Life Expectation Judgments, Fairness, and Loss Aversion in the Psychology of Social Security Claiming Decisions

Suzanne B. Shu
Anderson Graduate School of Management, UCLA

John W. Payne
Fuqua School of Business, Duke University

PRELIMINARY WORKING PAPER: Please do not cite or circulate without permission

Abstract:

This research seeks to better understand the psychological processes underlying Social Security claiming decisions. Specifically, we argue that the decision of when to claim Social Security benefits is affected by individuals' subjective judgments of life expectation as well as psychological value constructs such as loss aversion and fairness. In a series of three online surveys of individuals aged 35-65, we find that individual differences in life expectation judgments, levels of sensitivity to losses, and perceived fairness and/or perceived ownership of SSA benefits jointly lead to predictable differences in individuals' predictions of their own early or late claiming of benefits. We also test several manipulations of information presentation to determine their effects on early versus late claiming.

1. **Introduction**

Every day ten thousand Americans reach age 65 and are faced with one of the most expensive, long, and hazardous journeys of their life: retirement. At the start of that journey, the decision on when to claim Social Security benefits, between the ages of 62 and 70, is one of the most important financial decisions that most Americans will ever make (Scott, 2012). Social Security is the single largest source of retirement income for retirees in the U.S. and the only meaningful source of inflation-indexed income for most Americans. Social Security benefits also provide a hedge against "longevity risk" or the risk of living long enough to outlast one's savings, which is a major concern of retirees. It is also a substantial risk given that the chance of a healthy 65 year old making it to age 90 is almost 30% for a male and almost 40% for a female. Further, Shoven and Slavov (2012) suggest that delaying is actuarially advantageous for a large subset of people, particularly for real interest rates of 3.5 percent or below. They find that at interest rates similar to those that prevail today, "primary earners with average life expectancy should delay benefits to age 70 to maximize expected present value." These authors further argue that during periods of low interest rates, households may be better off spending down 401(k) assets first and deferring Social Security, effectively substituting Social Security deferral for the purchase of private annuities (p.20).

Unfortunately, there is concern that many people may not be making the wisest decisions about when to start claiming their Social Security benefits. Most Americans (50%) start collecting at age 62 or within two months of leaving the labor force, and eighty percent or more claim their Social Security benefits before the normal retirement age (NRA) of 66. The percentage who delay claiming to the maximum age of 70 is quite small, estimated at around 2%. Given both the substantial risks of longevity, and the financial benefits from delaying claiming, it has been suggested that later claiming should generally be chosen and even that these percentages should be reversed (Shoven & Slavov, 2012; Tacchino, Littell, & Scholbel, 2012). While one might argue the exact percentages of who should claim when, it seems clear that many Americans are claiming too early given the various factors that should go into that critical decision.

The possibility that people may not make this important financial decision wisely perhaps should not be too surprising. The decision to delay claiming of Social Security benefits involves evaluating a complex option with multiple outcomes occurring over time contingent upon several

uncertain events. The studies reported here seek to better understand the Social Security claiming decision using individual differences in judgments about life expectations, loss aversion, and affective tradeoffs (such as concerns about fairness). On the topic of uncertainty, recent work has documented the effects of question framing on individuals' judgments of their own life expectations, finding that asking questions in a "live to" frame rather than a "die by" frame can lead to an approximately ten year difference in predicted life expectation (Payne et al 2013). Because life expectation is a key input to the claiming decision, it is important to understand how these types of question framing effects influence predicted claiming age. Another key psychological influence on claiming decisions is an individual's measure of loss aversion, due to the perspective that not claiming early may result in a loss of benefits relative to a breakeven calculation or relative to the individual's own contributions into Social Security during their working years. Finally, we also predict that affective reactions such as feelings of perceived fairness and ownership (e.g., "I deserve the payments I contributed over my working life") can also be a strong driver of financial decisions such as Social Security claiming. Significant effects of loss aversion and perceived fairness on predicted claiming age would be consistent with recent research on life annuity preferences that finds a relationship between individual differences in loss aversion and fairness with overall preference for life annuities as well as preference for particular annuity attributes such as period certain guarantees (Shu, Zeithammer, and Payne 2013). A significant relationship between loss aversion and perceived ownership also connects the claiming decision to research on the endowment effect. This work also contributes to the literature on how heterogeneity in individual preferences may affect early claiming (Gustman & Steinmeier 2012) and may offer insights for incorporation of additional particular behavioral differences in models of claiming.

This paper reports on three studies that use survey responses to try and better understand the individual psychology underlying early versus late claiming of Social Security benefits. In addition to studying how individual differences in judgments and values relate to claiming, in studies 2 and 3 we explore how simply providing people with information on the cumulative payouts that can be expected at different ages and how priming the importance of past contributions impact the claiming decision as well as its relationships with subjective life expectations, fairness, and loss aversion. As a preview of our results, we find the following main effects: First, individual measures of loss aversion do significantly affect predicted claiming age,

with a 1-point increase on our 9-point scale having an effect of increasing claiming by around one month; respondents in the top quartile of the loss aversion scale intend to claim four months earlier, on average, than those in the bottom quartile. Second, differences in predicted life expectancy are also significant, with an extra ten years of subjective life expectation translating to a six month delay in claiming. Third, we also find that individual differences in perceived fairness, and especially perceived ownership of benefits, significantly affect expectations of claiming. Participants in the top quartile of our 3-item, 7-point measurement intend to claim approximately four months earlier than those in the bottom quartile. We also find significant effects of several other individual measures, including perceptions of SSA solvency and measures of intertemporal patience.

2. Background

In the three studies presented in this paper, we investigate Social Security claiming behavior in terms of three behavioral factors: subjective judgments of life expectations, individual differences in levels of loss aversion, and perceived fairness. Knoll (2011) provides a comprehensive overview of how psychological research on judgment and decision making can inform new research on Social Security claiming; our proposed research seeks to explore several of the topics she has outlined. Specifically, issues of loss aversion (pgs 18-19 of Knoll 2011), biases in predicting future events such as life expectancies (pgs 24-26), and emotional concerns such as fairness (pg 27) are directly tested in our studies. In this section we describe each of these factors in additional detail, and specifically why they are expected to predict individual level claiming decisions.

2.1 Subjective life expectations

Arguably the most influential model for the consumer allocation of costs and benefits over time is the Maximization of the Expected Utility of Lifetime Consumption model (or Life-Cycle model, see Browning & Crossley, 2001). Essentially, the Life Cycle model of expected utility maximization breaks the task of identifying the optimal consumption path of costs and benefits across time into three major components. First, the consumer must assess his or her utilities for consumption at any given point in time. Second, the consumer must assess how much he or she is willing to trade off smaller amounts of costs and benefits sooner in time against larger costs and benefits later in time. This allows the utilities at different points in time to be

compared. Third, the time-adjusted utilities of consumption must be weighted by his or her probabilities of reaching different points in time in the future.

Over the years, the classic Life-Cycle model has been modified in various ways to better capture actual consumer behavior. For example, the utility of consumption has been modified to include reference values and the coding of changes in consumption as gains or losses related to the reference level. An example of such a modified model is the model that includes habit as a reference value (Browning & Crossley, 2001). The time discounting of utilities has been modified to include a bias towards consumption in the present over all future periods (Angeletos, Laibson, Repetto, Tobacman, & Weinberg 2001). Recent research on how framing questions about life expectations leads to predictable biases in life expectancy suggests a need to also modify the third component of the Expected Utility of Life-time Consumption model.

Recent research by Payne et al (2013) has demonstrated that subjective probability judgments of live life expectations, a clearly important future event, and a event for which a person should have significant private information, may be "constructed" in the sense that the judgment is subject to predictable biases such as how the event is framed. Participants asked for life expectations framed as a "live to" prediction provided higher probabilities across all age ranges than those asked about "die by". The differences between the estimates are seen most clearly when one considers where average judgments under each frame cross the 50% threshold: for "live to" this occurs around 85 years old, whereas for "die by" this occurs at 75 years old. This ten year difference in the median expected age of being dead or alive is not only statistically significant but also highly meaningful to a number of important life decisions such as how to finance one's consumption during retirement.

Building on this research on framing effects for life expectation judgments, we investigate how differences in life expectation solicitations affect later retirement decisions such as Social Security claiming. We test these effects in multiple ways. In Study 1, we expose some participants to either a "live to" or "die by" frame prior to making a series of hypothetical retirement decisions to see how their life expectations judgments effect those later decisions. As a control, other participants make the life expectation judgments after answering the retirement decisions. We find that subjective life expectancies are positively related to intentions to purchase a life annuity and to delay claiming of Social Security. This positive relationship is much stronger when the life expectancies are asked in a live-to frame rather than a die-by frame.

In Studies 2 and 3, we use only the "live to" frame and again manipulate whether the judgments are collected before or after the claiming decisions. For participants who answer the live-to questions prior to claiming decisions, there is a significant and persistent effect of subjective life expectation judgments on predicted claiming age.

2.2 Effects of loss aversion

One of the primary arguments for delaying claiming of Social Security benefits is that larger future benefits help reduce the downside implications of longevity risk. Accordingly, individuals with high levels of risk aversion should be more, rather than less, likely to want to delay claiming. In other words, because Social Security provides a guaranteed stream of lifetime income, larger monthly benefits are seen as a way to reduce risk and should be most highly valued by individuals with significant levels of risk aversion. We suggest that risk aversion is the wrong utility theory to apply to the claiming decision. Instead of risk aversion, economic modelers of the claiming decision should be considering loss aversion.[1]

There are several implications of using loss aversion, rather than risk aversion, to explain claiming preferences. A very substantial behavioral literature exists on manipulations that moderate loss aversion in a wide variety of tasks. By thinking about the Social Security claiming decision in a loss aversion context, we can begin looking for ways to apply those findings to creating information interventions that influence the claiming decision. Since benefits may be perceived as already "owned" by the individual, the decision of when to claim begins to resemble an endowment effect situation, where currently held (owned) options are more highly valued that the same option when not owned. The standard explanation for the endowment effect is loss aversion, in which the owner sees giving up the option as a loss and therefore demands a higher compensation. If Social Security benefits are also perceived to be owned by a potential claimant, the decision to delay looks like a potential loss (relative to either the breakeven value and/or death before any benefits are received). Thus, individuals who are high in loss aversion should be less likely to be willing to delay claiming.

Our studies on Social Security claiming described below do find that loss aversion, when measured at the individual level, is a significant predictor of preference for early versus late claiming. Together these three studies have involved over 3000 respondents, and effects of loss

---

[1] While it is tempting to think of loss aversion as simply a more severe form of risk aversion, Rabin & Thaler (2001) show that standard risk aversion utility models cannot explain empirical results for rejection of small gambles, and thus reference point-based loss aversion models are more useful in these contexts.

aversion are consistent throughout. The empirical finding that individual level heterogeneity in loss aversion predicts claiming preferences supports theories proposed by other researchers on this topic. As noted by Brown (2007), individuals who delay claiming their Social Security benefits beyond age 62 are essentially purchasing an inflation-indexed annuity for the future; however, consumers sometimes view the purchase of an immediate annuity as "gambling on their lives." Extending that idea, Hu and Scott (2007, p.8) suggest examining annuity choice from the perspective of more behavioral models such Cumulative Prospect Theory (Tversky & Kahneman, 1992) under the argument that CPT is a better behavioral model than the classic expected utility model. Our findings support the argument that incorporating loss aversion into models of claiming decisions may improve those models predictive power.

2.3 Fairness and ownership concerns

Research has suggested perceived fairness is an important consideration for consumers of financial products as well as a strong input into attitude measures for such products; such fairness judgments depend on not just how outcomes are shared between consumers and firms, but also on the transparency and procedural aspects of the system that determines the outcomes (Bies et al. 1993). Thus, issues of perceived fairness for Social Security claiming may be captured through both direct questions about benefit fairness (Kahneman, Knetsch, and Thaler 1986) and questions about the process underlying Social Security benefits. Ongoing research on annuities and other financial decisions (Shu, Zeithammer, and Payne 2013; Shu and Morelli 2012) suggests that individual level perceptions of perceived fairness for financial products can significantly affect preferences for those products. In particular, for annuities, we find that individual measures of perceived fairness are predictive of overall annuity preference and are especially predictive of preference for period-certain attributes, consistent with behavioral explanations for the annuity puzzle (Hu & Scott 2007, Benartzi, Previtero & Thaler 2011). We expect that such perceived fairness measures will also be relevant predictors for individual claiming decisions.

Related to the issue of perceived benefit fairness is the question of perceived ownership of the benefits. Ownership is clearly an important aspect of loss aversion, as without ownership, there would not be loss. A key aspect of loss aversion is reference dependence; the object must be integrated into the individual's endowment so that not having it as seen as a loss. In other words, the individual must assess "is it a loss?" before loss aversion becomes relevant. It is not

necessary to have legal ownership of an object for these effects to occur; anticipatory possession or pseudo-endowment can have similar psychological effects to legal ownership, even when the individual does not have legal possession of the object (Ariely and Simonson 2003; Hoch and Loewenstein 1991). Carmon, Wertenbroch, and Zeelenberg (2003) demonstrated through a comprehensive set of studies that "prefactual ownership" of an option can be affected by manipulations like the amount of deliberation spent on the decision. A direct measure of perceived ownership, similar to one used in this work, has been found to be a significant predictor of the valuation disparities that underlie these endowment effects (Peck and Shu 2009, Shu and Peck 2011). Psychological ownership has been explored in other domains as well. Pierce, Kostova and Dirks (2001) define it as being characterized by the feeling that something is "mine". We propose that a measure of psychological (or perceived) ownership can be used to capture these feelings of ownership, and that individuals with a higher perception of ownership for their benefits will be more likely to want to claim benefits early.

Thus, our studies include perceived fairness measures as an additional individual difference to see how perceived fairness affects claiming decisions. Specific dimensions of perceived fairness that may be most relevant to claiming are issues of perceived ownership of benefits (i.e., whether they are perceived as having been earned and deserved) and issues of procedural fairness (i.e., is the system appropriately generous and fair). Specialized measures for these dimensions are included in our studies. Findings based on these measures will be useful for suggesting improved messages and/or targeted interventions for individuals with high levels of fairness concerns.

2.4 Information presentation interventions

In addition to incorporating the individual behavioral measures outlined above, we also use our studies to examine potential choice architecture interventions that vary how information is presented. For example, if loss aversion is a driver of claiming decisions, then variations of gain/loss framing for early claiming should affect claiming decisions. Furthermore, these effects should be most significant for individuals with higher levels of loss aversion. Framing effects have been one of the most studied behavioral effects related to Social Security claiming with indications that the use of a payback frame leads to earlier claiming, as in Brown et al. (2011) and the references therein. The effects of other frames, e.g., gain versus losses from some referent amount, have been less clear. In our studies we build upon this prior work by examining

7

potential interactions between frames and individual differences in loss aversion. Additional variations of gain/loss framing include changing the order in which payout information is presented so that larger or smaller amounts are seen as the most salient reference point. Note that these proposed interventions differ from prior work by Brown, Kapteyn, and Mitchell (2011) and Liebman and Luttmer (2009) in several significant ways. First, our interventions more directly incorporate issues of life expectations, including self-generated judgments which are affected by how questions are framed. Second, we expect that effects of framing and information presentation will differ according to individual differences in loss aversion and fairness, which we directly measure.

We also take this opportunity to build on our ongoing work on the effect of information presentation on annuity preferences by testing the influence of cumulative payout information on claiming intentions. This intervention is unique in the claiming literature in that it expands the set of years that are considered in the delay decision beyond a single breakeven age. A similar intervention has been shown to have significant effects on annuity choice, with information on cumulative payoffs increasing both overall liking for annuities and valuation of particular annuity attributes, relative to presentations that focus only on monthly income (Shu, Zeithammer, and Payne 2013). Based on this prior work we expected that variations in cumulative vs monthly payoffs and gain/loss framing can be used to design presentation formats that allow individuals to make more meaningful claiming decisions. However, as discussed in more detail in our study results, we were surprised to find that the information presentation results from the annuity environment do not successfully carry over to individuals' claiming decisions. In fact, cumulative payout information appears to encourage earlier claiming rather than later claiming, the opposite of its effect on annuities. We provide a potential explanation for this result and suggest future research that may be able to examine it in more detail.

3. Empirical Results

We have completed three online studies using national panels provided by data collection firms Survey Sampling International and Qualtrics. These survey panels, while convenience samples, provide a distribution of American adults whose demographics fit reasonably well with national averages (see Table 1 for demographics from our studies). Participants are recruited and screened by the firms and are paid for their participation. During the studies, participants are

further screened by relevant demographic variables (for example, by age) and according to their successful completion of an attention check (see Oppenheimer, Meyvis, and Davidenko 2009). We find results from these surveys that are similar to HRS data on key questions; for example, our online populations typically report an average subjective probability of being alive at age 75 of between 63% and 70%, while Elder (2007) reports an average subjective probability of being alive at age 75 of 65% among HRS respondents using a similar probability scale. Our first study focuses on the effects of life expectations judgments and loss aversion on a set of four retirement decisions including Social Security claiming. Studies 2 and 3 focus exclusively on the claiming decision, and show the effects of life expectations, loss aversion, perceived fairness and/or perceived ownership; we also test several information presentation interventions to see whether claiming decisions are influenced by this additional information.

3.1 Study 1: Effects of life expectations and loss aversion on retirement decisions

Participants. Study 1 is an online study with a convenience sample of U.S. residents aged 35 to 65 (N = 832) who were recruited and run online through the internet panel company Survey Sampling International. Respondents (48.7% female, M_{age} = 50.5) were paid a fixed amount for participation.

Method. Participants in the study were randomly assigned to one of four conditions in a 2X2 design. The first manipulation is whether participants were asked to complete judgments of life expectations before or after completing the series of questions about retirement decisions. The second manipulation is whether the life expectation judgments were collected in a "live to" frame versus a "die by" frame. Specifically, participants were asked to estimate and report the chance that they would live to [die by] a certain age or older [younger] using a slider scale for each of the ages 65, 75, 85, and 95. Note that for any given individual, the answers to these two question frames should perfectly mirror each other, with the probability of living to a given age being one minus the probability of dying by that age. However, prior research shows that framing has a significant effect, with implied probabilities of living much higher in the live-to frame.

We collected four separate dependent variables, all of which capture whether the individual is being myopic about retirement income decisions. Specifically, we ask about hypothetical decisions regarding Social Security claiming age, preference for an immediate

single life annuity, choice of equities versus risk-free bonds for retirement assets, and amount of income to allocate to retirement savings. We also collect substantial additional information about each participant to use as covariates in our analysis, including age, gender, current savings, perception of future social security solvency, life expectancy, loss aversion, subjective health, and numeracy.

Results. We start by converting the life expectancy probabilities taken for ages 65, 75, 85, and 95 into a single comprehensive measure of life expectation. More specifically, for each individual respondent, we estimated a set of Weibull parameters based on the individual's current age and the full set of probability responses. (The Weibull estimates assume a 0% chance of being alive at 130 years old to provide a reasonable ceiling to the model estimates; additional details about how these estimates are performed are provided in Payne et al 2013.) Using the estimated Weibull parameters per participant, a mean life expectancy was estimated per individual, at which the model predicted that person's chance of being alive to be exactly 50%. This single mean life expectation is then used in all remaining analysis. To ensure that individual life expectation judgments reflect both demographic inputs and framing effects that have been found in prior research, we regress life expectation on age, gender, health, and framing and find significant effects of each in the expected directions.

We begin with an analysis of the Social Security claiming measure. Individuals were asked when they expected to begin claiming benefits and could choose any age from 62 to 70 years old. A regression of claiming age on the full set of demographic and psychographic measures, as well as indicators for the order and framing conditions, finds significant effects of self-reported health, life expectancy, perceived SSA solvency, and framing (live-to versus die-by). All effects are reported in Table 2. Interpretation of these results indicates that individuals are more likely to claim at an older age if they are more subjectively healthy, if they expect to live longer, and if they think Social Security benefits will still exist when they retire. Looking more closely at the effects of life expectation on claiming, people who preferred to claim at ages 65 or earlier expressed probabilities of living to ages 75 and 85, on average, of .60 and .41, respectively. In contrast, people who preferred to claim at ages 67 or later had probabilities of living to ages 75 and 85, on average, of .68 and .50, respectively.

The effects of framing and order manipulations are mixed. Order does not have an effect; thinking about life expectancy before or after answering the claiming question does not

significantly change responses. However, framing does have an effect, but in a surprising way. A close investigation of the framing effect shows that there is no main effect of framing (β=-.09, p=.37) unless an interaction between frame and expected age is included in the model. At this point, the effect of framing becomes negative and the interaction positive. Separate analyses of the two frames allows us to understand this interaction more clearly, and shows that the effects of higher life expectancy are only significant when individuals are in the live-to frame (β=.05, p<.001). When individuals are in the die-by frame, effects of higher life expectancy are not significant (β=.01, p=.44) but the regression constant is higher (65.9 vs 62.2), indicating that these participants are reporting later intended claiming but not accounting for differences in life expectancy when doing so. A graphic display of this difference in slope overlaid on the raw data points and relative to a histogram of the life expectancies per framing condition is provided in Figure 1. We will return to the implication of these results shortly.

Continuing with the other dependent variables of annuity preference, choice of equities, and income allocated to savings, we find similar results. The annuity preference measure represents an individual's self-reported likelihood of purchasing a standard life annuity in retirement as collected on a percentage scale with increments of 10 (0%, 10%, etc. up to 100%); higher numbers represent more interest in an annuity. The choice of equities was asked as what percentage of retirement savings the individual would prefer to invest in bonds rather than stocks and was collected on a continuous scale of 0-100; here, higher numbers indicate stronger preference for bonds. Finally, the savings allocation measure was taken as the answer to a question about what percentage of one's paycheck participants would like to save toward retirement, with answers ranging from 1% to 20%. Regression results are again shown in Table 2. For annuities, younger individuals, those with longer reported life expectancy, and those worried about SSA solvency report more interest in annuities, and again framing and life expectancy interact in a pattern similar to the one observed for claiming. Framing does not have these effects on the bond and savings questions, but we do see significant effects of loss aversion, with more loss averse individuals strongly preferring bonds and less likely to save for retirement.

One final regression combines the four dependent variables into a single behavioral score that indicates overall myopia in retirement decisions. The desire to claim Social Security benefits early, a dislike of life annuities, a preference for bonds over equities, and a disinclination to save

for retirement can all be interpreted as representing a short-term perspective regarding retirement income. To combine the four decisions into a single measure, we adjust each measure into a standardized z-score with higher values representing more long-term perspective (the measure of preference for bonds was accordingly reverse-coded). Echoing results from the earlier separate models, we see that higher subjective health, longer life expectancy, lower loss aversion, and higher predicted SSA solvency all contribute to a more forward-looking perspective in retirement decisions. The effect of framing is again significant, but only when the interaction between frame and expected age is retained, suggesting that individuals in the live-to frame are reacting (appropriately) to their own predicted life expectancies, but those in the die-by frame are not.

  Discussion. Our main findings in this study show that individual measures of both loss aversion and life expectancy are important predictors of individuals' retirement decisions. Specifically, longer predicted life expectancy predicts less myopic behavior, with individuals choosing to delay Social Security claiming, expressing a preference for life annuities, choosing equities, and saving a higher percentage of their income for retirement. Higher levels of loss aversion have the opposite effect. Importantly, loss aversion and life expectancy are not correlated, showing that they are independent influences. Many demographics, such as age and gender, have little to no effect outside of their influence on predicted life expectancy; the only exception is subjective health, which has an effect in some models. Perceptions of SSA solvency are also important inputs into these decisions.

  In terms of our different information manipulations in this study, we find an interesting interaction. Only individuals who answer their life expectation questions in a live-to frame show a relationship between life expectancy and choices; those in the die-by frame do not show an effect. This may suggest something like an "ostrich effect" in which thoughts about dying result in an unwillingness to consider important choices related to retirement. One implication of this result is that researchers hoping to gather behavioral measures that fully reflect respondents' true subjective life expectations should be careful to use live-to framing when doing so. For our remaining studies, we utilize only the live-to frame when collecting life expectations measures.

3.2 Study 2: Life expectations, loss aversion, and fairness influences on claiming

  For Study 2, we continue with our findings from Study 1 by again testing the influence of life expectation judgments and loss aversion on the claiming task, but now expand the behavioral

measures under consideration by also collecting measures of perceived fairness. We also test an information presentation intervention that shows cumulative payout information for different claiming ages. Use of similar cumulative payout tables has been shown to influence annuity preferences by increasing overall liking of annuities among respondents (Shu, Zeithammer, and Payne 2013). A priori, we expected that it should have a similar impact on the claiming decision.

Participants. Study 2 is an online study with a convenience sample of U.S. residents aged 30 to 60 (N = 1432) who were recruited and run online through the internet panel company Qualtrics. Participants (49.8% female, M_{age} = 44.3) were paid a fixed amount for participation.

Method. Participants in the study were randomly assigned to one of five conditions. One condition was a basic Social Security claiming question similar to the one used in Study 1; the impact of claiming at different ages was shown based on the differences in monthly income for each claiming age. The other four conditions differed from this basic question by providing respondents with information about cumulative payouts from Social Security at a variety of different ages displayed in a matrix format. For the first of these conditions (condition 2), the cumulative payout details ranged from age 73 to age 93. Thus, in addition to seeing the monthly payment information, the matrix showed what the cumulative payouts would be if the claimant lived to each of these ages. Condition three displayed a matrix that ranged from age 63 to age 93. Condition four used the same matrix as condition 3 but added the average probability of living to each age, taken from the SSA website. Finally, condition 5 was the same as condition 4 but collected life expectancy questions after the claiming decision rather than before, as was done in the other four conditions. Reversing the order of tasks in this way allows us to test whether the life expectations questions are having any type of priming effect on the claiming task. An example of the matrix and choice task used in conditions 4 and 5 is provided in Figure 2.

In addition to our main dependent variable of predicted claiming age, we collect a variety of demographic and psychographic measures to use as covariates and provide us with additional insight on participants' inputs to the claiming decision. For all participants, we collect self-reported age, gender, education, household income, retirement savings, numeracy, and health as demographics. As psychographics, we ask for perceptions of SSA solvency, perceptions of fairness, and loss aversion. The SSA solvency question is the same as used in Study 1. For perceived fairness, we ask a set of nine questions. One is a basic four-point overall fairness question similar to those used by Kahneman, Knetsch, and Thaler (1986). The next five focus on

perceptions of fairness regarding the overall Social Security system (e.g., "I understand the system well" and "the system behind Social Security should be changed"). Two questions are oriented toward feelings of ownership for the benefits: "I feel that I have earned these retirement benefits" and "the Social Security benefits that I will receive come from the money that I contributed." Finally, the last fairness question addresses concerns of outcome fairness by asking "delaying claiming of my benefits might mean that I won't get all my money back." Other than the initial overall fairness question, all questions are measured as agreement or disagreement with each statement on a 7-point Likert scale. The loss aversion scale is similar to the 9-point scale used in Study 1 but is adapted to capture a broader distribution of answers on the upper end of the measure.

Results. As with Study 1, we again start by converting the life expectancy probabilities taken for ages 65, 75, 85, and 95 into a single comprehensive measure of life expectation using a Weibull estimation procedure. We also collapse the nine fairness questions into three separate measures. Based on a factor analysis, three measures were created: one for overall fairness based on the first fairness question, one for system fairness based on an average of four questions, and one for perceived ownership based on three questions.

We run several regressions, one for each separate information presentation condition and one for all conditions combined. Table 3 provides the results for each model. For the initial condition, which is approximately a replication of the claiming question asked in Study 1, we find marginally significant effects of age and gender, with older and male participants indicating plans for earlier benefits claiming. We replicate the effects of life expectancy from Study 1, with participants who expect to live longer claiming later. While the coefficients for health and SSA solvency are in the correct direction, they are not significant as they were in Study 1. The effect of loss aversion is marginally significant for this condition, but the measures of perceived fairness and ownership are not significant.

The remaining conditions introduce a cumulative payout table so that participants can see the long run implications of different claiming ages. The cumulative table in Condition 2 starts only at age 73 to increase attention on older ages; this is in contrast to the tables in Conditions 3 through 5, which start at age 63 and thus show cumulative amounts of $0 for several of the younger ages in the table entries under a scenario of late claiming. For Condition 2, the regression shows that increased subjective health leads to later claiming, while numeracy and

14

SSA solvency beliefs lead to later claiming. We again find a strong effect of life expectancy on claiming. Measures of perceived fairness also reach significance in this condition, with both general fairness and perceived ownership affecting planned claiming age. Individuals who see Social Security as fair in general are more likely to claim later. In contrast, those who feel that their benefits have been "earned" and thus belong to them are significantly more likely to want to claim early. The measure of perceived system fairness (e.g., "the system should be changed") does not have an effect. The larger cumulative table in conditions 3 through 5, which starts at age 63, shows similar effects. Life expectancy and perceived ownership still matter, and although loss aversion is not quite significant the directionality of the coefficient is consistent with individuals higher in loss aversion expressing a desire to claim earlier. Effects from manipulations of order (i.e., whether life expectancy was taken before or after the claiming task) and display of SSA mortality rates do not appear to affect the claiming decision.

The final column of Table 3 analyzes all five conditions together, with an indicator variable to distinguish the conditions that include the cumulative payout table (conditions 2 through 5). With the larger sample size, effects of age, gender, health, and SSA solvency all reach significance. We also see that our main psychological variables of interest, life expectancy judgments, loss aversion, and perceived ownership are each significant. To get a clearer picture of how these variables jointly contribute to the claiming decision, we categorize individuals according to their loss aversion level and predicted life expectancy, and calculate the percentage of participants who express an intention to claim early (prior to age 65). We see a clear effect of both life expectancy and loss aversion, with 66% of individuals estimating a life expectancy below 80 and a high level of loss aversion claiming early, but only 21% of individuals with life expectancy above 90 and low loss aversion doing so. Figure 3 shows the joint effect of these measures on early claiming.

Discussion. Study 2 extends our understanding of which individual level characteristics, including both demographics (age, gender, health) and psychographics (loss aversion, perceived fairness), affect intentions of when to claim Social Security benefits. We find that judgments of life expectations collected through a series of "live to" probability questions for ages 65 through 95 are highly significant for predicting claiming; individuals who express longer life expectancies are more willing to claim later, as would be expected. An important null result in Study 2 is that these life expectation effects occur whether the life expectancy judgments are

taken before or after the claiming question; the lack of effect for the order manipulation shows that the life expectancy questions are not priming or otherwise effecting respondents' claiming answers. High levels of loss aversion affect claiming by pushing individuals toward earlier claiming, consistent with thinking of monthly benefits as an endowed resource. Lending further credence to an endowment mentality toward Social Security benefits, we also see concerns about fairness and perceived ownership affecting claiming decisions, especially for the conditions in which cumulative amounts are displayed. It may be that the cumulative payout tables encourage individuals to think of claiming as a breakeven problem, in which their goal is to receive the maximum amount of payments within an average lifespan and relative to the contributions that they put into the system.

Study 2 also tested several presentations of cumulative payout information, an intervention that has been found successful at increasing interest in life annuities, a financial product with similar features to Social Security. Unlike the impact of these cumulative tables on annuities, their effect on participants in Study 2 is insignificant. Directionally, in fact, the effect is negative, with cumulative tables appearing to encourage earlier claiming rather than later claiming. These results are intriguing and may suggest that it maybe a mistake for researchers to think of Social Security and annuity purchase as similar decisions. We investigate additional information presentation approaches in Study 3, and also test a priming manipulation designed to interact with the perceived ownership measures found to be significant in Study 2.

3.3 Study 3: Testing of information presentation and priming interventions

Study 3 continues to test the importance of individual measures of life expectancy judgments, loss aversion, and perceived fairness on intentions to claim Social Security benefits. To further explore how information presentation may also influence these decisions, we modify the cumulative payout tables tested in Study 2 to see whether shifting attention to later payout ages will affect claiming decisions. We also further explore the role of perceived ownership by employing a prime that should increase the salience of prior contributions, which should further exacerbate the tendency to claim early for individuals with high perceived ownership.

Participants. Study 3 is an online study with a convenience sample of U.S. residents aged 40 to 65 (N = 1113) who were recruited and run online through the internet panel company Qualtrics. Participants (49.7% female, M_{age} = 53) were paid a fixed amount for participation.

Method. Participants in the study were randomly assigned to one of six conditions in a 3x2 design. The first design factor was a modification of the cumulative payout tables used in Study 2. Participants saw either basic information of monthly benefits with no cumulative information, a cumulative payout table that started at age 62 and went to age 70, or a reversed cumulative payout table that had age 70 on the left and descended to age 62 on the right. Our expectation was that the latter design would increase attention to the larger cumulative amounts that can be achieved by delaying claiming. The other design factor was a priming manipulation; half of participants, as part of the study introduction, were given information about the average amount of contributions a worker has made into the Social Security system at the point of retirement. More specifically, participants were shown the following text:

> "When thinking about claiming Social Security, many retirees refer to the information provided to them by the Social Security Administration about their contributions into the system over their working years.
>
> As an example of such contributions, imagine that you started working at age 20 and you were to continue working until you are at your mid-sixties. Further imagine that your salary started at around $3,760 in 1968 and has kept up with inflation to be around $53,100 by the time you retire. Based on standard tax rates, you would see the following information on the Social Security website:
>
> Total estimated taxes paid for Social Security over your working career through the last year:
> You paid: $70,010
> Your employers paid: $72,157
> The total contributions paid: $142,167"

The other half of participants did not have this prime included in their study instructions. We anticipated that seeing this total contribution amount would highlight the value of immediate benefits among individuals with high perceived ownership and high loss aversion, and therefore encourage earlier claiming among that group of participants.

In addition to the manipulations of cumulative payout information and the prior contribution prime, we collect our standard measures of self-reported age, gender, retirement assets, and health as demographics. As psychographics, we ask for perceptions of SSA solvency, perceptions of fairness, and loss aversion. We also introduce a measure of intertemporal discounting - a set of three questions adapted from Schreiber and Weber (2013). Individuals receive a score of 1 to 3, with higher values indicating more patience for the future. For the perceived fairness measure, only the three questions that constituted the perceived ownership

measure reported in Study 2 were used since they were the most predictive of claiming intentions in that study.

Results. This study allowed an answer of "I don't know" to the main dependent variable of predicted claiming age, and participants who selected this answer are excluded from further analysis, reducing our final sample to 933 respondents. As with Study 1, we start by converting the life expectancy probabilities taken for ages 65, 75, 85, and 95 into a single comprehensive measure of life expectation using a Weibull estimation procedure. A regression of claiming age on the main variables of interest, similar to that done in the previous two studies, shows a familiar set of results (see Table 4). Age is significant, with older participants indicating a preference for earlier claiming. Life expectancy is again strongly significant, with individuals expecting to live longer preferring later claiming. Our psychographic measures of loss aversion, SSA solvency, and perceived ownership are all significant in the predicted directions; those who are more highly loss averse, concerned about solvency, or who see the benefits as their own all prefer to claim earlier. Our new psychographic measure of intertemporal discounting also shows a significant effect, with more patient respondents showing a willingness to delay their claiming.

Also similar to Study 2, our manipulations of the information presented and the priming of prior contributions appear to have little effect on shifting claiming intentions among our respondents. Interactions of these manipulations with the individual difference variables also do not show significant effects, contrary to our expectations; for example, an interaction of the priming manipulation with the perceived ownership measure does not show any increased effect of priming among individuals with high perceived ownership. An interaction between the information presentation and priming does show an effect however. Specifically, inclusion of this interaction shows a significant negative effect of the presence of the cumulative table, but only when there is no prime of prior contributions. This negative effect of the cumulative table confirms, in the similar non-priming condition, the directional (but non-significant) effect of cumulative payout information in Study 2.

To take a closer look at the joint effects of life expectations, loss aversion, perceived ownership, and intertemporal patience on claiming decisions, we group respondents by quartile on each measure for further analysis. Upper and lower quartiles are at scores of 3 and 7 (respectively) on the loss aversion measure, at scores of 5 and 6.3 on the perceived ownership measure, at scores of 0 and 3 on the intertemporal patience measure, and at ages of below 78 and

above 92 on life expectations. The set of three graphs in Figure 3 show how the percentage of individuals who intend to claim early (at age 64 or before) changes based on combinations of these measures. For example, almost 57% of participants who indicate both high loss aversion and low life expectations indicate a desire to claim early, while only 22% of participants with low loss aversion and high life expectations do so. The pattern of results is similar for each of the behavioral measures we focus on; high loss aversion, high feelings of ownership toward Social Security benefits, and low intertemporal patience are all significant predictors of early claiming.

Discussion. Consistent with many of the effects found in Study 2, Study 3 shows that measures of life expectancy, loss aversion, perceived ownership, and SSA solvency are all significant individual differences that can predict intentions for early versus late Social Security claiming. We introduce a new individual difference measure in Study 3, of intertemporal patience, which also is predictive of claiming. Importantly, all of these individual difference measures operate independently of each other, suggesting that they can each contribute to the effectiveness of models of claiming behavior.

We also find, for the first time in these studies, significant effects of information presentation and priming. For participants who do not see a prime about prior Social Security contributions, the presentation of a table of cumulative payouts for different claiming ages has the effect of decreasing their intended claiming age. This result, which was also hinted at in Study 2, is surprising due to being in the opposite direction of prior findings in which similar tables increased preferences for life annuities. As noted earlier, this suggests that the annuity purchase decision and the Social Security claiming decision, while seen as similar in their importance for reducing mortality risk, are actually quite different in the psychological processes that drive them.

4. Summary

Overall, we have documented that higher perceived life expectations, preferences for losses as measured through individual-level loss aversion, impatience (preference for smaller amounts sooner versus larger amounts of money later), and personal beliefs about fairness and perceived ownership of prior SSA contributions are all significantly predictive of expressed preference for early versus late claiming. These findings lend strong support to previously hypothesized effects of how JDM literature can inform research on Social Security claiming

19

(Knoll 2011). This work also contributes to the literature on heterogeneity in individual preferences for claiming (Gustman & Steinmeier 2012).

While the results of the studies presented here focus primarily on measures of individual differences, rather than on explicit manipulations of primary variables, we hope that these results will lend insight to both models of claiming and future behavioral interventions. Behavioral interventions that have been previously tested in the Social Security claiming area have tended to focus on manipulation of gain/loss framing (e.g., Brown, Kapteyn, and Mitchell 2011; Liebman and Luttmer 2009), without strong success at encouraging later claiming. Our information presentation and priming manipulations also had limited success, with significant effects in directions we did not predict. In particular, we tested several different cumulative payoff displays that have been found to successfully change preferences for annuities; however, in contrast to their effects on annuities, we found that highlighting cumulative payouts for different claiming ages appears to have either no effect or, in some cases, encourage earlier claiming. The difference between the annuity purchase decision and the Social Security claiming decision may center on the issue of perceived ownership that we have captured in these studies. With an annuity, the choice is one of purchase, while with claiming, the choice is of exercising an already held (owned) option. The influence of the cumulative table in the annuity environment may increase the perceived value of the annuity and thus make it more preferred as a purchase. However, in the claiming environment, the cumulative table may remind the individual of the high value of the option they already hold, making them more impatient for receiving it. Knowing that it is this focus on perceived ownership that drives earlier claiming may suggest interventions for moderating its effects.

As noted earlier, the Life-Cycle model of consumption (Browning & Crossley, 2001) is an important framework for understanding both consumption and deconsumption behaviors. Three major components of the model are consumption utility, time preference, and judgments of uncertainty. The relationship of these components to the measures in our studies is worth noting. First, measures of loss aversion are an important input to many models of utility since they affect the relative weighting of losses and gains. Second, our measure of intertemporal patience can be seen as a measure of individual time preference. Finally, since life expectancy is one of the most crucial uncertainties in planning retirement income, our life expectation judgment serves as a useful measure of the uncertainty component. Our finding that all of these

individual difference measures are significant predictors of claiming supports the relevance of the Life Cycle theoretical framework as an approach for considering the claiming decision, while also suggesting the importance of incorporating behavioral elements into the overall model.

Future research should continue to test interventions built around the psychological measures of loss aversion and perceived ownership of benefits. Our results suggest, for instance, that the Social Security claiming decision and the decision on whether or not to purchase a life annuity, which in theory might both be forms of insurance against longevity risk, may not be perceived as similar types of decisions by many Americans. There are similar relationships when examined from the perspective of certain psychological variables like life expectations and loss aversion that suggest similar decisions but the sign differences with the presentation of cumulative payout information which suggest differences as well. Understanding these differences in behavioral response to solutions for longevity risk may be helped by moving beyond just looking at decision outcomes but by also examining more process data such as eye fixations. Ongoing work with eyetracking technology should provide further insight into which information is used in the claiming decision and also help guide development of new intervention materials.

References

Angeletos, G., D. Laibson, A. Repetto, J. Tobacman, and S. Weinberg. 2001. "The hyperbolic consumption model: Calibration, simulation, and empirical evaluation." *The Journal of Economic Perspectives*, 15(3) 47-68.

Ariely, D., & Simonson, I. 2003. "Buying, bidding, playing, or competing? Value assessment and decision dynamics in online auctions." *Journal of Consumer Psychology*, 13, 113–23.

Benartzi, Shlomo, Alessandro Previtero, and Richard Thaler. 2011. "Annuitization Puzzles." *The Journal of Economic Perspectives*, 25(4), 143-164.

Bies, R. J., T.M. Tripp, and M.A. Neale. 1993. "Procedural fairness and profit seeking: The perceived legitimacy of market exploitation." *Journal of Behavioral Decision Making,* 6, 243–256.

Brown, J. R. 2007. "Rational and behavioral perspectives on the role of annuities in retirement planning." NBER Working Paper No. 13537.

Brown, J.R., A. Kapteyn, O.S. Mitchell. 2011. "Framing effects and expected social security claiming behavior." NBER Working Paper 17018.

Browning, M., and T.F. Crossley. 2001. "The life-cycle model of consumption and saving." *The Journal of Economic Perspectives*, 15(3) 3-22.

Carmon, Z., Wertenbroch, K., & Zeelenberg, M. 2003. "Option attachment: When deliberating makes choosing feel like losing." *Journal of Consumer Research*, 30 (June), 15–29

Gustman, Alan L., and Thomas L. Steinmeier. 2012. "Behavioral Effects of Social Security Policies on Benefit Claiming, Retirement and Saving." Working Paper 2012-263.

Elder, T. E. 2007. "Subjective survival probabilities in the Health and Retirement Study: Systematic biases and predictive validity." Working Paper 2007-159, Michigan Retirement Research Center.

Hu, W.Y., & Scott, J.S. 2007. Behavioral obstacles to the annuity market. *Financial Analysts Journal*, 63(6), 71-82.

Kahneman, D., Knetsch, J. & Thaler, R.H. (1986). Fairness as a constraint on profit-seeking: Entitlements in the market. *American Economic Review*, 76(4), 728-741.

Knoll, M.A.Z. 2011. Behavioral and Psychological Aspects of the Retirement Decision. *Social Security Bulletin*, 71(4), 15-32.

Leibman, J. B., E. F.P. Luttmer. 2009. The Perception of Social Security Incentives for Labor Supply and Retirement: The Median Voter Knows More than You'd Think. NBER Working Paper NB08-01.

Oppenheimer, D. M., T. Meyvis, N. Davidenko. 2009. Instructional Manipulation Checks: Detecting Satisficing to Increase Statistical Power. *Journal of Experimental Social Psychology*, 45 (4), 867-72.

Payne, John, Namika Sagara, Suzanne B. Shu, Kirsten Appelt, and Eric Johnson. 2013. "Life Expectation: A Constructed Belief? Evidence of a Live To or Die By Framing Effect," *Journal of Risk and Uncertainty*, 46, 27-50.

Peck, Joann, and Suzanne B. Shu. 2009. "The Effect of Mere Touch on Perceived Ownership," *Journal of Consumer Research*, 36 (Oct). 434-447.

Pierce, J.L., Kostova, T. & Dirks, K.T. 2001. Towards a theory of psychological ownership in organizations." *Academy of Management Review*, 26 (2), 298-310.

Rabin, Matthew, and Richard H. Thaler. 2001. "Anomalies: Risk Aversion." *Journal of Economic Perspectives*, 15(1): 219-232.

Seligman, D.A. & Schwartz, B. 1997. Domain specificity of fairness judgments in economic transactions" *Journal of Economic Psychology*, 18 (6), 579-604.

Schreiber, Philipp and Weber, Martin. 2013. "Time Inconsistent Preferences and the Annuitization Decision." SSRN working paper.

Shoven, John B., and Sita Nataraj Slavov. 2012. "The Decision to Delay Social Security Benefits: Theory and Evidence." NBER Working Paper No. 17866.

Shu, Suzanne B., and Sylvia Morelli. 2013. "Drivers and Outcomes of Perceived Fairness in Consumer Financial Decisions." UCLA working paper.

Shu, Suzanne B., and Joann Peck. 2011. "Perceived Ownership and Affective Reaction: Emotional Attachment Process Variables and the Endowment Effect," *Journal of Consumer Psychology*. 21 (4), 439-452.

Shu, Suzanne B., Robert Zeithammer, and John Payne, "Consumer Valuation of Annuities: Beyond NPV," UCLA working paper.

Tacchino, K.B., D.A. Littell & B.D. Scholbel. 2012. "A Decision Framework for Optimizing the Social Security Claiming Age." *Benefits Quarterly*, 40-52.

Tversky, A. & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty, 5*(4), 297-323.

Table 1: Participant demographics from online studies 1-3

	Study 1 (n=832)	Study 2 (n=1432)	Study 3 (n=1113)
Source		Qualtrics	Qualtrics
Age	min 35, max 65, mean 50.5	min 30, max 60, mean 44.3	min 40, max 65, mean 53
Gender	48.7% female , 51.3% male	49.8% female, 50.2% male	49.7% female , 50.3% male
Numeracy	min 0, max 8, mean 3.84	min 0, max 8, mean 3.30	n.a.
Health	min 1, max 7, mean 5.12	min 1, max 7, mean 4.98	min 1, max 7, mean 5.34
Retirement savings	min 2.5k, max 1.5m, median 12.5k	min 2.5k, max 875k, median 12.5k	
Subjective life exp.	min 47, max 130, mean 80.8	min 46, max 130, mean 85.7	min 48.6, max 120, mean 85.7
Loss aversion	min 0, max 9, mean 6.27	min 0, max 9, mean 4.58	min 0, max 9, mean 5.06

Table 2: Regression results for Study 1

	DV: claiming	DV: annuities	DV: bonds	DV: save	DV: combined
Constant	64.19*** (.99)	30.55*** (10.5)	41.64*** (9.0)	6.45*** (1.87)	-.52*** (.20)
Demographics					
Age	-.013 (.014)	-.30** (.15)	.072 (.13)	.04 (.03)	-.001 (.002)
Gender (female=1)	.083 (.104)	1.59 (1.1)	1.22 (.95)	.007 (.2)	.019 (.02)
Health	.173** (.08)	1.31 (.82)	.13 (.70)	.026 (.15)	.039** (.016)
Savings	0 (0)	.001 (.002)	.003 (.002)	.001 (0)	0 (0)
Numeracy	.065 (.06)	-.271 (.59)	-.53 (.51)	.266*** (.10)	.01 (.01)
Life expectancy	.031*** (.008)	.20** (.09)	-.173** (.08)	.027 (.02)	.008*** (.001)
Loss aversion	-.064 (.04)	-.678 (.46)	.847** (.39)	-.19** (.08)	-.025*** (.009)
SSA solvency	.012*** (.003)	-.082** (.04)	-.116*** (.03)	-.001 (.007)	.001** (0)
Manipulations					
Framing	-1.65*** (.66)	-13.62** (6.96)	-6.38 (6.14)	.037 (1.26)	-.35*** (.14)
Order	.117 (.098)	1.84* (1.04)	1.21 (.89)	-.127 (.18)	.01 (.02)
Framing * life exp	.02** (.008)	.20** (.09)	.09 (.08)	-.001 (.02)	.004*** (.001)

Notes: Reports non-standardized coefficients from OLS regressions. Standard errors are in parentheses.

*** Significant at the 1 percent level
 ** Significant at the 5 percent level
  * Significant at the 10 percent level

Table 3: Regression results for Study 2

	DV: claiming Basic (C1) N=294	DV: claiming Cum pmt 73 (C2) N=294	DV: claiming Cum pmt 63 (4-6) N=844	DV: claiming ALL N=1432
Constant	62.88*** (1.77)	62.51*** (1.73)	61.32*** (.96)	62.25*** (.77)
Demographics				
Age	-.03* (.019)	-.015 (.019)	-.015 (.011)	-.021** (.008)
Gender (female=1)	.32** (.16)	.036 (.16)	.10 (.09)	.14** (.07)
Health	.140 (.127)	.267** (.124)	.110 (.075)	.146*** (.06)
Savings	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Numeracy	.007 (.08)	-.154* (.09)	.072 (.05)	.015 (.04)
Life expectancy	.040*** (.012)	.043*** (.013)	.054*** (.008)	.047*** (.006)
Loss aversion	-.100* (.06)	-.025 (.06)	-.041 (.03)	-.045* (.03)
SSA solvency	-.008 (.006)	-.017*** (.005)	-.005 (.003)	-.008*** (.003)
General fairness	.20 (.24)	.568** (.25)	-.025 (.14)	.115 (.11)
System fairness	-.01 (.20)	.002 (.23)	.11 (.13)	.04 (.10)
Ownership	-.176 (.16)	-.413*** (.16)	-.176** (.09)	-.224*** (.07)
Manipulations				
Order			.164 (.23)	.143 (.23)
Mortality %s			-.224 (.22)	.020 (.19)
Cumulative table				-.255 (.189)

Notes: Reports non-standardized coefficients from OLS regressions. Standard errors are in parentheses. Age is mean-centered at age 44.3 for Study 2.

*** Significant at the 1 percent level
 ** Significant at the 5 percent level
  * Significant at the 10 percent level

Table 4: Regression results for Study 3

	DV: claiming N=933	DV: claiming N=933
Constant	62.53*** (.88)	63.03*** (.88)
Demographics		
Age	-.03** (.015)	-.03** (.15)
Gender	-.06 (.17)	-.05 (.17)
Health	.036 (.07)	.035 (.07)
Savings	0.0 (0.0)	0.0 (0)
Life expectancy	.059*** (.008)	.060*** (.008)
Loss aversion	-.08** (.03)	-.08** (.03)
SSA solvency	-.008** (.003)	-.008** (.004)
Ownership	-.24*** (.08)	-.245*** (.08)
Intertemporal patience	.314*** (.09)	.307*** (.09)
Manipulations		
Priming	.222 (.17)	-.266 (.29)
Cumulative table	-.244 (.21)	-.733*** (.25)
Reversed table	-.257 (.21)	
Priming * cumulative table		.727** (.36)

Notes: Reports non-standardized coefficients from OLS regressions. Standard errors are in parentheses. Age is mean-centered at age 53 for Study 3.

*** Significant at the 1 percent level
 ** Significant at the 5 percent level
  * Significant at the 10 percent level

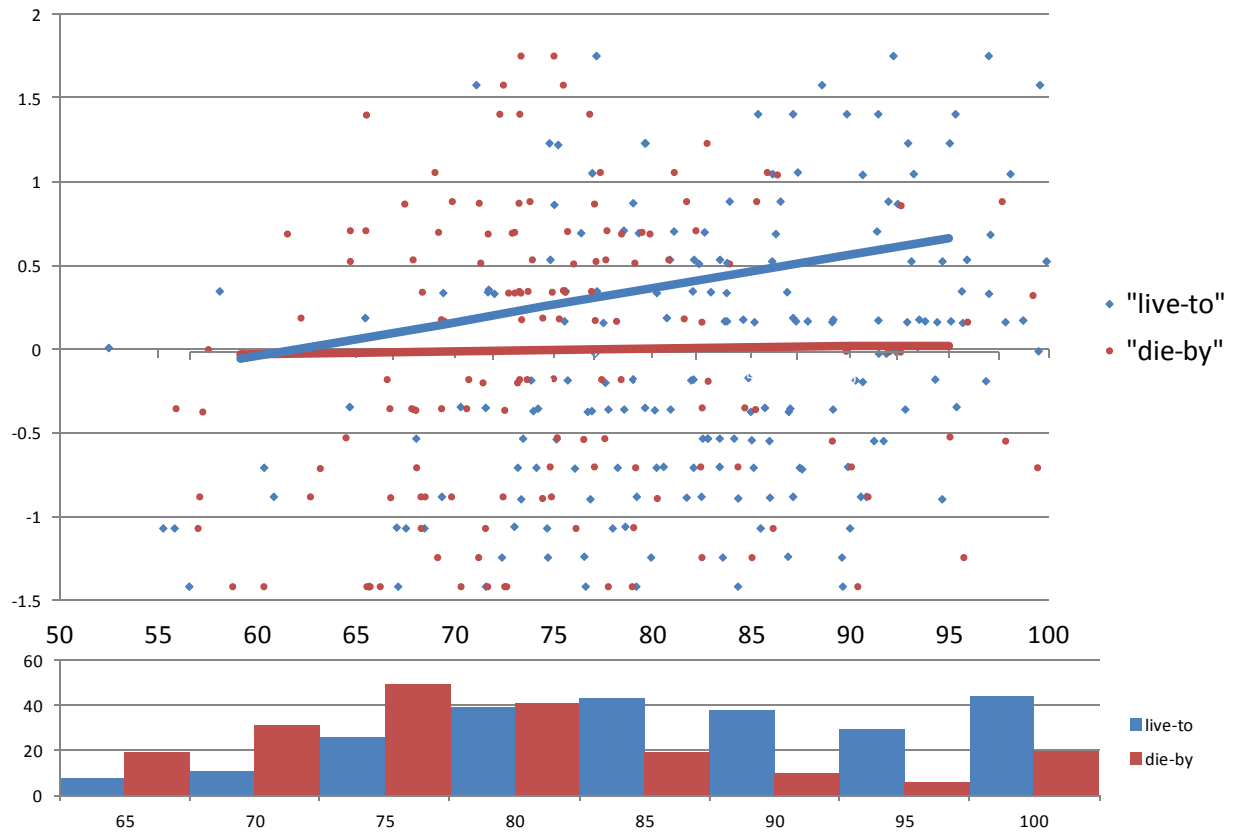**Figure 1: Framing and life expectation interaction for Study 1**

Figure 2: Cumulative payout matrix and choice task for condition 4 of Study 2

	63	68	73	78	83	88	93
Starting yr and payment / % of living	97%	90%	81%	68%	51%	31%	13%
62 ($1,339/month)	$16,100	$96,400	$176,700	$257,100	$337,400	$417,800	$498,100
64 ($1,544/month)	$0	$74,100	$166,800	$259,400	$352,000	$444,700	$537,300
66 ($1,793/month)	$0	$43,000	$150,600	$258,200	$365,800	$473,400	$580,900
68 ($1,960/month)	$0	$0	$117,600	$235,200	$352,800	$470,400	$588,000
70 ($2,395/month)	$0	$0	$86,200	$229,900	$373,600	$517,300	$661,000

Cumulative amount paid to you by different age if you live to that age

62 yrs old   64 yrs old   66 yrs old   68 yrs old   70 yrs old   I don't know

□   □   □   □   □   □

Figure 3: Joint effects of loss aversion and life expectancy on claiming in Study 2

% of early claimers

- Low expec age (<80), High loss aversion (>5), : 66%
- Low expec age (<80), Low loss aversion (<4), : 50%
- high expec age (>90), High loss aversion (>5), : 36%
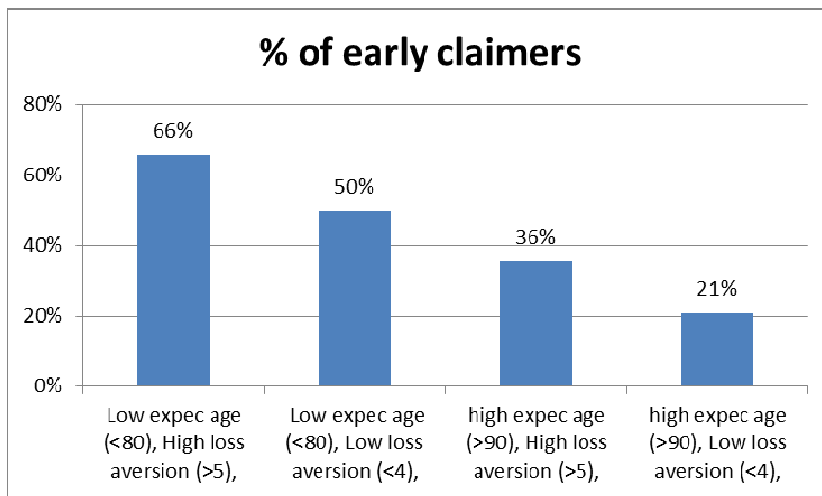- high expec age (>90), Low loss aversion (<4), : 21%

Figure 4: Joint effects of life expectancy and other measures on claiming in Study 3