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Authors, Titles and Publication Dates of the Articles Addressed in the Insight
John W. Payne, Namika Sagara, Suzanne B. Shu, Kirstin C. Appelt, and Eric J. Johnson, "Life expectancy as a constructed belief: Evidence of a live-to or die-by framing effect", *Journal of Risk and Uncertainty* Vol. 46, No. 1 (February 2013), pp. 27-50

Insight: NEW TAKES ON THE ANNUITY PUZZLE: THE IMPORTANCE OF FRAMING LONGEVITY WITH CLIENTS

IDEAS IN THE INSIGHT YOU CAN PUT INTO ACTION

In general, asking clients to think about whether they will be alive by – as opposed to deceased by – a given age will lead to longer estimates of expected lifetime.

- Ask clients to consider the state of their personal health and lifetime estimate before talking about purchasing an annuity.
- When asking for estimates of ages under 80, ask client the chance they will be alive by age X; for age estimates over 80, ask client for chance they will be deceased by age X.
- There is also evidence that personal information about health state matters more than publicly available demographic data when estimating life expectancy highlighting the importance of talking with clients rather than using an actuarial approach.

PRINCIPAL INSIGHTS

Estimating how long we expect to live is critical input for many financial decisions, ranging from how much to save to when to retire to the kind of retirement plan we choose. As Payne et al. demonstrate, the way that we ask people to estimate their expected lifetime can have significant effects on how they view their remaining years of life and suggests that care be taken when asking this question. In particular, the study shows that the likelihood of purchasing an annuity product is affected by how we ask for estimates of life expectancy.

When we talk about life expectancy, for any person and any given age X, the $\Pr(\text{person dies before age X}) + \Pr(\text{person lives to be at least age X}) = 1$. $\Pr(A)$ is the probability of event A occurring. It follows that if we estimate one of these probabilities, then we can also find the other and it should not matter which question we ask. In this study, people who were asked to estimate "the chance that I will live to be X years or older," hereafter *live-to* framing, were much more optimistic about the length of their lifetime than those asked to estimate "the chance that I will die at X years or younger," here after *die-by* framing. Across three studies, the *live-to* question led to estimated lifetimes of 7.38 to 9.17 years longer than the *die-by* question. This study also provides further evidence that estimates of quantities such as expected lifetime are constructed based on context rather than retrieved from memory. In the study, lifetime estimates elicited with *die-by* questions were more consistent with

SSA data for ages above 80 while estimates from *live-to* questions were more consistent with SSA data for ages below 80. There is also evidence that personal information about health state has a greater impact on estimated lifetime than observable demographic data like age – this provides evidence about the value of people providing these estimates rather than simply using actuarial data.

Clearly, expected lifetime plays an important role in the selection of retirement products like annuities. This paper finds that as we would hope, people in good health estimate longer expected lifetimes and people who expect to live longer specify a higher probability of buying an annuity upon retirement. This latter effect, however, was stronger for people asked to assess this expected lifetime via *live-to* questions, suggesting that there is more happening than simply the way the questions are asked. Perhaps asking a person about how long they will live creates a positive effect, leading to higher estimated probabilities of purchasing an annuity independent of how many years that person expects to live. To put it another way, **the study suggests if one individual is asked to provide estimates using *live-to* questions, that person will be more likely to purchase an annuity than another person with the exact same expected lifetime but who provided estimates with *die-by* questions.** There was also an increase in the estimated probability of purchasing an annuity if the person was asked to estimate their lifetime before indicating their probability of annuity purchase compared to the opposite order of questioning. This is further evidence that context matters when constructing estimates.

STUDY I

In the first study by Payne et al, a sample of 1,444 U.S. residents with ages from 18 to 83 were paid to take an online survey designed to be comparable to the University of Michigan Health and Retirement Survey (HRS). The HRS is a longitudinal panel study surveying a representative sample of 20,000 Americans about issues related to aging.

In this first study, half of the subjects used sliders to indicate “The chance that I will live to be X years old or older is” and the other half used slides to indicate “The chance that I will die at X years or younger is” for a variety of X values. A number of controls were put in place to ensure that the data was robust for a number of factors (e.g., some subjects started estimating probabilities at age 55, some at 65, and some at 75). This was done to determine if the starting age had an effect on responses. Eighty-four percent of the subjects made coherent judgments and specified $\Pr(\text{live to } 75) \geq \Pr(\text{live to } 85) \geq \Pr(\text{live to } 95)$ and their data was used in the analysis.

As a first comparison, the authors compared the survey results to two important public data sources: the HRS and the Social Security Administration (SSA). The survey participants specified an average probability of being alive at age 75 of 63.7 percent. That compares favorably to the 65 percent from the HRS and 67 percent from the SSA, suggesting that the participants’ responses were similar to those used in other studies.

How the question about life expectancy was framed had a significant impact on the response. Subjects in the *live-to* condition estimated lifetimes 9.17 years longer than participants in the *die-by* condition. For example, in the *live-to* condition, participants estimated a 55 percent chance of being alive at age 85 while participants in the *die-by* condition estimated a 68 percent chance of being dead at 85 or a 32 percent chance of being alive at 85. This 23 percent difference was statistically significant and similar results were found for other ages. There was no evidence that the first estimated target age had an effect on the elicitation results.

In this study, the participant’s age was also a statistically significant factor – older subjects estimated longer expected lifetimes – and female participants also estimated longer expected lifetimes, all else being equal.

A comparison with SSA data suggests that participants in both conditions underestimate the probabilities of reaching ages below 80 and overestimate the probability of reaching ages above 80, which is consistent with prior studies. But participants in the *live-to* condition over-estimate the chance of reaching ages 75, 85, and 95 more than the participants in the *die-by* condition.

STUDY II

Study II restricted the age of 514 participants to 45 to 65 years old in an online sample to increase comparability to the HRS dataset and attempt to validate the impact of the elicitation method found in Study I. The authors also collected more demographic data from participants - including a measure of current health and an index to measure of numeracy/cognitive ability - to investigate other factors that could affect lifetime estimates.

Similar to Study I, in the *live-to* condition, participants estimated a 52 percent chance of being alive at 85 whereas participants in the *die-by* condition estimated a 70 percent chance of being dead at 85, or a 30 percent chance of being alive at 85, thus confirming the impact of elicitation method on lifetime estimates. **On average, the *live-to* participant estimated a lifetime 10 years longer than the *die-by* participant.** In addition, participants who indicated they were in good health estimated about 7.5 years of additional lifetime all else being equal; numeracy did not have a statistically significant impact on lifetime estimates. This is inconsistent with the literature. Women added 2.5 years to their estimates on average. The impact of elicitation method on over-/under- estimating probabilities of survival compared to SSA data found in Study I were replicated in Study II.

STUDY III

Studies I and II found that relevant factors of gender, health state, and current age had significant and logical effects on estimates of expected lifetime, but the irrelevant factor of elicitation method also affected these estimates. Study III attempted to identify the cognitive processes that underlie the discrepancies in the *live-to* compared to *die-by* elicitation for age 85.

The authors hypothesized that the elicitation format will affect the series of questions participants ask themselves when constructing their estimates of living to (dying by) 85. Specifically, participants in the *live-to* questions should have more thoughts about surviving to 85 than participants asked *die-by* questions.

In Study III, participants who specified coherent probabilities of survival, e.g. $\Pr(\text{live to } 65) \geq \Pr(\text{live to } 95)$, were asked to list their thoughts as to the assessed probability of living to (dying by) age 85. After completing their lists of thoughts, subjects answered fill-in-the-blank questions about living to (dying by) ages 65, 75, and 85. Then, participants indicated if each of their thoughts was “more about life and/or living, more about death and/or dying, or neither” and whether each thought was positive, negative, or neutral. Finally, participants provided demographic data, including health status.

More confirmation of the elicitation impact was found. In the *live-to* condition, participants estimated a 57 percent chance of being alive at 85 while participants in the *die-by* condition estimated 33 percent. *Live-to* participants’ lifetime estimates were about eight years longer than those *die-by* participants. Over/under estimates of life expectancy were consistent with the results in Studies I and II. In this study, health state was statistically significant in predicting lifetime estimates, but age and gender were only marginally significant. This suggests that personal information about health state may be more predictive than observable demographic data.

Turning to the thoughts generated by participants, overall, more thoughts in favor of living to age 85 were generated than thoughts of dying by age 85. Participants in the *live-to* condition

had more thoughts related to living than those in the *die-by* condition. Further, there was statistical evidence that more positive thoughts about living to age 85 lead to higher probabilities that the participant would, in fact, live to age 85. There was also evidence that the number of generated positive thoughts does affect lifetime expectations, but there may be other factors at work as well.

ANNUITY PREFERENCES

While there is theoretical support for (at least) partial annuitization of retirement savings, evidence about actual annuity purchases is mixed. To investigate this important issue, half of the participants in Study II provided additional data about their likelihood of purchasing an annuity after estimating their expected lifetime. The literature suggests that these estimates are consistent with realized behaviors.

The average estimated probability of annuity purchase was 33 percent and the mode was 0 percent, indicating a highly skewed distribution. The probability of annuity purchase was higher for participants who expected to live longer, and this effect was stronger for *live-to* participants. In other words, *live-to* subjects were more sensitive to their estimated lifetime. A follow-up study found that asking about life expectancies before likelihood of annuity purchase had no effect on estimated lifetime, but seemed to increase the likelihood of annuity purchase over self-managed retirement savings. This provides more evidence that the elicitation context matters.