation. To note, fixed-effects regressions require within-subject variation, enabling the model to control for time-invariant variables and reducing omitted variable bias. Consequently, the authors were able to observe the effects of changing health statuses on the annuity income amount variable.

When examining the results in their totality, the findings suggest that subjective health evaluation does not fully explain the low annuity participation rate. As noted by Zhao (2015), rational agents would not fully insure uncertain health expenses nor fully annuitize their wealth under uncertain longevity, as non-annuitization provides uncertainty reduction when considering the connection between longevity, health expenses, and the need for liquidity. For instance, a health shock both increases health expenses and may reduce longevity. Thus, in the event of a health shock, non-annuitized assets allow for increased health consumption during a potentially reduced life period.

Health shocks, and the resulting increase in healthcare costs, decrease the attractiveness of annuities when considering the trade-off between the need for liquidity during a period of reduced longevity. In other words, the purchase of an annuity, and the resulting liquidity constraints, are a consideration when evaluating the uncertainty regarding the ability to finance healthcare consumption. Two overarching implications are drawn from these findings. (1) Individuals maintain high future health uncertainty, independent of their current health state, resulting in decreases in annuity demand and preference for increased maintenance of their liquidity. (2) Individuals with above-average health may not fully understand the longevity insurance benefits from annuity participation.

It should be noted that the literature has offered copious explanations for the Annuity Puzzle, such as bequest motives (Banks & Crawford, 2022; Lockwood, 2012), unfair annuity pricing (Agnew, 2008), the way in which an annuity purchase is framed (Agnew, 2008; Ramsay & Oguledo, 2018), and lower degrees of investor sophistication (Korankye et al., 2022). Future research may benefit from considering the explanations for the annuity puzzle in their totality when conducting future research on the annuity puzzle.

Implications

Financial service professionals often include the use of annuities and other insurance products as a part of their holistic approach to financial advice and planning. The existence of a measure that allows individuals to assess their current health state and the degree of substitutability between an annuity and a non-annuity financial option would be valuable for understanding and managing the nexus between longevity uncertainty, uncertainty regarding future health shocks, and liquidity risk. Standardization of this

type of assessment metric would allow for greater transparency to retail financial service customers. Similarly, insurance companies that report optimal annuity choice as a function of health can benefit their customers by providing decision-relevant information when their customers are in the process of purchasing an annuity.

Employer and non-employer retirement product designs offer solutions to improve annuity decision-making. As suggested by Kojien et al., (2016), a life-cycle product that shifts from life insurance to annuities during advancing age allows individuals to arrive at mortality-optimal insurance solutions over the life cycle, similar to the current life-cycle mutual funds that are available within employer-sponsored retirement plans and other retail financial outlets. Under a similar scope, defined contribution plans that default a portion of contributions to an age-dependent annuity account would offer a synthetic annuity-type option to manage longevity risk, independent of health status. Given the trend of employers shifting from defined-benefit retirement plans to defined-contribution retirement plans, an annuity option housed within an employer-sponsored defined-contribution plan allows plan participants increased access to financial solutions that may better fit their individual needs. These types of product designs are more likely to garner greater value for the financially illiterate.

Uncertainty regarding optimal annuity usage, independent of health, could also help explain this study's findings. As noted by Korankye et al. (2022), lower degrees of investor sophistication were found to be associated with lower rates of annuity ownership. An improved understanding of the role of annuities within the household portfolio may allow individuals to better comprehend the advantages and disadvantages of annuity participation. Financial planning education has been connected to positive financial outcomes (Sterbenz et al., 2021; Pearson & Lacombe, 2021; Korankye & Pearson, 2023). Thus, personal financial literacy and education programs incorporating annuity education can provide an outlet for individuals to understand annuity products and their benefits.

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Tables

Table 1

Frequency of Annuity Usage and Dollar Amount by Subjective Health Status

Health Status	Total Sample (N = 245,572)						Annuity Owners (n = 7,906)				
	Ownership Rates			Annuity Income Amounts							
	Mean	Std. Dev.	Freq (#)	Mean (\$)	Std. Dev.	Freq (#)	Freq (%)	Mean (\$)	Std. Dev.	Freq (#)	Freq (%)
Poor	0.0223	0.1476	21,863	334.2178	10,450.05	21,863	8.90%	15,004.12	68,496.74	487	6.16%
Fair	0.0281	0.1652	50,490	412.9117	10,539.27	50,490	20.56%	14,702.33	61,216.90	1,418	17.94%
Good	0.0339	0.1809	77,162	462.3939	10,406.67	77,162	31.42%	13,654.51	54,945.88	2,613	33.05%
Very good	0.0371	0.1890	68,643	552.6765	9,224.716	68,643	27.95%	14,894.93	45,612.74	2,547	32.22%
Excellent	0.0307	0.1724	27,414	451.1856	6,032.783	27,414	11.16%	14,707.26	31,269.78	841	10.64%
Total	0.0322	0.0177	245,572	464.7937	9,718.044	245,572	100%	14,437.18	52,269.20	7,906	100%

Data collected from the 1992-2018 waves of the Health and Retirement Survey.

Table 2
Combined Regression Results

	Total Sample Results (N = 245,572)				Annuity Owner Results (n = 7,906)	
	Random-Effects Probit Results (Average Marginal Effects)		Fixed-Effects Regression Results (OLS)			
	Coefficient	Std. Dev.	Coefficient	Std. Dev.	Coefficient	Std. Dev.
Health (Poor as Reference)						
Fair	0.0045**	0.0012	0.0064	0.0081	-0.7153	0.4601
Good	0.0088**	0.0012	0.0016	0.0077	-0.4151	0.4719
Very good	0.0125**	0.0013	-0.0051	0.0078	-0.5242	0.4946
Excellent	0.0146**	0.0017	-0.0235	0.0092	-0.3979	0.5819
Age	0.0097**	0.004	-0.0018	0.0017	0.0729	0.1572
Age ²	-0.0001**	2.98e-06	0.0000	0.0000	-0.0004	0.0011
Wealth	1.86e-09	2.28e-10	1.12e-07**	1.52e-09	1.41e-06**	1.00e-07
Non-Annuity Income	-2.38e-08**	6.44e-09	1.24e-07**	3.55e-08	1.10e-06	8.28e-07
Married	-0.0069**	0.0009	-0.0494**	0.0044	-0.5114	0.3742

Data collected from the 1992-2018 waves of the Health and Retirement Survey.
Significance is defined as follows: * significant at p < 0.01 ** significant at p < 0.001