

## Overview of the Design

The design investigates three mechanisms that can lead to lower-than-optimal take-up of annuities: status-quo bias, failure to think through savings choices associated with annuity decisions, and a heuristic aversion to allocating income to states of the world in which there is both high marginal and high absolute utility from money. We benchmark the three mechanisms above to the price elasticity of take-up decisions.

To study status-quo bias, we introduce a treatment that removes the status quo of not owning an annuity. Unlike the control group, where participants have an endowment without an annuity and can choose to “buy” an annuity, in the no-status-quo group the annuity choice is presented using a neutral framing (people choose between taking an annuity or not, without either choice being the default).

Within the no-status-quo framing, we study four treatments that address people’s potential failures to think through how they would condition their savings choices on their choice of acquiring an annuity. In the first treatment, respondents first choose their level of savings in each of the two contingencies—having an annuity and not having annuity—and then they make the decision of whether to acquire an annuity or not. In other words, the first treatment encourages respondents to think through the dynamic decision using backwards induction. Because this treatment highlights how savings choices might optimally vary with the annuity decision, we call this the “savings salient” treatment.

The second treatment eliminates the need to solve the problem using backwards induction by showing the corresponding level of savings, as previously chosen by the respondent. We refer to this treatment as “explicit contingencies” because all consequences of choosing the annuity or not are fully explicit in this treatment. The third treatment is nearly identical, but presents the same choice without context—i.e., without discussing “savings”, “income,” or “annuities.” In other words, the choice is presented solely in terms of tokens corresponding to each of the two choices. We refer to this treatment as “explicit contingencies, no context.” The fourth treatment is like the third but ensures that the annuity stochastically dominates by adjusting the savings decision for the annuity such that the resulting tokens in stage 2 are identical with and without the annuity (and the resulting tokens in stage 1 are higher for the annuity).

Finally, we study a potential heuristic aversion to allocating income to states of the world in which there is both high marginal and high absolute utility from money. We do this by constructing a nearly identical setting where the impact of annuitization and feasible savings levels are identical, but where the state of the world in which the “annuity” pays off is actually the state with a lower absolute level of utility. We do this by reframing people’s decisions as being about insuring the loss of stage-2 income. Our hypothesis is that people find it more natural to insure states of the world with lower absolute utility than with high absolute utility. Because this treatment reverses the correlation between marginal utility and absolute utility relative to the standard positive relationship in the annuity context, we call this the “reverse correlation” treatment.

To summarize, we have a total of 9 experimental groups.

- The control group (“G0”), which is constructed to best resemble the conditions of annuity choice that people typically face. These annuities are worse than actuarially fair, the status quo is not owning an annuity, respondents are not

induced to think about savings nor are they reminded of their savings plans for each contingency, and the annuity choice uses natural wording such as “annuities”, “insurance” or “Social Security.”

Five treatments investigate the three mechanisms of primary interest:

- One treatment group which is like the control group but where the status quo of not owning an annuity is removed (“G1”)
- Four treatments that increase proper accounting for contingent savings decisions, leading to the following groups:
  - Savings salient group (“G2”)
  - Explicit contingencies group (“G3”)
  - Explicit contingencies, No context, group (“G4”)
  - Explicit contingencies, No context, Dominance, group (“G5”)
- The reverse correlation treatment group (“G10”)

Two treatment groups to help us gauge the magnitude of the response:

- The low-price group (“G20”)
- A combined treatment group (“G35”), which combines a low price, the treatment in G5, and reverses the correlation as in G10.

We randomize subjects such that the expected number of observations in each of these 9 groups is expected to be equal.

### **Structure of the experiment:**

Each respondent makes 6 decisions, and the decisions are divided into three blocks. The order of the blocks varies across respondents.

Savings block (3 decisions):

- The desired amount of savings if the respondent does not have an annuity
- The desired amount of savings if the respondent has a better-than-fair annuity (low price)
- The desired amount of savings if the respondent has a worse-than-fair annuity (high price)

Regular annuity decisions (2 decisions):

- Annuity choice if the annuity has a low price (i.e., is better than fair)
- Annuity choice if the annuity has a high price (i.e., is worse than fair)

One of the three “Explicit contingencies” decisions:

- Annuity choice if the contingencies are made for the treatment (i) explicit contingencies, (ii) explicit contingencies, no context, or (iii) explicit contingencies, no context, dominance. Because contingencies can only be made explicit if the respondent has already made their savings choices, this block necessarily comes after the savings block.

## Randomization

Figure 1, at the end, summarizes the experimental cells and the randomization.

The primary randomization allocates annuity decisions (not respondents, because respondents each make three annuity decisions) into one of the 9 experimental groups described above. Decisions are randomized into these 9 groups with equal probability.

All decisions of a given respondent are either randomized into “regular correlation” groups (in columns A or C of Figure 1) or into “reverse correlation” groups (in columns B or D of Figure 1).

There are five secondary randomizations:

- **Wording.** In the explanation of the experiment and in the some of the annuity decisions (the ones with context), the annuity choice is described either in terms of “annuities,” “insurance,” or “Social Security.” One of these three wordings is selected with probability 1/3 for each of the respondents whose annuity decisions are randomized into “regular correlation” groups. Only the insurance wording is used for respondents whose annuity decisions are randomized into “reverse correlation” groups (the other two wordings would be unnatural).
- When there is no status quo, we randomize (with equal probability) which option is presented on the left or the right.
- If the savings block is asked first, the order of the two annuity blocks is randomized.
- The order of the 3 savings decisions in the savings block is randomized
- The order of the two annuity decisions in the regular annuity decision block is randomized

## Implementation

Given the structure of the experiment, we define a number of manipulations that mechanically alter the online experiment so as to generate the 9 desired experimental groups described above. These mechanical manipulations, and their randomization fractions, are described below. We do not view these manipulations as being economically meaningful; rather they are a means of implementing the 9 group of interest. Given the structure of the experiment, it is inevitable that we also collect data on 3 additional groups (G21 - low price, no status quo; G22 – low price, savings salient; G30 – low price, reverse correlation).

Complete list of Manipulations:

1. Regular vs. reverse correlation (between subject)
  - A1 = *Reverse Correlation*. The state contingency is whether or not the subject loses their stage-2 income. If they lose their stage-2 income, their marginal utility of wealth is higher and their level of utility is *lower*.
  - A2 = *Regular Correlation*. The state contingency is whether or not the subject lives in stage 2. If they live in stage 2, their marginal utility of wealth is higher and their level of utility is *higher*.
2. Wording (between subject)

- B1 = *Social Security*. The introduction, comprehension questions, and annuity choice (if using context) is worded in terms of “Social Security.”
- B2 = *Annuity*. The introduction, comprehension questions, and annuity choice (if using context) is worded in terms of “Annuity.”
- B4 = *Insurance*. The introduction, comprehension questions, and annuity choice (if using context) is worded in terms of “Insurance.”
3. Status Quo (between subject)
    - C1 = *No Status Quo*, secondary randomization leads to annuity shown on the right.
    - C2 = *No Status Quo*, secondary randomization leads to annuity shown on the left.
    - C3 = *Status Quo*. The respondent starts out without an annuity and is given a choice whether or not to “buy” an annuity.
  4. Savings Salient (between subject)
    - D1 = *Savings Not Salient*. The block with regular annuity decisions is asked *before* the block with savings decisions. Thus, the order is: regular annuity decisions, then savings decisions, then the explicit-contingencies annuity decision.
    - D2 = *Savings Salient*, secondary randomization 1. The block with regular annuity decisions is asked *after* the block with savings decisions (but before the explicit-contingencies annuity decision). Thus, the order is: savings decisions, then regular annuity decisions, then the explicit-contingency annuity decision.
    - D3 = *Savings Salient*, secondary randomization 2. The block with regular annuity decisions is asked *after* the block with savings decisions (and also after the explicit-contingencies annuity decision). Thus, the order is: savings decisions, then the explicit-contingency decision, then regular annuity decisions.
  5. Price of the annuity
    - E11 = *High Price*. The annuity question with explicit contingencies is asked for a high-priced annuity.
    - E12 = *Low Price*. The annuity question with explicit contingencies is asked for a low-priced annuity.
  6. Versions of the explicit-contingencies annuity treatments
    - G1 – *Regular*. The annuity question with explicit contingencies has context and uses the respondent’s savings choices.
    - G2 – *No Context*. The annuity question with explicit contingencies is devoid of context and uses the respondent’s savings choices.
    - G3 – *Dominance*. The annuity question with explicit contingencies is devoid of context, uses the respondent’s savings choice for the option without an annuity, but adjusts the savings for the option with the annuity so that stage-2 payouts are identical with and without the annuity (but stage-2 payouts are higher with the annuity).
  7. Order of the three savings decisions within the savings block
 

Each of the 6 possible orders is selected with equal probability and independently of any of the other manipulations.
  8. Order of the two annuity decisions within the regular annuity decision block
 

Each of the 2 possible orders is selected with equal probability and independently of any of the other manipulations.

The 9 experimental groups (and the 3 greyed-out groups that we're not primarily interested in) are formed by randomizing respondents with equal probability to each of the rows in the table below. Within the table, slashes indicate independent randomizations with equal probability within a row.

**Table 1:** Summary of experimental cells

Manipulation						Annuity Decision		
A	E	D	C	B	G			
		Savings	Status		Explicit-contingencies	High Price	Low price	Explicit
Correlation	Price	Salient	Quo	Wording	Version	Standard	Standard	Contingencies
A2	E11	D1	C3	B1/B2/B4	G1/G2/G3	Group 0	Group 20	Group 3/4/5
A2	E11	D1	C1/C2	B1/B2/B4	G1/G2/G3	Group 1	Group 21	Group 3/4/5
A2	E11	D2/D3	C1/C2	B1/B2/B4	G1/G2/G3	Group 2	Group 22	Group 3/4/5
A1	E12	D1	C3	B4	G3	Group 10	Group 30	Group 35

## Exclusions

Not all participants will be able to complete the full study. Participants who fail the comprehension check will be automatically redirected to a study-completion screen (and will therefore not answer our three savings questions and our three “annuity” take-up questions). We details the specifics below:

There are 7 comprehension check questions: one True/False question (Q1), five multiple-choice questions (Q2-Q6), and one with a numerical answer that needs to be typed in a box (Q7). Question Q7 is **not** used to screen out participants. If a participant fails to correctly answer a multiple-choice question (Q2-Q6), the next question offered is a retake question (a question similar to the original one, but with different numbers). The questions are presented in order from Q1 to Q7, with retakes inserted immediately after an incorrectly answered multiple-choice question.

A participant fails the comprehension check as soon as they either:

- fail to correctly answer two of the questions Q1-Q6
- or
- fail to correctly answer a retake question.

As soon as a participant fails the comprehension check, the participant is redirected to the study-completion screen. In other words, the participant is not asked any remaining comprehension check questions, nor is the participant presented with any savings or annuity decisions.

Figure 1: Summary of experimental design

