The Welfare Cost of Perceived Policy Uncertainty: Evidence from Social Security

Erzo F. P. Luttmer*

Andrew A. Samwick*

April 6, 2012

Abstract

Policy uncertainty can reduce individual welfare in cases when individuals have limited opportunities to mitigate or insure against consumption fluctuations induced by the policy uncertainty. For this reason, policy uncertainty surrounding future Social Security benefits may have important welfare costs. We field an original survey to measure the degree of policy uncertainty and to estimate the impact of this uncertainty on individual welfare. On average, our survey respondents expect only about 60 percent of the benefits they are supposed to get under current law. We document the wide variation around the expectation for most respondents and the heterogeneity in the perceived distributions of future benefits across respondents. This uncertainty has real costs. Our central estimates show that on average individuals would be willing to forego 4 – 6 percent of the benefits they are supposed to get under current law to remove the policy uncertainty associated with their future benefits. This translates to a risk premium from policy uncertainty equal to 7 – 10 percent of expected benefits.

JEL classification: H55 (Social Security and Public Pensions)

Keywords: Social Security; Policy Risk; Retirement; Political Risk

* Department of Economics, 6106 Rockefeller Hall, Hanover, NH 03755 and National Bureau of Economic Research. Corresponding author: Erzo Luttmer, Erzo.FP.Luttmer@dartmouth.edu. We thank Steve Venti and Alan Gustman for helpful comments and Poom Nukulkij and Wan Yan of Knowledge Networks for their work on our survey. We are grateful to Matthew Greenwald for providing us with tabulations of data from his research, to Steve Goss for guidance on the present discounted value of accrued future Social Security benefits, and to Ben Chuchla for exceptional research assistance. This research was supported by the U.S. Social Security Administration through grant #5 RRC08098400-03-00 to the National Bureau of Economic Research as part of the SSA Retirement Research Consortium. The findings and conclusions expressed are solely those of the author(s) and do not represent the views of SSA, any agency of the Federal Government, or the NBER.

1. Introduction

Relative to the extensive literature that values risk in insurance and financial markets, economists have paid surprisingly little attention to the welfare consequences of policy uncertainty. The welfare effects of policy uncertainty are likely to be especially pronounced when (i) individuals take actions in anticipation of a policy but before the policy is realized, (ii) these actions are not costlessly reversible, and (iii) the risk associated with the policy is not diversifiable or insurable. For example, uncertainty about future taxes is costly to individuals because their investments in human capital will not be privately optimal for the actual realization of the future tax rate.[1] Uncertainty about generosity of expenditure programs for the elderly, such as Social Security and Medicare, hampers individuals' ability to smooth consumption over the lifecycle. Given that Social Security is mandatory, non-diversifiable, and accounts for more than a third of total income among the elderly, we suspect that the welfare cost of policy uncertainty regarding its generosity is likely to be one of the major sources of welfare cost of policy uncertainty more generally. This paper's objective, therefore, is to estimate the welfare cost to individuals of policy uncertainty regarding Social Security benefits.[2] In other words, we estimate the risk premium for policy uncertainty in Social Security wealth.

The traditional method of valuing uncertainty by comparing an asset's market value to its expected value is generally not feasible in the case of policy uncertainty because the effect of policy uncertainty is hardly ever fully captured by a publicly traded asset, and even if it were, then other sources of uncertainty might also affect the asset's value. To overcome this challenge, the empirical literature on policy uncertainty proceeds in two steps. The first step is to measure the degree of policy uncertainty. This can be done retrospectively by measuring uncertainty as the residuals in a VAR, as Skinner (1988) does, or by estimating the variability in past policy

---

[1] As noted by Weiss (1976) and Stiglitz (1982) in the case of income taxes, policy uncertainty can induce behavioral changes that may counteract existing distortions. Such behavior changes thus yield a positive effect on welfare and this positive effect could potentially more than offset the negative welfare effect of the consumption risk induced by the policy uncertainty. Alm (1988) and Kim, Snow, and Warren (1995) provide further theoretical results regarding the welfare effects of tax policy uncertainty in a second-best world.

[2] Our empirical approach does not allow us to ascertain whether some of perceived policy uncertainty is optimal from an intergenerational risk-sharing perspective (see, e.g., Gordon and Varian, 1988). To the extent some component of the perceived policy uncertainty is optimal for intergenerational risk sharing, our estimates of the welfare cost to current individuals of policy uncertainty are an overestimate of the total welfare effect of policy uncertainty. Similarly, we are not able to evaluate any welfare effects of policy uncertainty that stem from the uncertainty reducing existing distortions. We suspect this latter effect is minimal in our application because we find little evidence of behavioral responses to policy uncertainty.

changes, which is the approach taken by Nataraj and Shoven (2003), Shoven and Slavov (2006), Borgman and Heidler (2007), Dušek (2007), and Blake (2008). Because past variability may not necessarily provide a good estimate of uncertainty about future policy (e.g., if the process is non-ergodic or there is a so-called peso-problem), other studies, including Van der Wiel (2008), Guiso, Jappelli, and Padula (2010), and Giavazzi and McMahon (2012) have measured perceived policy uncertainty using survey questions about future policy.

Not all of these papers proceed to the second step, but those who do either relate the policy uncertainty estimated in the first step to observed behavior or use the estimated policy uncertainty to calibrate a model that yields a welfare estimate. Papers that relate estimated policy uncertainty to observed behavior include Giavazzi and McMahon (2012), who analyze its effects on household saving, Guiso, Jappelli, and Padula (2010), who study the effects on enrollment in private pensions and health insurance, and Van der Wiel (2008), who examines the effects on private pension participation. These papers, however, do not estimate the welfare cost of the policy uncertainty. In contrast, Skinner (1988) and Dušek (2007) evaluate the estimated uncertainty using a model to calculate the welfare cost of the uncertainty. Skinner estimates that the welfare cost of uncertain taxes is 0.4% of national income and Dušek finds that the risk premium for the uncertainty around the indexing of Social Security benefits in the Czech Republic is 1.3% when the coefficient of relative risk aversion is assumed to equal 3. Alternatively, it is possible to calculate the welfare cost of policy uncertainty using a calibrated (rather than estimated) measure of policy uncertainty, which is the approach taken by Gomes, Kotlikoff, and Viceira (2012). They actually focus on a slightly different question, namely the welfare gain from resolving uncertainty about future Social Security benefits earlier holding constant the variance in future Social Security benefits, and find that early resolution can lead to welfare gains that are equivalent to 0.5% of lifetime consumption.

In this paper, we take an alternative and, to the best of our knowledge, novel approach to valuing the cost of policy uncertainty: we elicit both the expected policy and the certainty equivalent of uncertain future policy, and show how the difference between these two measures captures the welfare cost to the individual of policy uncertainty. Our approach is thus similar to the traditional approach of valuing uncertainty except that we elicit the certainty equivalent by asking individuals how they value a hypothetical asset that has no policy uncertainty rather than using a market price to observe this certainty equivalent. The obvious concern of our approach is that some individuals may have trouble giving a meaningful valuation of a hypothetical asset. Because we believe this is an important concern, we included various forms of randomized variation in the way we elicited expectations and certainty equivalents, and the responses to this randomized variation allow us to evaluate the quality of the responses. The benefit of our approach is that our estimate of the cost of uncertainty does not rely on model specification or parameter assumptions. This means that our estimate does not rely on any assumptions on, or estimates of, the types of behaviors people may undertake to mitigate the policy risk. Moreover, our estimates capture any direct effects (such as disutility from stress or worrying) related to the policy uncertainty that might not be captured by a standard expected utility model.

We estimate the cost of policy uncertainty for Social Security benefits because this is arguably one of the largest sources of policy uncertainty for individuals. To address the solvency of Social Security, some combination of benefit cuts and tax increases will likely occur at some point in the future.[3] The need for reform to restore the program to long-term financial stability has been an active topic of policy discussion since at least the report of the 1994-1996 Advisory Council (Advisory Council, 1997). Since then, each of the last three presidents has made the reform of Social Security an important part of his policy agenda.[4] With the status of reform still in doubt, individuals can expect something to happen but not be certain of the timing, size, and composition of the policy change. To illustrate the role of this policy uncertainty, consider two scenarios in a stylized example. In the first, individuals know for sure that their Social Security benefit will be cut by 20 percent. In the second, they have a 20 percent chance that their benefits will be cut completely and an 80 percent chance that their benefits will not be cut at all. While the expected benefits (and thus the expected cost to the government) are the same in both scenarios, individuals only face policy uncertainty in the second scenario. Because of the uncertainty in the second scenario, risk averse individuals value their benefits less than what they cost in expectation. In particular, they would likely be willing to trade the second scenario for a sure benefit cut, even if that sure benefit cut is somewhat greater than 20 percent. The difference between the expected benefit cut and the largest sure benefit cut people would be willing to

---

[3] In their most recent report, Social Security's Board of Trustees (2011) projected that the program's trust funds would be exhausted in 2036, at which point annual costs are projected to exceed annual income by 28 percent or 3.8 percentage points of taxable payroll.

[4] The Social Security Administration keeps an archive of presidential statements on Social Security at http://www.ssa.gov/history/presstmts.html. President Bush spent much of 2005 advocating for reform, and the need for reform figured prominently in President Obama's call for a bipartisan fiscal commission in 2010 and negotiations over the debt ceiling increase in the summer of 2011.

accept is an estimate the cost to individuals of policy uncertainty surrounding Social Security benefits.

We implement our methodology by fielding an original, internet-based survey of 3,000 individuals between the ages 25 and 59, who are broadly representative of the U.S. population in that age range. We focus on this age range because this is the prime age range in which individuals need to prepare for retirement and because older individuals will likely be (largely) grandfathered into the existing rules if there is a major Social Security reform. An important innovation relative to the literature that examines perceptions of future Social Security benefits is that we ask about future benefits *relative* to the benefits scheduled under current law.[6] This allows us to filter out any uncertainty (or misperceptions) regarding the current benefit rules as well as uncertainty about benefits that is related to uncertain arguments (such as own future earnings or aggregate future wage growth) of the benefit formula. The key part of the survey consists of two sets of questions about these benefits. In the first, respondents are asked to describe the likelihood of receiving benefits in specific ranges relative to "the benefits they are supposed to get under current law." They fill in a histogram of this distribution by putting balls into bins on their computer screens. This histogram allows us to calculate their expected benefits. In the second part, respondents are asked to make a sequence of choices as to whether they would prefer a guaranteed contract at a hypothetical percentage of the benefits they are supposed to get under current law to the distribution of benefits they are expecting. This sequence of questions allows us to bracket their certainty equivalent benefit level. Subtracting the certainty equivalent from the expected benefits yields the respondent's risk premium against policy uncertainty.

Our main results indicate that individuals perceive the risk to which policy uncertainty exposes them and that the welfare cost of that risk is statistically and economically significant. Across respondents, the average expected benefits are 59.4 percent of the benefits the respondents are supposed to get under current law and the average standard deviation is 22.5 percent. The average certainty equivalent is 53.7 percent, yielding an average risk premium of 5.8 percent. At 7.0 percent, the median risk premium is close to the average risk premium.

[6] There is an extensive literature examining perceptions of expected Social Security benefits. An early example focusing on the relationship between Social Security expectations and private saving is Bernheim and Levin (1989). More recent examples include Gustman and Steinmeier (2005), Dominitz and Manski (2006), Delavande and Rohwedder (2008), and Liebman and Luttmer (2012).

These risk premiums are expressed as percent of benefits under current law, but would become 9.7 percent and 11.8 percent respectively if expressed as a percent of expected benefits.

Regression results show that the risk premium increases with age and decreases with income. Expected benefits as a fraction of benefits under current law rise with age and the standard deviation of benefits decreases with age. This implies that the increase in the risk premium with age is driven by the fact that it is more costly for older people to bear policy risk in Social Security, for example because they have fewer means to mitigate this uncertainty by changing their labor supply or savings rate.

Because we recognize that some of the questions on our survey push the boundary in terms of information that can be meaningfully elicited in a representative survey, we did our utmost to build into the survey randomizations that can alert us to respondents giving non-meaningful answers. One of the key randomizations that we inserted is the value of the starting value to the series of questions that brackets the value of the certainty equivalent. This starting value should not affect the final valuation of the certainty equivalent for a respondent who can report a stable underlying valuation of the certainty equivalent. The extent to which valuations depend on this starting value therefore allows us to gauge the degree of non-meaningful answers. Moreover, by using a simple model that assumes that respondents consist of a mixture of those who give meaningful answers and those who answer completely randomly, we can both estimate the fraction of randomizers and correct our estimates of the risk premium for the effect of the starting value. We find the sensitivity to the starting value is consistent with 68 percent of respondents being able to report a stable underlying value and the remainder behaving as if they answer randomly. Correcting our estimates for the influence of the randomizers, we find a mean adjusted risk premium of 4.1 percent and a median adjusted risk premium of 6.0 percent. In short, even if a fraction of respondents finds the survey questions too difficult to answer meaningfully, we can correct our estimates for this and find adjusted risk premia that are reasonably similar to the unadjusted ones.

As a further check, we calculated the risk premium using the methodology that the existing literature has taken, namely applying a model and an assumed coefficient of risk aversion to our estimates of the degree of policy uncertainty as given the reported histogram of future benefits. The resulting "simulated" risk premium has a median of 4.0 percent and an average of 9.4 percent if we assume a coefficient of relative risk aversion of 3. The simulated risk premium is based on an admittedly very simple model and sensitive to various assumptions including the value of the coefficient of relative risk aversion. We nevertheless find it reassuring that the resulting estimate is broadly similar to our main estimate of the risk premium of policy uncertainty in Social Security benefits.

The remainder of the paper is organized as follows. In section 2, we describe our sampling frame and survey instrument and provide summary statistics for the demographic and other control variables used in our analysis. In section 3, we discuss the particular design features of the survey that enable us to elicit information on the distribution of future benefits and its certainty equivalent. We present our main results and sensitivity tests in Section 4. Section 5 provides evidence on the validity of survey responses to questions about benefit distributions. Section 6 considers possible adjustments that could be made to the distribution of risk premia. We discuss perceptions of policy uncertainty in tax policy in Section 7 and the impact of policy uncertainty on behavior in Section 8. Section 9 briefly concludes.

2. Data

Our survey is conducted as a module of the KnowledgePanel, created by the survey firm Knowledge Networks. The KnowledgePanel is an address-based sample drawn from the U.S. Postal Service's Delivery Sequence File.[7] When households without Internet access are recruited, they are provided with a laptop computer and free Internet service so they may participate in the panel. The KnowledgePanel consists of about 50,000 participants over the age of 18 and includes persons living in cell phone only households. Knowledge Networks collects basic demographic characteristics for all its panelists, and its panelists are roughly representative of the adult U.S. population according to these characteristics. Active members of the panel are invited to take specific surveys, with subsamples drawn using probability weighted sampling methods. The burden of panel membership is kept low by having members selected for no more than one survey per week.

[7] As discussed in Knowledge Networks (2010), randomly sampled addresses are invited to join the KnowledgePanel through a series of mailings (English and Spanish materials) and by telephone follow-up to non-responders when a telephone number can be matched to the sampled address. Invited households can join the panel by one of several means: completing and mailing back an acceptance form in a postage-paid envelope; calling a toll-free hotline staffed by bilingual recruitment agents; or going to a dedicated Knowledge Networks recruitment Web site and completing the recruitment information online.

We contracted with Knowledge Networks to obtain survey responses from approximately 3,000 KnowledgePanel participants who were between the ages of 25 and 59 in June 2011. Our sample contains the results for 3,053 completed interviews conducted between June 10 and July 1, 2011. The median duration of the interview was 20 minutes and we paid respondents a $5 cash-equivalent incentive to enhance survey completion. Table 1 contains summary statistics on the demographic and other control variables that we use in our empirical analysis.[8] Appendix Table A1 compares these summary statistics for these and other demographic variables to the Current Population Survey from March 2010. While for many demographic characteristics we can reject the hypothesis that the mean is the same in the CPS and our sample, in terms of economic magnitude the differences are limited. We therefore consider our sample as broadly representative of the U.S. population between the ages of 25 and 59.

In our regressions, we control for these demographic characteristics, along with MSA residency, homeownership, and employment status, as shown in Table 1. In some specifications, we also include a set of additional control variables that are relevant to perceptions of policy uncertainty in general and the Social Security program in particular.[9] We ask about risk preferences, life expectancy, the importance of Social Security in retirement, optimism, trust in the political system, and financial literacy. Summary statistics are presented in the last six rows of Table 1.

We measure risk preference through a sequence of questions in which respondents can choose a job that offers a certain lifetime income or a job that offers varying degrees of risk, such as a 50-50 chance of doubling lifetime income and a 50-50 chance of reducing it by some percentage. The sequence varies the reduction to bracket the respondent's point of indifference, from which we can infer risk aversion. In a constant relative risk aversion scenario, the brackets are coefficients of less than 1, 1 – 2, 2 – 4, 4 – 8, and greater than 8. The median response is consistent with risk aversion of 4 – 8.

Two factors are very important to the role of Social Security in retirement. The first is how long the beneficiary will live. We ask respondents for a subjective probability of surviving

---

[8] We defer the discussion of the first four rows, which summarize the distribution of perceived Social Security benefits, until Section 4 below.

[9] We ask these questions at the end of the survey. The full survey instrument is included as Appendix B. As these control variables are not the focus of our analysis, we create a dummy variable for whether the response is missing, recode the missing values to zero, and then include both the recoded variable and the dummy for whether the response was originally missing in our regressions.

to age 75. The mean probability is 67.9 and the median is 71. A quarter of the sample places the probability at 51 percent or below and another quarter at 85 percent or higher. The second is how important Social Security will be as a share of retirement income. We ask this question directly, with possible responses, coded 1 – 4, in the form of ranges of less than 25 percent of spending, 25 – 50 percent, 50 – 75 percent, and greater than 75 percent. There is considerable variation around a mean of 2.8 and a median of 3 (50 – 75 percent).

To measure optimism, we ask six questions about how the respondent perceives the outcomes of uncertain events (e.g., "In uncertain times, I usually expect the best.") The respondent can pick from five choices – strongly disagree, somewhat disagree, neither agree or disagree, somewhat agree, strongly agree – which are given numerical values of 1 – 5, with higher values indicating more optimism. We average these numerical responses and standardize the variable to have zero mean and unit standard deviation.

Trust in the political system is measured as the response to the statement, "Most elected officials are trustworthy." As with the optimism question, the five choices range from strongly disagree to strongly agree, with numerical values ranging from 1 – 5. The average response is 2.2 and the median response is 2.0, indicating that most respondents lack trust in the political system.

Finally, we measure financial literacy as the number of correct answers given by the respondent to four simple questions about a lottery, money illusion, compound interest, and mutual funds. The average score is 2.4, with a median of 3.

3. Methodology

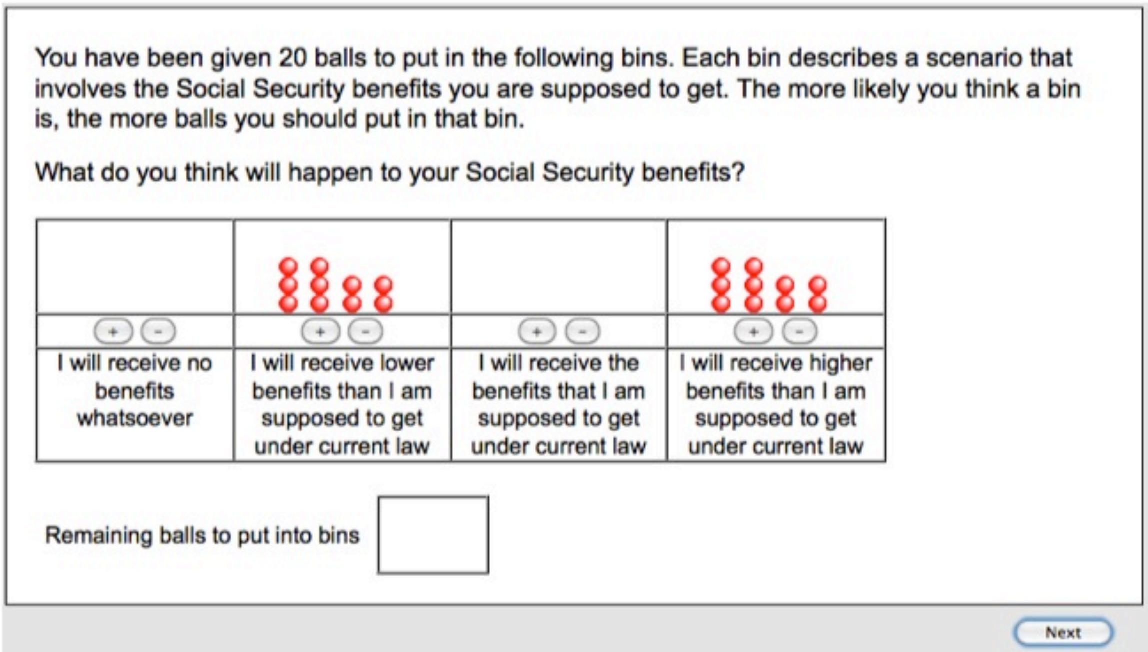
The main part of our survey is designed to gather information from the respondents sufficient to calculate the costs of policy uncertainty. As this is not an everyday topic of conversation for most people, the survey itself needs to guide them through the steps of the process. In addition, we made sure to include randomizations in the survey that allow us to gauge whether respondents are able to give meaningful answers. This section discusses and illustrates three important design features of the survey.

3.1 Choice of Baseline Benefits

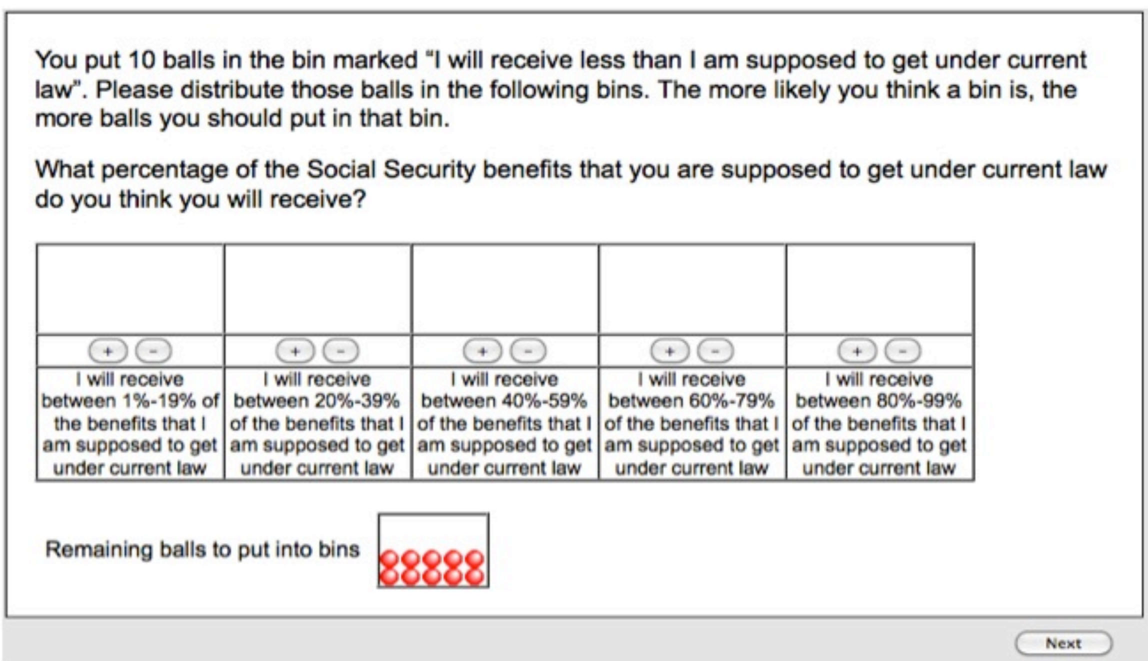
The first feature, which to the best of our knowledge has not been implemented before, is to use the respondent's own perception of current law benefits as the baseline. Throughout the survey, respondents are asked to compare expected or hypothetical benefits to "the benefits you are supposed to get under current law." We do not seek to measure whether the respondent has an accurate projection of what those current law benefits would be or whether the respondent is uncertain about benefits under current law because those benefits depend on variables that themselves are uncertain, such as future own earnings or future aggregate earnings. By keeping whatever uncertainty or misconceptions respondents may have about benefits under current law in the baseline, the survey responses will pertain only to the policy uncertainty regarding how current law benefits will be changed by policy makers.

3.2 Constructing the Perceived Distribution of Social Security Benefits

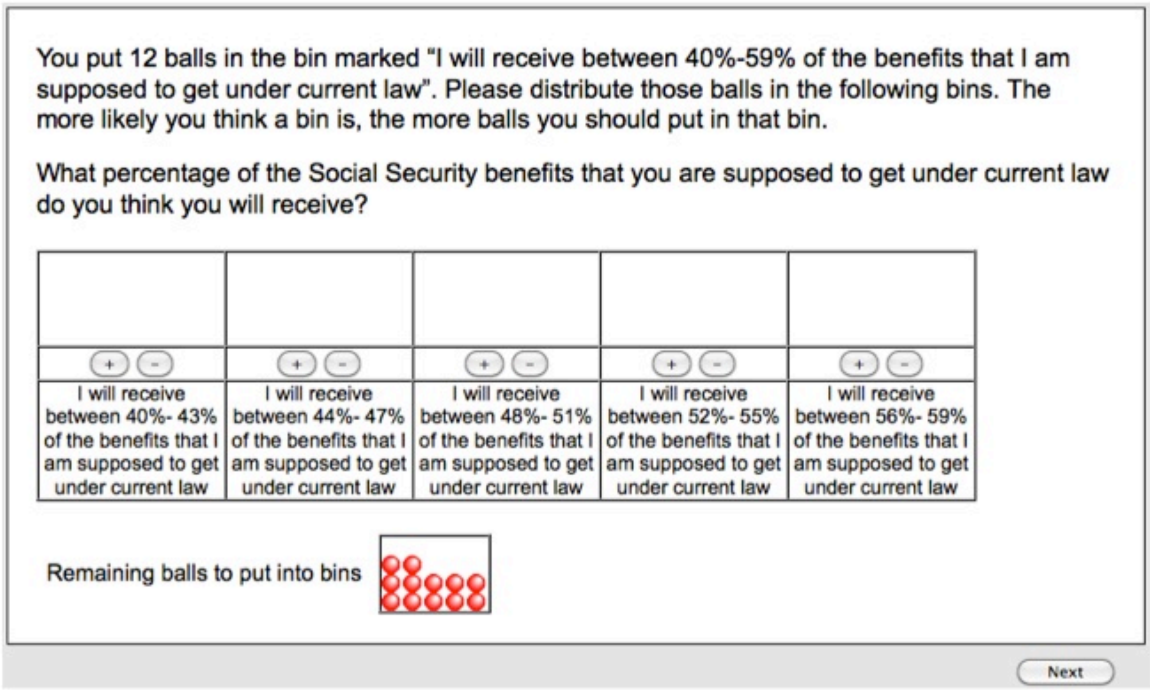
The second feature is to use the visual aspect of the online survey to facilitate the answer to the general question of how uncertain the respondent believes future Social Security benefits to be. This feature was developed in Delavande and Rohwedder (2008) and subsequently also used in Liebman and Luttmer (2011). We measure uncertainty in the form of a histogram of where the respondents believe their benefits will be and allow us to estimate the cumulative distribution function (CDF) of benefits for each respondent as a percent of what he or she is supposed to get under current law. The survey first asks the respondent to allocate 20 balls across four bins reflecting different benefit amounts, where each ball is explained to represent a 1 in 20 chance of that benefit amount occurring. One category is the "no benefits whatsoever." The other three categories are lower, the same, and higher benefits relative to the benefits that the respondent is supposed to get under current law. An example of what the survey screen might look like when the respondent has allocated the 20 balls to the 4 bins is:



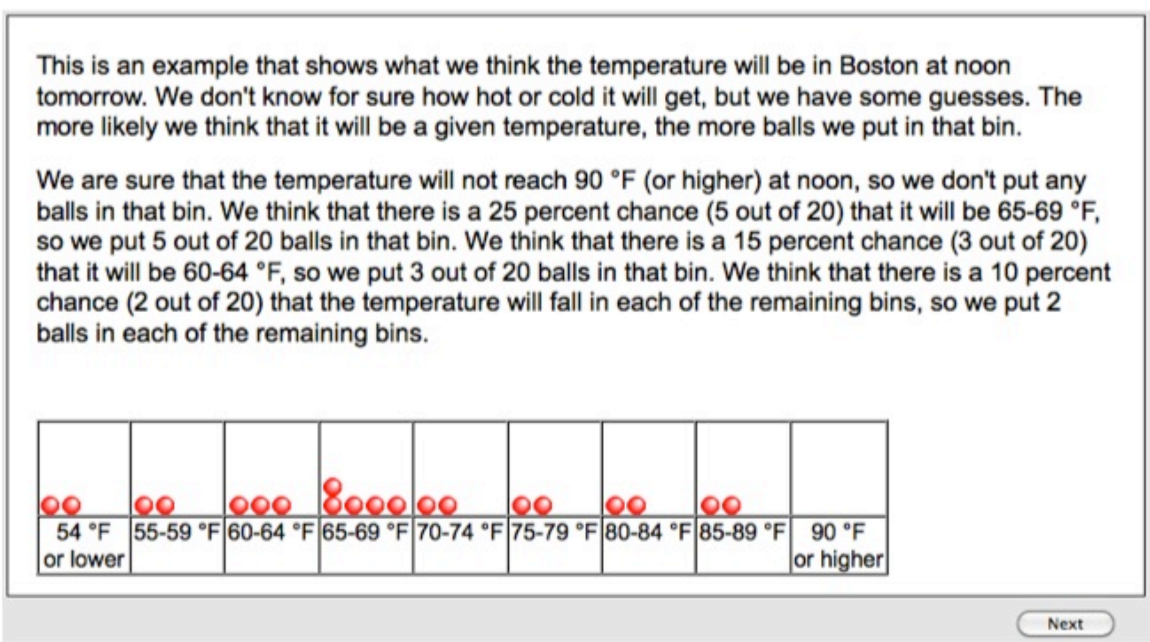
Respondents who put any of these balls in the "lower" or "higher" bins are then asked to further specify which 20-percentage-point bins between 1 and 99% or 101 and 200% should contain these balls. An example of the next screen this respondent will see is:



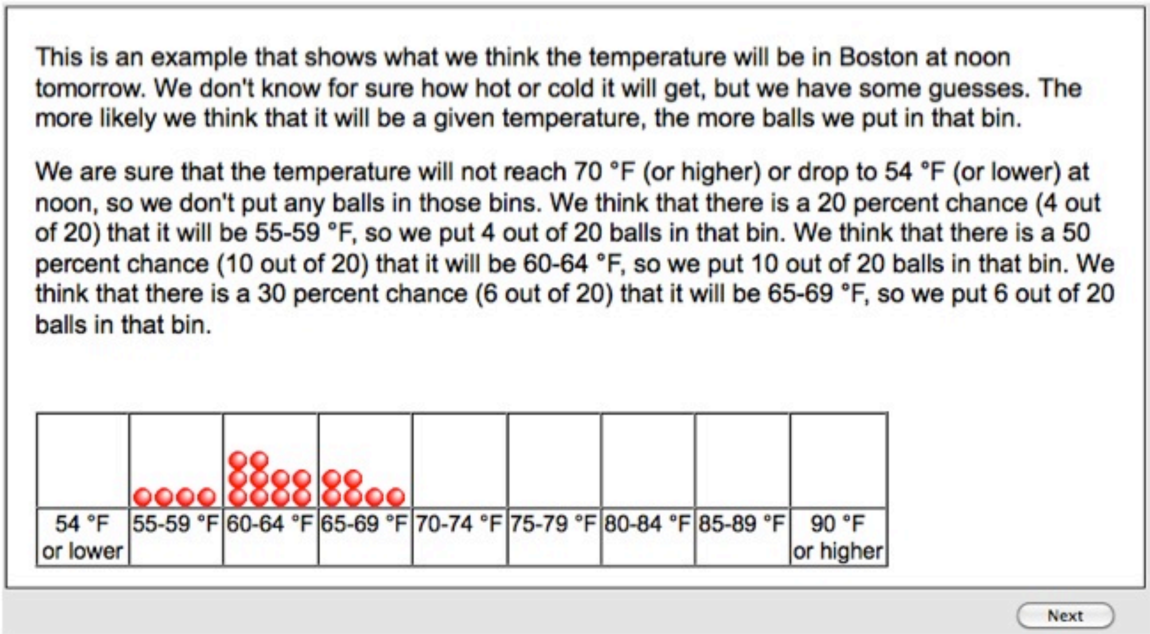
Finally, any bin into which 11 or more balls are placed is further broken down into five smaller bins, and respondents are asked to allocate the balls from the larger bin into the smaller bins. An example of the screen that the respondent would have seen in that case is:



By this three-step process, we obtain the CDF of expected future benefits for each respondent. In order to have greater confidence that respondents will know how to use this tool to express their preferences, we first give an illustration using the weather in Boston. Recognizing that the shape of the distribution that we show them to illustrate the method might influence the way they fill in the distribution of perceived benefits, we choose two different illustrations and assign them to respondents at random. For example, the wide distribution is:



And the narrow distribution is:



If we had shown no illustration, we could not be sure that respondents would understand the tool well enough to answer the subsequent question. If we had only shown one illustration, then we would have had no way to gauge the size of any bias that our particular choice of illustration may have had on the subsequent question. By choosing two illustrations, we can estimate the impact of the characteristics of the illustration – wide or narrow – on the responses to the subsequent question.

3.3 Obtaining the Certainty Equivalent Benefit

The natural metrics to quantify just how much the uncertainty in the perceived distribution of Social Security benefits matters to respondents are how much they would pay to insure themselves against it or at what discount they would be willing to sell their claim to future Social Security benefits. Even in a more straightforward context, respondents could be expected to have trouble coming up with a sensible answer if we asked for it directly. This concern led us to develop a third important feature of our survey, which is the sequence of binary choices that the survey presents to the respondent that allow us to bracket the respondent's certainty equivalent to the perceived distribution of benefits described in Section 3.2. The survey calculates the expected value (denoted below by the variable X) of the benefit distribution each respondent constructed by putting balls into bins and presents the respondent with the following choice:

> The way you put balls into various bins shows that you expect to receive **[*X*]%** of the Social Security benefits you are supposed to get under current law. It also shows that you could receive more or less than this **[*X*]%**. Let's call this distribution of possible benefits, as described by you using the bins and balls, your "uncertain benefits." So, your uncertain benefits are whatever level of benefits you get when you claim benefits.
>
> Imagine a contract that instead guarantees you a certain percentage of the Social Security benefits you are supposed to get under current law. This is like having all 20 balls on this certain percentage. This contract is unbreakable and cannot be changed by anybody, even the United States government.
>
> Would you rather have:
>
> (1) Guaranteed benefits equal to [***Y***]**%** of the Social Security benefits you are supposed to get under current law
>
> (2) Uncertain benefits around **[*X*]%** of the Social Security benefits you are supposed to get under current law

Respondents are prompted with a starting value of Y_1 equal to 30 or 70, chosen randomly, so that we can assess the impact of the starting value on the ultimate results. (Whether the guaranteed benefits are the first or second choice is also randomized, for the same reason.) A respondent who chooses the guaranteed (uncertain) benefits at a given Y_1 is then offered a lower (higher) value of Y_2 and asked the same question. The questioning continues, with the differences between Y_n and Y_{n+1} narrowing, until the respondent has answered that he would take the uncertain benefits if offered the lower of Y_n and Y_m, and the guaranteed benefits if offered the higher of them, where the interval between them is 5.[10]

One problem in generating the certainty equivalent using the question above is that some respondents provide distributions that show no uncertainty. For these respondents, we ask a slightly different version of the question:

[10] The full sequence of offers that the respondents receive is shown in Question 4.3 of the survey instrument in Appendix B.

> Imagine that you were offered a contract that guaranteed you a certain percent of the Social Security benefits you are supposed to get under current law. This contract is unbreakable and cannot be changed by anybody, even the United States government.
>
> Would you rather have:
>
> (1) Benefits as determined by an unbreakable contract that offers you [***Y***]% of the Social Security benefits you are supposed to get under current law
>
> (2) Benefits as determined by Social Security when you claim benefits

The sequencing of the offers of *Y*% is the same as in the alternative question. This question simply makes no mention of a distribution that shows no uncertainty.

The answers to these questions provide us with upper and lower bounds on a certainty equivalent to the distribution of possible Social Security benefits. Subtracting this certainty equivalent from the distribution's expected value would yield the risk premium that the respondent would pay to insure against the policy uncertainty in Social Security. In order to make more precise estimates of this risk premium, we ask a follow-up question of respondents whose range for the certainty equivalent is close to the expected value of their distribution of benefits. Specifically, a respondent whose upper bound for the certainty equivalent is within 5 percentage points of the expected value will be asked the question again, with a value of *Y* close to *X* that will ensure that we can ascertain whether or not the risk premium exceeds two percent.

4. Results

4.1 General Expectations about Social Security

The survey begins by soliciting respondents' views on the financial condition of the Social Security program in order to get a qualitative understanding of respondents' views about policy risk as well as the nature of the risk that they perceive. Table 2 aggregates the responses to these general questions. About 91 percent of respondents are aware that Social Security faces a projected financial shortfall. When asked how confident they are that Social Security will be able to provide them with the benefits they are supposed to get under current law, only 3.3 percent were very confident, with another 22.3 percent somewhat confident. Thus, only a quarter expressed any confidence in the program's finances, while 45 percent are not too confident and 29 percent are not at all confident.

The wording of our question about confidence in Social Security matches that of Greenwald et al. (2010), who conducted a nationally representative, random-digit telephone survey. Appendix Table A2 provides comparisons of the responses to this question in our sample and the subsample of their respondents age 25 – 59.[11] In their sample, 10.5 percent were very confident and 34.0 percent were somewhat confident. Together, about 45 percent express confidence in Social Security in the Greenwald et al. sample, compared to 25 percent in the Knowledge Networks panel. Of the remaining 55 percent, 36.3 percent are not too confident and 19.2 percent are not at all confident. Thus, our sample respondents show less confidence than those in the Greenwald et al. sample. In both samples, confidence tends to rise with age and is similar across men and women.

The survey then asks respondents how they expect the projected shortfall will be closed. As shown in Table 2, more than half, about 58 percent, expect the shortfall to be addressed by a combination of tax increases and benefit reductions. Nearly a quarter believe the shortfall will be addressed mostly or entirely through tax increases, while 18 percent believe the shortfall will be addressed mostly or entirely through benefit cuts. We focus on benefit cuts in the next several tables and report the results of analogous questions about tax increases in Table 6 below.

When asked about the chance that the general level of benefits (as distinct from the benefits they expect to get individually) will decline over the next decade, the mean and median probabilities shown are 61 percent. The same question asked about a decline by the time the respondent reaches age 65 yields mean and median probabilities of 66.6 and 71 percent, respectively. This pessimism regarding future benefits is also reflected in expected benefit levels. Compared to the benefits they are supposed to get under current law, only 3 percent of respondents expect to get greater benefits, with 24 percent expecting the same benefits and 73 percent expecting lower benefits. When respondents are asked for a point estimate of benefits they expect to get relative to what they are supposed to get under current law, the mean and median responses for the point estimate of their benefits are 65.9 and 70 percent, respectively.

[11] We are indebted to Matthew Greenwald for providing these tabulations. The tabulations of the Knowledge Networks panel in Table A2 pertain to the respondents who answered both the ball/bins questions and the certainty equivalent questions, as described in Section 3 above.

4.2 The Perceived Distribution of Future Benefits

The responses to the general questions presented in Table 2 show that households by and large expect to not receive all of the benefits they are supposed to get under current law. By themselves, they do not indicate whether households face uncertainty about the benefits they will get. Respondents could have a firm belief that they will receive, say, 70 percent of their current-law benefits, no more and no less.

Figure 1 graphs the aggregate CDF of perceived future Social Security benefits for all respondents to the survey. Looking at the probability mass at 0 and 100 percent, in aggregate, respondents perceive about a one in six chance of receiving no benefits whatsoever and about a one in four chance of receiving exactly the benefits they are supposed to get under current law. The perceived probability of outcomes strictly above current-law benefits is less than four percent. The remaining 54 percent of the probability mass lies strictly between 0 and 100, with an overall median at 69.5 percent.

The aggregate CDF shown in Figure 1 incorporates both the variation in possible outcomes within individual respondents' CDFs and the variation across respondents' CDFs. Figures 2 and 3 demonstrate that both sources of variation are important. Figure 2 shows the CDF of the mean perceived benefit across respondents. There is very little probability mass at zero, at 100 percent, or above 100 percent. Almost all of the respondents have mean perceived benefits between 0 and 100 percent of the benefits they are supposed to get under current law. The graph shows wide variation across respondents, with summary statistics provided in the first row of Table 1. The 25th and 75th percentiles are 37.1 and 83.4 percent, respectively.

We can use two other questions that we asked about the expectations of future benefits to assess the validity of the subjective probability distribution using our ball/bin question. In the first, we compute the correlation of the mean of the subjective distribution with the straightforward multiple-choice question about confidence in Social Security that we presented in Panel A of Table 2. This correlation is 0.54, indicating that those with more confidence tended to construct distributions with higher expected benefits. In the second, we compute the correlation of the mean of the subjective distribution with the point estimate of future benefits as a fraction of benefits under current law that we presented in Panel F of Table 2. This correlation is 0.69, and like the first, is highly statistically significant.

We use the expectation of the subjective probability distribution of future Social Security benefits, rather the point estimate, as our baseline measure of expected future benefits, for two reasons. First, we are not sure whether the point estimate offered by respondents is an expectation, a median, or a mode, whereas by construction the expectation of subjective benefits is an expectation. Second, the expectation of subjective benefits better predicts confidence in Social Security (as measured by the multiple-choice question) than the point estimate is able to predict confidence in Social Security. This suggests that the subjective expectation has less measurement error than the point estimate.

Figure 3 shows CDF of the standard deviations of respondent CDFs. Only 7.5 percent have a standard deviation of zero. The second row of Table 2 provides summary statistics, indicating mean and median values of about 23 percent, with a quarter of the standard deviations at 33 percent or higher. These figures and statistics show that respondents perceive uncertainty in the possible benefits they will receive from Social Security and that the perceived distribution of possible benefits varies across respondents.

4.3 The Certainty Equivalent Social Security Benefit

It could be that respondents perceive an uncertain distribution of future benefits but that due to risk-neutrality or indifference, the uncertainty has little impact on their welfare. As a first measure of the importance of uncertain benefits, the survey asks, "How much does it matter to you that you do not know exactly how much you will get in Social Security benefits?" Panel G of Table 2 reports the results. Only 20.5 percent respond that the uncertainty matters little or does not matter, compared to 32 percent who respond that it matters somewhat and 47.5 percent who respond that it matters very much.

Figure 4 shows the distributions of the upper and lower bounds for the certainty equivalents across respondents. In the rest of the paper, we compute the certainty equivalent as the midpoint of the interval between them. Summary statistics for the certainty equivalents are shown in the third row of Table 1, denominated as a percentage of the benefits the respondents are supposed to get under current law. The mean certainty equivalent is 53.7 percent and the median is 57.5 percent. About a quarter of respondents have a certainty equivalent of 32.5 percent or below, while a quarter have a certainty equivalent of 76.5 percent or above.

4.4 Risk Premia for Policy Uncertainty

With the responses for the expected benefit from the elicited benefit distribution and for the certainty equivalent from the sequence of choices between guaranteed and uncertain benefits, we can subtract the average of the upper and lower bounds shown in Figure 4 from the expected value of benefits to obtain our key results: the risk premia that respondents would pay in the form of lower benefits to avoid the policy uncertainty surrounding Social Security.

Summary statistics for the distribution of risk premia are shown in the fourth row of Table 1. The mean risk premium is 5.8 percent and the median risk premium is 7.0 percent. About 25 percent of respondents have a risk premium of zero or less – there is no requirement imposed on their responses that the certainty equivalent obtained through the sequence of choices of guaranteed versus uncertain benefits yields a certainty equivalent below the expected value. About 11 percent of respondents have risk premia less than negative 20 percent. At the other end of the distribution, 25 percent of respondents have risk premia of 16.5 percent or more, with 4 percent having risk premia in excess of 50 percent. Given the challenging nature of our questions, we are not surprised to find that the tails of the distribution of risk premia correspond to risk premia that may seem unreasonably high or low. Fortunately, the mean risk premium is not very sensitive to these tails. For example, if we ignore all observations below the 10^{th} percentile or above the 90^{th} percentile, the mean risk premium becomes 6.9%. Similarly, winsorizing at the 10^{th} and 90^{th} percentiles yields a mean risk premium of 6.3%.

Recall from Section 3.2 that there are some respondents who have missing benefit expectations or distributions that have no uncertainty who are asked an alternative version of the certainty equivalence questions. Figure 5 graphs the distribution of risk premia, with and without this subset of respondents who were asked the alternative question. The dark (blue) curve includes all respondents, and the light (yellow) curve includes only those respondents who were asked the first version of the certainty equivalent questions. The differences between the curves are slight. It is not surprising that excluding the respondents who perceived no uncertainty shifts the curve to the right – this group perceives less uncertainty and thus should have lower risk premia. Given this similarity, we use the full sample of respondents in the analyses below.

Our main estimate of the risk premium is based on our novel method of eliciting a certainty equivalent and comparing that to the expected value. The benefit of this estimate is that it does not rely on modeling or parameter assumptions and that it captures any responses that mitigate the impact of the uncertainty. Yet, this main estimate is based on a question in which respondents are asked to value a hypothetical contract, and some respondents may have found it challenging to answer this question. We therefore compare our main estimate with an estimate of the risk premium that uses the methodology that prior papers have used, namely to use a model to simulate the risk premium of the policy uncertainty. For each respondent, we calculate the risk premium that would be implied by the self-reported distribution of possible Social Security benefits, assuming constant relative risk aversion preferences with coefficients of relative risk aversion equal to 1, 3, and 5.[12] These simulated risk premia also incorporate the information from the variable that captures how important the respondent expects Social Security to be in financing retirement spending.[13]

By construction, the distributions of simulated risk premia cannot have negative values and will show a zero premium for any respondent who did not indicate variation in the self-reported distribution of future Social Security benefits. Figure 6 shows the CDFs for the risk premia calculated in this manner, along with the CDF from Figure 5 based on self-reported certainty equivalents. The graph shows that for the 75 percent of respondents who reported positive risk premia, the CDF of those risk premia is intermediate between the hypothetical CDFs that would obtain if all respondents had coefficients of relative risk aversion between 3 and 5. This indicates that our main estimate of the risk premium is consistent with the risk premium that would be obtained using a basic model and a reasonable assumption of the coefficient of relative risk aversion.[14]

4.5 Correlates of the Perceived Distribution of Benefits

We next consider the empirical relationships between the characteristics of the perceived distribution of Social Security benefits and the demographic and other control variables included

---

[12] For an expected utility function $u(w)$, relative risk aversion is given by the expression $-u''(w)*w/u'(w)$. This expression is constant at a value of γ when $u(w) = C^{1-\gamma}/(1-\gamma)$ for $\gamma > 1$ and $u(w) = \ln(w)$ for $\gamma = 1$.

[13] Specifically, suppose that the respondent's Social Security benefits will be 100. Recall that the four responses to the survey question for the importance of Social Security are less than 25 percent, 25 – 50 percent, 50 – 75 percent, and more than 75 percent. If Social Security financed 25 percent of spending, that would require other income of 300. For 50 and 75 percent, the other income would have to be 100 and 33, respectively. Thus, we can assign other income of 200, 67, and 17 for the 25 – 50, 50 – 75, and 75 – 100 intervals. For the interval that is 0 – 25, we choose a value of 500 (consistent with Social Security funding 17 percent).

[14] For a 50-50 chance of gaining or losing 25 percent of one's wealth, the risk premia are 3.2, 9.0, and 13.5 percent for coefficients of relative risk aversion of 1, 3, and 5, respectively.

in the survey. The most important of these is the age of the respondent. Figure 7a shows the expected benefits with a 95% confidence interval for 5-year age groups in our sample. The overall pattern is that the expected benefits, as a share of what respondents believe they are supposed to get under current law, are an increasing function of age. This pattern is evident at ages above 40 and even more so above 50. The point estimates for the average expected benefits by age are 79.4 percent for those 55 – 59, 67.8 for those 50 – 54, 59.0 for those 45 – 49, and 56.0 for those 40 – 44. This positive relationship is reasonable – politicians frequently assert that any reforms would impose minimal effects on those "at or near retirement."

We consider age and other factors in a regression in Table 3. There are two pairs of regressions, the first using expected benefits as the dependent variable and the second using the standard deviation of benefits. Within each pair, the first column includes only the demographic variables from the Knowledge Networks panel and the second also includes the other control variables about preferences and beliefs that we ask in our survey. Focusing on the regression with all of the covariates, an additional year of age leads to a 0.96 percentage point increase in expected benefits and a decrease in the standard deviation of 0.22 percentage points. These estimates are statistically significant at the 1 percent level. They are consistent with political rhetoric on Social Security reform – the older people get, the less likely they are to get a benefit cut, and the less variable they will expect that cut to be.

Table 3 also shows that some demographic and other control variables have significant effects on the expected benefits and the standard deviation of benefits. The effect of being retired on expected benefits is large and significant – equivalent to the effect of 10 years of age. This is consistent with Benítez-Silva et al. (2007), who find that early retirement can be partly explained by individuals retiring early in order to reduce exposure to policy risk. The point estimates for the effect on the standard deviation are negative but significant only at the 10 percent level. A 10 percent increase in income leads to a 0.32 percentage point decline in expected benefits and a 0.09 percentage point reduction in the standard deviation of benefits. This result is also consistent with political rhetoric surrounding Social Security reform, in which potential benefit cuts relative to current law are designed to be "progressive."[15] Race and education also matter – being Black or Hispanic or having less than a high school diploma all predict higher standard deviations. Black and Hispanic also predict higher expected benefits.

[15] See, for example, Mermin (2005).

Being female or having kids predicts lower expected benefits, equivalent to being about 3 or 6 years younger, respectively. Living in the Northeast has a positive effect on expected benefits, equivalent to 4 years of age. Among the other control variables, higher longevity, greater importance of Social Security to retirement spending, greater trust in the political system, greater optimism and higher financial literacy all predict higher expected benefits. Greater risk aversion and higher longevity predict lower standard deviations.

Figure 7b shows the analogous graph of average risk premia by 5-year age group, with a 95% confidence interval for 5-year age groups. There is a clear difference between those over 50 and those under 50. The former have risk premia of 9.9 and 11.7 percent in the 50-54 and 55-59 age groups, respectively. For the respondents under 50, risk premia are around 4 percent, with no statistically significant differences across age groups, though most are significantly different from zero.

In Table 4, we present two pairs regressions of risk premia on our demographic and other control variables. Within each pair, the first regression includes only the demographic variables while the second includes all demographic and control variables. In the first pair, the dependent variable is the risk premium calculated based on the certainty equivalent. In the second pair, the dependent variable is the simulated risk premium calculated using an assumed risk aversion coefficient of 3 and the response to the question about how important Social Security will be in financing retirement spending. The difference between the two measures is that the risk premium based on the certainty equivalent tells us not only about the characteristics of the perceived distribution of benefits but the respondent's subjective utility loss associated with the risk in that distribution. The simulated risk premium reflects only the characteristics of the distribution. If an effect appears in the latter but not the former, then it is a feature of the individual's reaction to the perceived distribution, not the perceived distribution itself.

For example, the effect of age is positive and significant on the risk premium calculated from the certainty equivalent. An additional decade of age increases the risk premium by 3 percentage points. But the effect is negative on the simulated risk premium, indicating that it is not the degree of uncertainty that varies by age but the extent to which a given amount of uncertainty affects the respondent's welfare. This is exactly what theory would predict because a given amount uncertainty is more costly to people near retirement as they have fewer opportunities to mitigate the benefit uncertainty by adjusting future labor supply or savings. The effect of income is negative using either risk premium, but the point estimate is larger on the risk premium based on the certainty equivalent. Higher income respondents report less uncertain distributions and experience less of a welfare loss when uncertainty increases. A 10 percent increase income leads to a 0.19 percentage point reduction in the risk premium. Other significant effects on the risk premia include the positive effects of being retired (equal to 30 years of age), being Black or Hispanic, being more risk averse, having a higher chance of living to age 75, and having more trust in the political system.

5. Cross-validation of Responses

Recognizing that our survey asks questions that may be challenging for some respondents to answer, we incorporated a number of design features to enable us to determine how valid the answers to the key questions are. In Table 5, we present four such regressions. In Panel A, we construct a dummy variable for whether the respondent took the option of the guaranteed benefits (rather than the uncertain benefits) in the first round of questioning. Recall that the first offer of guaranteed benefits was randomized at either 30 or 70 percent of the benefits the respondent is supposed to get under current law. We also randomized whether the guaranteed benefits were listed as the first or second option. If respondents are making reasonable choices, then we would expect that the guaranteed benefits are more likely to be chosen when they are higher and that the results should be insensitive to whether the guaranteed benefits are the first or second choice. The regressions in Panel A show this to be the case. Focusing on the second regression, which includes the demographic and other controls from Tables 3 and 4, the respondent is 34 percentage points more likely to accept the guaranteed benefits when they are at 70 percent rather than 30 percent, an effect which is both large and statistically significant at the 1 percent level. The point estimate indicates that the respondent is 1.6 percentage points less likely to take the guaranteed benefits when they are the second choice, but the point estimate is not even as large as its standard error and thus statistically insignificant.

In Panel B of Table 5, we regress the respondent's certainty equivalent on three key variables that should predict it as well as two variables that should not predict it. The three key variables that should predict the certainty equivalent are: the respondent's expected benefits, the respondent's perceived standard deviation of benefits, and the measure of the respondent's risk aversion derived from separate questions about hypothetical gambles described in Section 2. Recall that the expected benefits and standard deviation are derived solely from the distribution of benefits presented by the respondent before questions are asked about the certainty equivalent. All three coefficients have the predicted signs and are statistically significant at the 1 percent level. The regression in column 1 shows that a 1 percentage point increase in the expected benefits is associated with a 0.49 percentage point increase in the certainty equivalent, while a 1 percentage point increase in the standard deviation is associated with a reduction in the certainty equivalent by 0.41 percentage point. An increase of 1 unit in the measure of risk aversion (e.g., from a coefficient between 1 – 2 to one between 2 – 4) predicts a reduction of the certainty equivalent by 2.0 percentage points.

The next two regressors in Panel B should not affect the certainty equivalent if the respondent is able to report a stable underlying value: a dummy for the starting value being 70% and a dummy for the order in which the guaranteed benefits option is presented. As in Panel A, the order in which the guaranteed benefits are presented has no statistically significant effect on the result. However, the starting value affects the certainty equivalent in a statistically significant way. The regressions show that if the respondent is first presented with guaranteed benefits of 70 percent rather than 30 percent, then the certainty equivalent that obtains from the sequence of questions is about 8 percentage points higher. This effect is statistically significant at the 1 percent level but should be zero – a fully rational respondent would give the same certainty equivalent regardless of the starting point. We explore possible explanations for this bias, along with one suggested correction, in Section 6 below. The regression in the second column of panel B shows that including additional demographic and other controls does not substantively affect the results.

In Panel C of Table 5, we consider the impact of the "weather" illustration of how to put balls into bins on the distribution of benefits reported by the respondent. The regressions indicate that respondents who are shown the wider distribution of temperatures subsequently report distributions with more uncertainty. The dependent variable is the certainty equivalent of the distribution under a hypothetical (constant) coefficient of relative risk aversion of 3. A respondent shown the wider distribution has on average a certainty equivalent 3.5 percentage points lower than one shown the narrower distribution.[16] The distributions of the resulting risk premia, conditional on the wide versus narrow weather example, are graphed in Appendix Figure A1 and summarized in the bottom two panels of Appendix Table A4. The finding that the reported dispersion in the distribution of future benefits is sensitive to the weather example is an indication that some fraction of respondents have trouble accurately reporting their perceived uncertainty through means of the bins-and-balls question. This is an additional reason why we do not take our simulated measure of the risk premium as our central estimate. Fortunately, the estimate of the risk premium based on our novel methodology does not rely on the reported dispersion of this distribution, but only on the mean of the distribution. Thus, as long as the mean is reported accurately, our central estimate is not affected by the sensitivity to the weather example. Indeed, in unreported regressions that are analogous to those in Panel C, but that instead use our main estimate of the risk premium as the dependent variable, we find no effect of the weather example on the risk premium – the point estimates are less than 0.1 in absolute value and statistically insignificant.

6. Possible Adjustments to Risk Premia

The estimates in Table 5 indicate that the starting value in the sequence of questions that determine the respondent's certainty equivalent has an effect on the resulting value. We consider two types of adjustment to the reported distributions that may account for a bias introduced by the starting value.

6.1 Linear Adjustment

The first type of adjustment is based on a simple linear model in which the reported value (*R*) of the certainty equivalent for respondent *i* is a weighted average of the respondent's true underlying value (*V*) and the starting value (*S*):

$$R_i = (1-\beta) * V_i + \beta * S_i .$$

[16] Regressions not shown indicate that there is a negative but insignificant effect on expected benefits and a positive and highly significant effect on the standard deviation of benefits. There is not, however, any statistically significant impact of the weather example on the certainty equivalent or the risk premium derived from it, so no further adjustments are required.

The parameter, β, can be interpreted either as a bias that affects all respondents uniformly or as a fraction of the population who give random answers to the questions and thus have a reported value close to the starting value. Given the linear model, and the fact that we randomly varied the starting values across respondents, we can recover the average value of V_i by running the following regression:

$$R_i = \alpha + \beta * S_i + \varepsilon_i,$$

and computing the value of $\alpha/(1 - \beta)$. We estimate this regression and obtain parameters of α = 44.72 (s.e. = 1.40) and β = 0.18 (s.e. = 0.03). Based on these coefficients for α and β, the average value of V_i is estimated to be 44.72/0.82 = 54.5 (s.e. = 0.63). Comparing this to the sample average value of the certainty equivalent of 53.7 shown in Table 1, the bias estimated to be 0.8 percentage points. This bias affects both the certainty equivalent and the risk premium equally, so a simple linear adjustment would lower the average risk premium from 5.8 to 5.0 percent. The benefit of the linear adjustment method is that it is simple and intuitive. The drawback, however, is that, if the model is taken literally, certain observed values of R_i can only be rationalized by underlying values of V_i that are negative, which is impossible. Below, we develop an alternative adjustment that does not have this drawback.

6.2 Adjustment Assuming Partially Random Answering

The second type of adjustment is illustrated graphically by the three pairs of CDFs shown in Figure 8. Each pair has a common line style (dotted, dashed, or solid), with the curve on the left in each pair pertaining to a starting value of 30 and the curve on the right pertaining to a starting value of 70. The dotted curves are the CDFs of reported certainty equivalents. Our second adjustment assumes that each of these curves is a mixture of two populations, one that chooses randomly between the guaranteed and the uncertain benefits and another that answers with its true certainty equivalent. The dashed curves in the figure show the hypothetical distributions of certainty equivalents for populations of respondents giving random answers. They are constructed directly from the specific sequences of values for guaranteed benefits in the question that elicits the certainty equivalents. They generally have more probability mass in the tails than the observed distributions, since half of the respondents choosing randomly would accept a guaranteed benefit of 30 percent or refuse a guaranteed benefit of 70 percent.

The adjustment proceeds by noting that the true distribution of certainty equivalents is the same regardless of the starting value. Since the starting value is randomly assigned, each observed distribution is a mixture of this true distribution and the respective hypothetical distributions for respondents answering randomly. If we conjecture that a specific fraction, δ, of the population is randomizing, then the probability of the true value falling in an interval j is:

$$\frac{P_j^O - \delta * P_j^R}{1-\delta},$$

Where P_j^O is the probability of falling in that interval in the observed distribution and P_j^R is the probability of falling in that interval in the hypothetical distribution. For each of the two starting values, we can construct a CDF from these probabilities. The adjustment procedure solves for the value of δ that minimizes the difference between the CDFs so constructed for the two starting values. In our sample, that value of δ is 0.32, suggesting that the difference is minimized under the assumption that 32 percent of our respondents chose randomly. The resulting "adjusted" CDFs are the solid curves in Figure 8. The degree to which the solid curves coincide over the whole range of benefits can be seen as a measure of goodness of fit for this model.

The adjusted CDFs shown in Figure 8 use only the information from the respondents' choices of guaranteed versus uncertain benefits. Recall that for respondents whose certainty equivalents were close to the expected value of their perceived distribution of benefits, the survey asked an additional question to obtain a tighter interval around their risk premia. Figure 9 shows the two adjusted CDFs with this additional information incorporated.[17]

[17] We create individual-level adjusted certainty equivalents from the aggregate-level adjusted certainty equivalent curves in Figure 8 as follows. First, we average the two adjusted curves in Figure 8 because the two adjusted curves only differ due to sampling variation if our model is correct. Next, we calculate the cumulative probability for each individual's unadjusted certainty equivalent response. We do this calculation separately for each group of individuals with the same starting value. Next, we use the average aggregate-level adjusted curve to find the adjusted certainty equivalent that corresponds to the cumulative probability calculated in the previous step, and assign that certainty equivalent to this individual. If there are multiple people who have the same unadjusted certainty equivalent and had the same starting value, we average their adjusted certainty equivalent amounts so that they will also all have the same adjusted certainty equivalent. This procedure assumes that the adjustment does not alter the ranking of the individuals' certainty equivalent amounts within each starting value group. This assumption

Figure 10 graphs the CDFs of the risk premia, with and without this adjustment. The CDF for the unadjusted risk premia is the same curve as in Figure 5. The CDF for the adjusted risk premia subtracts the adjusted certainty equivalents (as shown in Figure 9) from the expected benefits from the respondents' perceived benefit distributions. Figure 10 shows that, as in the case of the linear adjustment procedure, the adjustments to the certainty equivalents on balance tend to be positive and thus the adjusted distribution of risk premia shifts lower. The mean adjusted risk premium is 4.09 percent (s.e. = 0.51) and the median adjusted risk premium is 6.02 percent (s.e. = 0.29). Compared to the unadjusted risk premia, the differences of -1.71 percent at the mean and -0.98 percent at the median are statistically significant.[18] While they reduce the mean and median, these adjustments do not have large effects on the predictors of the risk premia.[19]

The finding in the previous section that the final answer to the certainty equivalent question is sensitive to the starting value is an indication that our questions are pushing the envelope in terms of what can be elicited from representative survey participants. This is not surprising because forming an estimate of the policy uncertainty to which one is exposed and putting a value on this uncertainty is a complicated task. In this section, we presented two straightforward models that correct our estimates for the bias induced by the starting value, and both models call for a similar correction. The estimate corrected for the bias is 1 to 2 percentage points lower than our uncorrected estimate of the risk premium. The adjustments in this section show that by being cognizant of possible bias that might arise when asking challenging questions, we can calculate the magnitude of that bias and produce a more credible final estimate.

---

is correct if individuals did not randomize. So, the individual-level adjusted curves are conditional on non-randomizing.

[18] Appendix Table A3 summarizes the unadjusted and adjusted risk premia distributions, presenting the means, medians, and 25th and 75th percentiles for each conditional on the starting values for the certainty equivalent questions.

[19] Appendix Table A2 repeats the first two regressions from Table 4 with the adjusted risk premia. It also presents regressions of the difference between the adjusted and unadjusted risk premia on the same explanatory variables. Of the variables that were statistically significant in Table 4, the positive effect of a year of age on the risk premium is higher by about 0.02 in the adjusted data, and the positive effect of being female on the risk premium is lower by about -0.5 (and is now not statistically significant). The effect of higher risk aversion also increases by 0.174 to 1.146, and this increase is statistically significant.

7. Perceptions of Future Social Security Taxes

Most of our analysis has focused on perceived distributions of future benefits and the welfare cost of policy uncertainty about future benefits. We did so because the welfare cost of policy uncertainty on the benefit side is likely more important than the welfare cost of policy uncertainty on the revenue side. Unlike policy uncertainty regarding benefits, policy uncertainty on the revenue side gets largely resolved during one's working life, when most revenues are collected. Thus, people can more easily adjust savings and labor supply to compensate for changes on the revenue side. Yet, because we also wanted to document expectations about the revenue side, our survey instrument included a section on this topic. Table 6 summarizes the responses to questions about three aspects of revenues – the payroll tax rate, the payroll tax base, and the possibility of a new source of funding. Social Security's main source of revenue is a payroll tax of 12.4 percent on all earnings up to a maximum taxable earnings level, which was $106,800 in 2011.[20] Each question asked the respondents for their assessment of the chance that the revenue source would be increased (beyond any increases that will occur under current law) over the horizons of 10 years and when they turn 65.

For the payroll tax rate, the mean responses were probabilities of an increase of 57.5 percent and 63.6 percent over the horizons of 10 years and through age 65. Median responses were slightly higher at 59 and 69 percent, respectively. The survey followed up with a question about what the payroll tax rate would be at each horizon. Mean responses were 16.6 percent at 10 years and 18.2 percent at age 65. Median increases in this case were more moderate, at 15 percent and 16 percent for the 10-year and age-65 horizons, respectively. It is worth noting that, apart from behavioral responses that might mitigate its revenue impact, an increase of the payroll tax rate from 12.4 to 15 percent within 10 years is enough to extend the projected date of trust fund exhaustion from 2036 to beyond 2085.[21]

Responses for the maximum taxable earnings level were very similar to those for the payroll tax rate, with mean probabilities of an increase of 57.7 and 61.9 percent and medians of

[20] In 2010, Social Security collected $637.3 billion from payroll taxes and received $117.5 billion as interest on trust fund assets. Income taxation of benefits generated $23.9 billion, with another $2.4 billion reimbursed from the General Fund of the Treasury. See Board of Trustees (2011, Table II.B1).

[21] Board of Trustees (2011, Table II.D2) project a long-term actuarial balance of -2.22 percent of taxable payroll, meaning that an increase of 2.22 percentage points starting in 2011 would generate a projected trust fund balance in 2085 equal to one year's worth of benefit payments.

59 and 64 percent. The typical respondent thinks it is likely that policy makers will intervene to make the payroll tax base larger as a share of total payroll. In contrast, respondents do not expect policy makers to shore up Social Security's financial status with revenue from a new source. The mean and median responses were all around 40 percent for both the 10-year and age-65 horizons.

8. Suggestive Evidence on Behavior Responses

Our main results establish that respondents recognize the policy uncertainty in the distribution of benefits they will receive from Social Security and that this uncertainty generates a loss of welfare on the order of 5 percent of the benefits they are supposed to get under current law. Given that welfare loss, it is reasonable to expect that the policy uncertainty is also affecting their behavior as they age toward retirement and their plans for their retirement years. Estimating behavioral responses is interesting for two reasons. First, they may give us insight into mechanisms that people use to mitigate the policy risk. Second, to the extent that any of these behaviors are distorted already, a change in behavior due to policy uncertainty that exacerbates a pre-existing distortion will add to the welfare cost of policy uncertainty that we estimated in the previous sections, while any change in behavior due to policy uncertainty that reduces a pre-existing distortion will mitigate our estimated welfare cost.

Unfortunately, we do not have a good source of exogenous variation in actual policy uncertainty, so we can offer only suggestive evidence of behavioral responses. We take two approaches. In the first approach, we correlate variation across our subjects in their risk-premium with planned future retirement behavior. The obvious drawback of this approach is that variation across respondents in risk premia may be correlated with omitted variables that also affect retirement plans. In the second approach, we try to introduce exogenous variation in perceived risk by asking respondents how they would change their behavior if their uncertain Social Security benefits were replaced by a contract that guarantees their benefits. The obvious drawback of this approach is that respondents have to predict their behavior in response to a counterfactual change. Keeping these important caveats in mind, we present the results from both approaches below.

Table 7 examines the association between the risk premia and planned retirement behavior. Panels A and B take the age at which the respondent plans to start claiming Social Security benefits as the outcome variable while Panels C and D have as dependent variable the planned retirement age (i.e., when the respondent plans to stop working). In Panels A and C, we use as the key explanatory variable our main estimate of the risk premium, which was calculated as the difference between the certainty equivalent and expected benefits. This "self-reported" risk premium, however, may depend on the individual-specific coefficient of risk aversion, which may be correlated with other unobservables. In Panels B and D, we therefore use the simulated risk premium as the key explanatory variable because the simulated risk premium is a transformation of the perceived uncertainty, measured on a scale that is comparable to the regressions in Panels A and C. Finally, the regressions in the first column do not include control variables, while the regressions in the second column include our standard set of demographic and additional controls.

Panels A and C show that all four regressions that have the self-reported risk premium as the explanatory variables show a statistically significant negative association between the risk premium and the planned claim or retirement age. This finding is consistent with the results in Benítez-Silva et al. (2007) who argue that people believe they can reduce their exposure to policy risk by claiming early because of the perception that politicians are more reluctant to change benefits of existing claimants than those of future claimants. However, as Panels B and D show, if we use the simulated risk premium as the explanatory variable, the association between the risk premium and the planned claim or retirement age is much weaker. It is only marginally significantly negative in two out of the four regressions and insignificant in the other two. We cannot determine why these latter regressions give weaker results. As we explained in earlier, we think the simulated risk premium is not as reliable as our "self-reported" measure, and this could be why the results based on the simulated risk premium are weaker. However, it could also be the case that the regressions using the self-reported risk premium are spuriously strong because the self-reported risk premium depends on the individual-specific coefficient of risk aversion, which could affect retirement behavior directly or indirectly by being correlated with other unobservables. In short, we take the results of Table 7 as at best suggestive of an effect of policy uncertainty on retirement behavior.

Our second attempt to examine effects of policy uncertainty on behavior relies on the section of our survey that asks about changes in six possible behaviors:

1. Savings the respondent does before retirement
2. Hours the respondent works per year before retirement
3. Spending the respondent does during retirement
4. Age at which the respondent stops working for pay
5. Age at which the respondent claims Social Security benefits
6. Assets the respondent leaves to others

The predictions for behavior prior to retirement in a standard life-cycle model are clear. Policy uncertainty should be generating precautionary behavior during that period – greater savings, more hours of work per year, and more years of work for pay. The operation of the precautionary motives on pre-retirement saving and work imply that individuals retire with more wealth which means that average spending and bequests in the entire post-retirement period will be higher. The prediction for the age at which the respondent claims benefits is ambiguous. The typical response to uncertainty is work more, and as claiming ages and retirement ages are linked, this would delay claiming ages. However, political discussions of reform often indicate that those currently receiving benefits will be spared some of the reductions in benefits that prospective beneficiaries will endure. If so, this argues for claiming benefits sooner to resolve the uncertainty about what they will be.

The survey asks respondents qualitatively how they would change these behaviors under either of two scenarios: a guaranteed contract at 100 percent of what they are supposed to get under current law and a guaranteed contract at the expected benefits of the perceived distribution of future benefits. Both scenarios reduce the policy uncertainty to zero. The variation in the question allows us to also assess the impact of the income effect associated with anticipated reforms to Social Security. Table 8 presents the percentages of the population who report that they would significantly increase or decrease, somewhat increase or decrease, or not change their behavior for each of the six behaviors under the two scenarios.

Consider first the scenario shown in Panel A of Table 8 in which benefits are guaranteed at the respondent's expected benefit level, so that the uncertainty is removed and the average benefit reduction is made certain. Two general features of the results stand out. First, a sizable fraction of the respondents indicate that they would make no change. For two questions, half or more indicate no change and for two other questions, no change is the highest-frequency response. Second, for those indicating a change, the percentages are one-sided, with the less frequent change (increase or decrease) having less than 10 percent representation when the two categories are added. Focusing now on the direction of the change for each question, more than half of respondents indicate that they would increase their pre-retirement savings and the age at which they stop working for pay. Nearly half indicate that they would increase the hours they work per year. Despite their additional saving and pre-retirement income, more than half would reduce their spending during retirement and about 40 percent would decrease the assets they leave to others.

Panel B of Table 8 shows the responses to the same questions in the scenario in which benefits are guaranteed at 100 percent of their current-law values. There are two differences with the results in Panel A, attributable to the income effect of guaranteeing the benefits at their higher level. First, larger fractions of the respondents report that they would not change behavior. The difference is about 17 percentage points, averaged across all six questions. Second, although the larger changes (increase or decrease) are still in the same directions as in Panel A, the directions of the changes are less one-sided. Both of these differences are what we would expect from a pure income effect – less saving, less work, more consumption, and larger bequests. While the income effect seems to be properly reflected in these tabulations, it is noteworthy that even a guarantee at 100 percent of the benefits under current law generates responses for prospective behavior that move opposite to predictions of a standard life cycle model. The results even seem to be at odds with a life-time budget constraint – Social Security wealth increases (100% rather than the expected 60%) and people say they will save more, work more, retire later and claim later, yet during retirement they will spend less and they will leave about the same assets to others. As mentioned earlier, it is hard for people to predict how they would behave in a hypothetical situation, and the results in Table 8 may reflect this difficulty rather than actual responses to the reduction in policy uncertainty. In particular, the responses largely seem to be consistent with what one would expect people to answer if you asked them how they "should" behave differently than they currently do. Overall, we think the responses in Table 8 are interesting, but we have doubts about whether they accurately reflect how people would actually behave after a reduction in policy uncertainty.

9. Conclusion

While it has been long recognized that policy uncertainty can have welfare consequences, the empirical literature trying to estimate the size of such welfare losses is relatively sparse. This paper contributes to this literature by providing the first empirical estimate of the size of the welfare loss to individuals of policy uncertainty in U.S. Social Security benefits. Relative to the literature on policy uncertainty, we take a novel approach to estimating this welfare loss – we elicit from a nationally representative sample of survey respondents both the expected value and the certainty equivalent of future Social Security benefits as a fraction of the benefits they are supposed to get under current law. Our approach mimics the traditional approach of measuring risk premia in the finance literature, except that, by necessity, we measure the certainty equivalent using survey methods rather than from market data. We are keenly aware of the challenges of getting survey respondents to give meaningful answers to hard questions, and we introduce randomizations in our survey instrument that allow us to detect biases, and in some cases, correct for them.

We apply our methodology to policy uncertainty surrounding Social Security benefits because this is arguably one of the largest sources of unavoidable and uninsurable economic policy uncertainty to U.S. residents. The projected financial shortfalls in the Social Security program have been the subject of active policy discussion for over 15 years. During that period, no clear policy direction has emerged for how the projected shortfalls will be closed, and, as a result, households are exposed to considerable policy uncertainty. We find that on average respondents would be willing to forego around 5 percent of the benefits they are supposed to get under current law to remove the policy uncertainty associated with their future benefits. Because respondents only expect to receive 60 percent of the benefits they are suppose to get under current law, this risk premium is equivalent to about 8 percent of expected benefits. The informal estimate of the accrued obligation, under current law, for individuals 25-59 by the Office of the Chief Actuary at the Social Security Administration is about $12 trillion.[22] So, in dollar terms, the welfare cost is 5 percent of $12 trillion, which equals $600 billion. In other words, the government could cut future Social Security benefits by a total of $600 billion in

[22] Steve C. Goss, Personal Communication, April 5, 2012.

present value terms without making individuals worse off on average if it (somehow) could remove all policy uncertainty surrounding future benefits.

A promising avenue for further research, in economics as well as political science, is the study of mechanisms by which policy uncertainty could be reduced. From the perspective of the current generation, which we adopted in this paper, all policy uncertainty is costly, but from an intergenerational risk-sharing perspective some degree of policy uncertainty may be optimal. Yet the current degree of policy uncertainty almost surely includes more than just the uncertainty that could potentially be justified by intergenerational risk sharing because it also includes uncertainty that is due to the uncertain behavior of political actors. So, one avenue is to try to eliminate the political component of the policy risk by specifying time-invariant rules that specify benefit levels as functions of macroeconomic parameters. Sweden and Germany have adopted such systems and their operation and performance is analyzed by Auerbach and Lee (2011). Another avenue for reducing policy risk, but one that has not been implemented anywhere, is to create government securities that pay out a benefit stream that has the same time-profile as Social Security benefits – in other words, people would be granted ownership of some kind of wage- and/or inflation indexed deferred annuity in return for contributions to the Social Security system. This will not completely eliminate policy risk – for example, the government could renege on annuity payments just like it could default on its treasury bills, but this would be politically much more difficult than changing benefit rules. Transforming Social Security into a system with personal accounts may be an alternative way of reducing policy risk but could expose individuals to other risks depending on the types of assets that individual could hold in such accounts.[23] Indeed, Smetters and Theseira (2011) find that fundamental reforms away from traditional pay-as-you-go Social Security systems to systems with funded accounts can be partly explained as a response to political uncertainty, either coming from a lack of intergenerational trust or from a lack of trust in the government to save.

[23] Diamond (1997) assesses the insulation against political risk that Chile's privatized mandatory pension system achieves.

References

Advisory Council on Social Security (1994 – 1996). 1997. *Report of the 1994 – 1996 Advisory Council on Social Security.* Washington: U.S. Government Printing Office, January 7. http://www.ssa.gov/history/reports/adcouncil/

Alm, James. 1988. "Uncertain Tax Policies, Individual Behavior, and Welfare," *American Economic Review*, 78(1), pp. 237 – 245.

Auerbach, Alan J. and Ronald Lee. 2011. "Welfare and Generational Equity in Sustainable Unfunded Pension Systems," *Journal of Public Economics*, 95(1-2), pp. 16–27.

Benítez-Silva, Hugo, Debra S. Dwyer, Frank Heiland, and Warren C. Sanderson. 2007. "Retirement and Social Security Reform Expectations: A Solution to the New Early Retirement Puzzle," unpublished manuscript, SUNY-Stony Brook.

Bernheim, B. Douglas and Lawrence Levin. 1989. "Social Security and Personal Saving: An Analysis of Expectations," *American Economic Review*, 79(2), pp. 97–102.

Blake, David. 2008. "What is a Promise from the Government Worth? Quantifying Political Risk in State and Personal Pension Schemes in the United Kingdom, *Economica*, 75(298), pp. 342–361.

Borgmann, Christoph, and Matthias Heidler. 2007. "Volatility of Social Security Wealth: Political Risks of Benefit-Rule Changes in Germany," *FinanzArchiv: Public Finance Analysis*, 63(1), pp. 83-106.

Board of Trustees, for the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 2011. *Annual Report*. http://www.ssa.gov/OACT/TR/2011/tr2011.pdf.

Delavande, Adeline, and Susann Rohwedder. 2008. "Eliciting Subjective Expectations in Internet Surveys," *Public Opinion Quarterly*, 72(5), 866-891.

Diamond, Peter. 1997. "Insulation of Pensions from Political Risk," in Salvador Valdés-Prieto (ed.), *The Economics of Pensions: Principles, Policies and International Experience*. Cambridge: Cambridge University Press, pp. 33–57.

Dominitz, Jeff, and Charles F. Manski. 2006. "Measuring Pension-benefit Expectation Probabilistically," *Labour*, 20(2), pp. 201-236.

Dušek, Libor. 2007. "Political Risk of Social Security: The Case of the Indexation of Benefits in the Czech Republic," CERGE-EI working paper 318, Prague.

Giavazzi, Francesco, and Michael McMahon. 2012. "Policy Uncertainty and Household Savings," *Review of Economics and Statistics*, 94(2).

Gomes, Francisco J., Laurence J. Kotlikoff, and Luis M. Viceira. 2012. "The Excess Burden of Government Indecision," in Jeffrey R. Brown (ed.) *Tax Policy and the Economy, Volume 26*, University of Chicago Press.
Gordon, Roger H., and Hal R. Varian. 1988. "Intergenerational Risk Sharing," *Journal of Public Economics*, 37(2), pp. 185–202.

Greenwald, Mathew, Arie Kapetyn, Olivia S. Mitchell, and Lisa Schneider. 2010. "What Do People Know About Social Security Benefits?" Pension Research Council Working Paper, September.

Guiso, Luigi, Tullio Jappelli, and Mario Padula. 2010, "How Risky is Pension Wealth?" Netspar discussion paper 09/2010-66.

Gustman, Alan L., and Thomas L. Steinmeier. 2005. "Imperfect Knowledge of Social Security and Pensions," *Industrial Relations*, 44(2), pp. 373-97.

Kim, Iltae, Arthur Snow, and Ronald S. Warren Jr. 1995. "Tax-Rate Uncertainty, Factor Supplies, and Welfare," *Economic Inquiry,* 33(1), pp. 159 – 169.

Knowledge Networks. 2010. "KnowledgePanel® Design Summary," Manuscript, May. http://www.knowledgenetworks.com/knpanel/docs/KnowledgePanel(R)-Design-Summary-Description.pdf

Liebman, Jeffrey B. and Erzo F.P. Luttmer. 2011. "Would People Behave Differently If They Better Understood Social Security? Evidence From a Field Experiment," NBER Working Paper No. 17287.

Liebman, Jeffrey B. and Erzo F.P. Luttmer. 2012. "The Perception of Social Security Incentives for Labor Supply and Retirement: The Median Voter Knows More Than You'd Think." in Jeffrey R. Brown (ed.) *Tax Policy and the Economy, Volume 26*, University of Chicago Press.

McHale, John. 2001. "The Risk of Social Security Benefit-Rule Changes: Some International Evidence," in John Y. Campbell and Martin S. Feldstein (eds.) *Risk Aspects of Investment-Based Social Security Reform*. Chicago: University of Chicago Press, 247 – 290.

Mermin, Gordon B.T. 2005. "Reforming Social Security through Price and Progressive Price Indexing," Older Americans' Economic Security Brief No. 6, The Urban Institute, December. http://www.urban.org/publications/900903.html

Nataraj, Sita and John B. Shoven, "Comparing the Risks of Social Security with and without Individual Accounts," *American Economic Review*, May 2003, pp. 348-53.

Shoven, John B., and Sita N. Slavov. 2006. "Political Risk versus Market Risk in Social Security," NBER Working Paper 12135.

Skinner, Jonathan. 1988. "The Welfare Cost of Uncertain Tax Policy," *Journal of Public Economics*, 37(2), 129 – 145.

Smetters, Kent, and Walter E. Theseira. 2011. "A Matter of Trust: Understanding Worldwide Public Pension Conversions," NBER Working Paper 17015.

Stiglitz, Joseph E. 1982. "Utilitarianism and Horizontal Equity: The Case for Random Taxation," *Journal of Public Economics*, 18(1), pp. 1-33.

Weiss, Laurence. 1976. "The Desirability of Cheating Incentives and Randomness in the Optimal Income," *Journal of Political Economy*, 84(6), pp. 1343-1352.

Van der Wiel, Karen. 2008. "Preparing for Policy Changes: Social Security Expectations and Pension Scheme Participation," Institute for the Study of Labor (IZA) Discussion Paper No. 3623. http://ftp.iza.org/dp3623.pdf

Table 1: Summary Statistics

Variable	(1) Mean	Standard Deviation	(2) 25th Percentile	(3) Median	(4) 75th Percentile	(5) Number of Observations
Key Outcome Variables						
(all in Percent of Benefits Under Current Law)						
Expected Benefits	59.4	30.1	37.1	62.6	83.4	2,960
Standard Deviation of Expected Benefits	22.5	13.7	11.4	23.0	33.3	2,960
Midpoint of Certainty Equivalent	53.7	27.8	32.5	57.5	76.5	2,939
Midpoint of Risk Premium	5.8	28.0	0.0	7.0	16.5	2,939
Demographic Control Variables						
Age	42.5	10.0	34.0	43.0	51.0	3,053
Ethnicity						
White	0.702					3,053
Black	0.103					3,053
Hispanic	0.154					3,053
Other	0.041					3,053
Education						
High School Dropout	0.088					3,053
High School Education	0.286					3,053
Some College	0.229					3,053
Bachelor's or Above	0.397					3,053
ln(Household Size)	1.00	0.52	0.69	1.10	1.39	3,053
ln(Household Income)	10.97	0.89	10.53	11.12	11.63	3,053
Martial Status						
Married	0.643					3,053
Widowed	0.013					3,053
Divorced	0.076					3,053
Separated	0.018					3,053
Never Married	0.157					3,053
Living with partner	0.092					3,053
Female	0.464					3,053
Homeowner	0.726					3,053
Region						
Northeast	0.174					3,053
Midwest	0.237					3,053
South	0.354					3,053
West	0.235					3,053
Lives in MSA	0.843					3,053
Kids in Household	0.467					3,053
Employment Status						
Currently Working	0.788					3,053
Retired	0.019					3,053
Disabled	0.021					3,053
Unemployed	0.086					3,053
Not Working	0.085					3,053
Other Control Variables						
Risk Aversion Index (Using Lifetime Income Gambles, 1-6 scale)	4.6	1.4	4.0	5.0	6.0	2,997
Subjective Probability of Surviving To Age 75 (percent)	67.9	22.5	51.0	71.0	85.0	2,935
Importance of Social Security Funds during Retirement (1-4 scale)	2.8	1.0	2.0	3.0	4.0	2,982
Trust in Elected Federal Officials (1-5 scale)	2.2	1.0	1.0	2.0	3.0	3,018
Optimism Indicator (standarized variable)	0.0	1.0	-0.6	0.0	0.7	2,955
Financial Literacy (0-4 scale)	2.4	1.2	2.0	3.0	3.0	3,053

Notes: Key outcome variables are measured in the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The baseline demographics are the values in the standard demographic profile variables at the time of the baseline survey (June 2010). The standard demographic profile is collected by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011. See the text and Appendix B for a discussion of and definitions of the key outcome variables. The risk-aversion variable is an index that runs from 1 to 6 and it based on five questions about hypothetical choices between a riskless and a risky job (Q6.1-Q6.5). The index corresponds respectively to the following six CRRA ranges: [<0.5], [0.5-1],[1-2],[2-4],[4-8],[>8]. Importance of Social Security Funds during Retirement is measured on a 4-point scale from "not so important" to "extremely important" (Q6.10). Trust in Elected Federal Officials is a on a five-point scale, with higher values indicating more trust (Q6.11). The Optimism Indicator is the standardized average of the non-missing responses to the six items (reverse coded when appropriate) of Q6.12. The financial literacy index is the number of correct responses to the four questions on financial literacy (Q6.13-Q6.13).

Table 2: Expectations about Social Security

	(1) Mean		(2) Median		(3) Number of Observations
Panel A: Respondent Confidence in Social Security					
Very Confident	0.033	(0.003)	..	..	3,045
Somewhat Confident	0.223	(0.008)	..	..	3,045
Not too Confident	0.453	(0.009)	..	..	3,045
Not at all Confident	0.291	(0.008)	..	..	3,045
Panel B: Does Social Security Face a Financial Shortfall?					
Yes	0.914	(0.005)	..	..	3,036
No	0.086	(0.005)	..	..	3,036
Panel C: How Will the Government Address the Shortfall?					
Mostly or Entirely through Benefit Cuts	0.183	(0.007)	..	..	3,028
Balanced Mix of Benefit Cuts and Tax Increases	0.576	(0.009)	..	..	3,028
Mostly or Entirely through Tax Increases	0.241	(0.008)	..	..	3,028
Panel D: Chance of a Decline in General Level of Benefits					
Within 10 Years	61.0	(0.5)	61.0	(0.8)	2,937
By Age 65	66.6	(0.5)	71.0	(0.5)	2,840
Panel E: Do you Expect More, the Same, or Less Benefits than you are Supposed to Get Under Current Law?					
More	0.028	(0.003)	..	..	3,026
The Same	0.241	(0.008)	..	..	3,026
Less	0.731	(0.008)	..	..	3,026
Panel F: Point Estimate of Expected Benefits as % of Current Benefits	65.9	(0.6)	70.0	(0.5)	2,956
Panel G: Importance of Benefit Amount Uncertainty					
Matters Very Much	0.475	(0.009)	..	..	3,038
Matters Somewhat	0.320	(0.008)	..	..	3,038
Matters Little	0.148	(0.006)	..	..	3,038
Does Not Matter at All	0.057	(0.004)	..	..	3,038

Notes: Robust standard errors in parentheses. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011. See Appendix B for exact question definitions: Q1.2 for Panel A, Q2.1 for Panel B, Q2.2 for Panel C, Q2.11 for Panel D, Q3.1 for Panel E, Q3.2 for Panel F, Q4.1 for Panel G.

Table 3: Correlates of Perceived Distribution of Future Social Security Benefits

	(1) Dep. Variable: Expected Benefits	(2) Dep. Variable: Expected Benefits	(3) Dep. Variable: Standard Deviation of Benefits	(4) Dep. Variable: Standard Deviation of Benefits
Age	0.96*** (0.06)	0.94*** (0.06)	-0.22*** (0.03)	-0.21*** (0.03)
Black	7.4*** (2.0)	5.1*** (1.9)	2.8*** (1.0)	3.1*** (1.0)
Hispanic	5.1*** (1.6)	3.9** (1.6)	1.6** (0.8)	1.8** (0.8)
Other	-0.9 (2.9)	-0.8 (2.8)	1.9 (1.3)	1.9 (1.2)
Highschool Dropout	-0.1 (2.3)	0.7 (2.2)	3.8*** (1.1)	3.7*** (1.1)
Some College	0.6 (1.5)	-0.3 (1.5)	-0.7 (0.7)	-0.7 (0.7)
Bachelor's Degree or Higher	3.3** (1.4)	0.6 (1.5)	0.1 (0.7)	0.1 (0.7)
Ln Household Size	1.4 (1.6)	0.8 (1.6)	0.5 (0.8)	0.6 (0.8)
Ln Household Income	-2.7*** (0.8)	-3.1*** (0.8)	-0.9** (0.4)	-0.9** (0.4)
Widowed	8.5** (4.0)	6.9* (4.0)	-0.7 (2.9)	-0.8 (2.9)
Divorced	0.6 (2.1)	-0.5 (2.0)	-0.1 (1.1)	0.0 (1.1)
Separated	1.7 (3.7)	-0.3 (3.7)	-0.3 (1.9)	-0.1 (1.8)
Never Married	2.8 (1.8)	2.9 (1.7)	-1.0 (0.9)	-1.0 (0.9)
Lives With Partner	0.6 (2.0)	0.6 (1.9)	0.6 (0.9)	0.7 (0.9)
Female	-2.5*** (1.1)	-3.0*** (1.1)	0.0 (0.5)	0.3 (0.5)
Owns House	-1.3 (1.3)	-1.1 (1.3)	-1.3** (0.7)	-1.2* (0.7)
Lives in Northeast	4.5*** (1.5)	4.0*** (1.5)	0.1 (0.7)	0.1 (0.7)
Lives in Midwest	2.2 (1.4)	2.4* (1.3)	0.1 (0.7)	0.1 (0.7)
Lives in West	0.4 (1.5)	0.0 (1.4)	1.1* (0.7)	1.2* (0.7)
Lives in MSA	2.6* (1.5)	2.3 (1.4)	-0.1 (0.7)	-0.1 (0.7)
Kids in Household	-5.9*** (1.6)	-5.4*** (1.5)	0.2 (0.8)	0.1 (0.8)
Retired	10.0** (3.9)	9.3** (3.8)	-3.4* (1.9)	-3.6* (1.9)
Disabled	-2.3 (3.9)	-2.5 (3.8)	-1.3 (2.2)	-1.5 (2.2)
Unemployed	-1.5 (2.1)	-2.0 (2.0)	-1.3 (1.0)	-1.4 (1.0)
Not Working	-0.7 (2.0)	-0.5 (2.0)	1.9** (0.9)	1.9** (0.9)
Risk Aversion Index		0.0 (0.4)		-0.2 (0.2)
Subjective Probability of Surviving To Age 75		0.13*** (0.03)		-0.03** (0.01)
Importance of SS to Retirement Spending		2.3*** (0.6)		-0.4 (0.3)
Trust in Elected Federal Officials		6.0*** (0.5)		0.0 (0.3)
Optimism Index		1.7*** (0.6)		-0.4 (0.3)
Financial Literacy		1.5*** (0.5)		0.0 (0.3)
R^2	0.136	0.202	0.064	0.069
N	2,960	2,960	2,960	2,960

Notes: Robust standard errors in parentheses. * significant at 10%, ** significant at 5% *** significant at 1%. Missing values of explanatory values are dummied out. Expected Benefits and Standard Deviation of Expected Benefits are based on the bin/ball question that elicites the subjective distribution of future Social Security benefits (Q3.3-Q3.6). Both variables are expressed as a percentage of benefits under current law. See the note to Table 1 for more details on the explanatory variables. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011.

Table 4: Correlates of Risk Premia

	(1)		(2)		(3)		(4)	
	Dependent Variable: Risk Premium Based on Certainty Equivalent		Dependent Variable: Risk Premium Based on Certainty Equivalent		Dependent Variable: Simulated Risk Premium for CRRA = 3		Dependent Variable: Simulated Risk Premium for CRRA = 3	
Age	0.31***	(0.06)	0.29***	(0.06)	-0.04	(0.02)	-0.10***	(0.02)
Black	10.6***	(2.1)	9.5***	(2.1)	1.6*	(0.9)	1.5*	(0.8)
Hispanic	5.5***	(1.7)	4.8***	(1.7)	2.5***	(0.8)	1.7**	(0.7)
Other	-4.4	(2.7)	-4.1	(2.6)	1.9*	(1.0)	0.5	(1.0)
Highschool Dropout	2.8	(2.4)	3.4	(2.4)	2.5**	(1.2)	2.1*	(1.1)
Some College	-1.6	(1.5)	-1.6	(1.5)	-2.0***	(0.7)	-0.9	(0.7)
Bachelor's Degree or Higher	0.0	(1.3)	-0.5	(1.5)	-3.6***	(0.6)	-1.0*	(0.6)
Ln Household Size	0.6	(1.5)	0.3	(1.6)	1.6**	(0.8)	1.2*	(0.7)
Ln Household Income	-1.8**	(0.9)	-1.8**	(0.9)	-1.7***	(0.4)	-0.7**	(0.4)
Widowed	6.2	(3.9)	5.3	(4.0)	-1.2	(2.2)	-0.3	(2.2)
Divorced	-0.4	(2.1)	-0.5	(2.1)	2.2*	(1.1)	0.9	(1.0)
Separated	7.3**	(3.3)	6.2*	(3.3)	2.0	(2.1)	0.7	(1.8)
Never Married	1.5	(1.7)	1.9	(1.7)	-0.2	(0.8)	-0.8	(0.7)
Lives With Partner	1.5	(2.1)	1.4	(2.1)	1.6*	(0.9)	0.0	(0.8)
Female	2.5**	(1.1)	2.0*	(1.1)	0.4	(0.5)	-0.1	(0.5)
Owns House	-1.9	(1.4)	-1.9	(1.4)	-1.6**	(0.6)	-1.3**	(0.6)
Lives in Northeast	-0.7	(1.4)	-1.1	(1.5)	-0.4	(0.6)	-0.8	(0.6)
Lives in Midwest	-0.9	(1.3)	-1.0	(1.3)	-0.2	(0.6)	-0.1	(0.6)
Lives in West	-2.3	(1.5)	-2.3	(1.4)	-0.2	(0.6)	0.3	(0.6)
Lives in MSA	0.4	(1.5)	0.2	(1.5)	-0.3	(0.7)	0.2	(0.6)
Kids in Household	-1.7	(1.5)	-1.1	(1.5)	-0.4	(0.7)	-0.3	(0.6)
Retired	10.7***	(3.5)	10.6***	(3.4)	-2.2	(1.6)	0.0	(1.5)
Disabled	-5.1	(4.1)	-4.9	(4.1)	-0.6	(2.3)	-0.4	(2.2)
Unemployed	-0.7	(2.2)	-0.7	(2.2)	-0.4	(1.0)	-0.4	(1.0)
Not Working	2.1	(2.0)	2.0	(2.0)	-0.6	(0.9)	0.9	(0.8)
Risk Aversion Index			1.6***	(0.5)			-0.2	(0.1)
Subjective Probability of Surviving To Age 75			0.05**	(0.03)			-0.01	(0.01)
Importance of SS to Retirement Spending			0.9	(0.6)			5.2***	(0.2)
Trust in Elected Federal Officials			2.3***	(0.5)			0.1	(0.2)
Optimism Index			0.6	(0.5)			-0.5**	(0.2)
Financial Literacy			0.7	(0.6)			0.2	(0.2)
R^2	0.052		0.075		0.090		0.235	
N	2939		2939		2960		2960	

Notes: Robust standard errors in parentheses. * significant at 10%, ** significant at 5% *** significant at 1%. Missing values of explanatory values are dummied out. The risk premium is the percent of benefits under current law that respondents are willing to sacrifice in order to receive their expected benefits for with certainty. The simulated risk premium is based on the respondent's reported subjective distribution of own future Social Security benefits, the fraction of retirement spending covered by Social Security benefits, and an assumed CRRA utility function with a CRRA of 3. See text for further details. See the note to Table 1 for more details on the explanatory variables. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011.

Table 5: Are Responses on Certainty Equivalence Meaningful?

	(1)	(2)
Panel A: Effect of Starting Value on First Choice	Dependent Variable: Dummy for Respondent Choosing Guaranteed Benefits	
Starting Value is 70%	0.34*** (0.02)	0.34*** (0.02)
Guaranteed Benefits is Second Option	-0.01 (0.02)	-0.02 (0.02)
Demographic and Other Controls	No	Yes
R^2	0.113	0.189
N	2,939	2,939
Panel B: Effects of Starting Value, Perceived Uncertainty, and Risk-Aversion on Certaintly Equivalent	Dependent Variable: Certainty Equivalent of Social Security Benefits	
Expected Social Security Benefits	0.49*** (0.02)	0.47*** (0.02)
Perceived Standard Deviation of own Social Security Benefits	-0.41*** (0.04)	-0.38*** (0.04)
Risk Aversion Index	-2.00*** (0.35)	-1.77*** (0.37)
Starting Value is 70%	7.7*** (0.8)	7.4*** (0.8)
Guaranteed Benefits is Second Option	0.9 (0.8)	1.2 (0.8)
Demographic and Other Controls	No	Yes
R^2	0.352	0.375
N	2,939	2,939
Panel C: Effect of Weather Example On Perceived Uncertainty	Dependent Variable: Simulated Risk Premium (CRRA = 3)	
Respondent Sees High SD Weather Example	2.2*** (0.5)	2.3*** (0.4)
Demographic and Other Controls	No	Yes
R^2	0.008	0.243
N	2,960	2,960

Notes: Robust standard errors in parentheses. * significant at 10%, ** significant at 5% *** significant at 1%. Demographic and other controls is the set of controls used in column 2 of Table 3. The Certainty Equivalent is the percent of benefits under current law that the respondent is just willing to accept in place of benefits under current law if the certainty equivalent is guaranteed in an unbreakable contract. The simulated risk premium is based on the respondent's reported subjective distribution of own future Social Security benefits, the fraction of retirement spending covered by Social Security benefits, and an assumed CRRA utility function with a CRRA of 3. See text for further details. Expected Social Security Benefits and Standard Deviation of Social Security Benefits are based on the respondent's subjective probability distribution of future Social Security Benefits as elicited by the Bin/Ball question (Q3.3-Q3.6). The Risk Aversion Index is defined in the note to Table 1. The weather example is an example of a probability distribution using the Bin/Ball format that was presented to the respondent prior to Q3.3. The variable Respondent Sees High SD Weather Example is a dummy that equals 1 if the variance of the distribution in the example was high. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011.

Table 6: Expectations about Social Security Taxes

	(1) Mean	(2) Median	(3) N
Percent chance that the Social Security payroll tax rate will be raised above 12.4%...			
Sometime within the next 10 years?	57.5 (0.48)	59 (1.25)	2,884
By the time you turn 65?	63.6 (0.50)	69 (1.00)	2,792
What do you expect the Social Security payroll tax rate to be…			
In ten years?	16.6 (0.11)	15 (0.04)	2,980
By the time you turn 65?	18.2 (0.13)	16 (0.20)	2,881
Percent chance that lawmakers will raise the Social Security taxable earnings limit beyond the automatic adjustments for inflation sometime…			
Within the next 10 years?	57.7 (0.50)	59 (1.25)	2,915
By the time you turn 65?	61.9 (0.52)	64 (1.76)	2,815
Percent chance that lawmakers will add a new source of revenue to fund Social Security…			
Within the next 10 years?	39.2 (0.46)	40 (0.49)	2,913
By the time you turn 65?	43.2 (0.48)	42 (1.26)	2,827

Notes: Robust standard errors in parentheses. See Q2.3, Q2.4, Q2.5, Q2.6, Q2.7, Q2.8, Q2.9, and Q2.10, respectively, for exact wording of the dependent variables. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011

Table 7: Risk Premium as Predictor of Planned Claim and Retirement Age

	(1)		(2)	
Panel A: Self-Reported Risk Premium as Predictor	Dependent Variable: Planned Claim Age			
Self-Reported Risk Premium	-0.021***	(0.004)	-0.016***	(0.004)
Demographic and Other Controls	No		Yes	
R^2	0.015		0.055	
N	2,873		2,873	
Panel B: Simulated Risk Premium as Predictor	Dependent Variable: Planned Claim Age			
Simulated Risk Premium (CRRA=3)	-0.016*	(0.008)	-0.007	(0.009)
Demographic and Other Controls	No		Yes	
R^2	0.002		0.049	
N	2,888		2,888	
Panel C: Self-Reported Risk Premium as Predictor	Dependent Variable: Planned Retirement Age			
Self-Reported Risk Premium	-0.033***	(0.009)	-0.027***	(0.009)
Demographic and Other Controls	No		Yes	
R^2	0.011		0.110	
N	2,771		2,771	
Panel D: Simulated Risk Premium as Predictor	Dependent Variable: Planned Retirement Age			
Simulated Risk Premium (CRRA=3)	0.014	(0.013)	-0.026*	(0.014)
Demographic and Other Controls	No		Yes	
R^2	0.000		0.106	
N	2,786		2,786	

Notes: Robust standard errors in parentheses. * significant at 10%, ** significant at 5% *** significant at 1%. See text for descriptions of the self-reported risk-premium and the simulated risk-premium. Claim age is the age at which the respondent plans to claim Social Security benefits (Q6.7). Retirement age is the age at which the respondent stopped working for pay or plans to stop working for pay (Q6.6). Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011. The sample in Panels C and D is further limited to those having ever worked and reporting a retirement age higher than 30.

Table 8: Hypothetical Behavior Responses to Guaranteed Contracts

	(1) Significantly Decrease	(2) Somewhat Decrease	(3) No Change	(4) Somewhat Increase	(5) Significantly Increase	(6) Average Response	(7) N
Panel A: Effect of a Guaranteed Contract Offering Expected Social Security Benefits on:							
Savings Before Retirement	2.8%	4.2%	39.2%	31.7%	22.2%	3.66***	1,466
	(0.4%)	(0.5%)	(1.3%)	(1.2%)	(1.1%)	(0.03)	
Hours Worked Per Year Before Retirement	1.8%	4.4%	55.5%	23.9%	14.4%	3.446***	1,463
	(0.4%)	(0.5%)	(1.3%)	(1.1%)	(0.9%)	(0.02)	
Spending During Retirement	17.7%	44.3%	29.3%	6.2%	2.5%	2.31***	1,461
	(1.0%)	(1.3%)	(1.2%)	(0.6%)	(0.4%)	(0.02)	
Age When You Stop Working for Pay	1.5%	6.9%	35.3%	38.0%	18.3%	3.65***	1,457
	(0.3%)	(0.7%)	(1.3%)	(1.3%)	(1.0%)	(0.02)	
Age When You Start Claiming SS Benefits	2.3%	6.6%	41.1%	35.8%	14.1%	3.53***	1,461
	(0.4%)	(0.7%)	(1.3%)	(1.3%)	(0.9%)	(0.02)	
Assets You Leave to Others	15.3%	25.0%	50.0%	6.5%	3.1%	2.57***	1,466
	(0.9%)	(1.1%)	(1.3%)	(0.6%)	(0.5%)	(0.02)	
Panel B: Effect of a Guaranteed Contract Offering 100% of Benefits Under Current Law on:							
Savings Before Retirement	2.8%	6.1%	60.1%	21.0%	10.0%	3.29***	1,497
	(0.4%)	(0.6%)	(1.3%)	(1.1%)	(0.8%)	(0.02)	
Hours Worked Per Year Before Retirement	1.9%	6.8%	67.4%	17.0%	6.9%	3.20***	1,486
	(0.4%)	(0.7%)	(1.2%)	(1.0%)	(0.7%)	(0.02)	
Spending During Retirement	7.7%	24.0%	48.5%	17.6%	2.2%	2.83***	1,490
	(0.7%)	(1.1%)	(1.3%)	(1.0%)	(0.4%)	(0.02)	
Age When You Stop Working for Pay	2.4%	15.1%	54.7%	20.6%	7.2%	3.15***	1,487
	(0.4%)	(0.9%)	(1.3%)	(1.1%)	(0.7%)	(0.02)	
Age When You Start Claiming SS Benefits	2.6%	11.1%	59.4%	20.5%	6.4%	3.17***	1,491
	(0.4%)	(0.8%)	(1.3%)	(1.0%)	(0.6%)	(0.02)	
Assets You Leave to Others	6.1%	10.4%	62.3%	17.3%	3.9%	3.03***	1,497
	(0.6%)	(0.8%)	(1.3%)	(1.0%)	(0.5%)	(0.02)	

Notes: Robust standard errors in parentheses. * significant at 10%, ** significant at 5% *** significant at 1%. See Q5.1 for wording of the question on hypothetical responses to guaranteed Social Security benefits. Respondents were randomized between being asked about guaranteed benefits at the level of their expected benefits (Panel A) and guaranteed benefits at a level of the full benefits under current law (Panel B). Respondents were provided with 5 choices on their hypothetical behavior response, ranging from Significantly Decrease (1) to Significantly Increase (5) with No Change (3) in the middle. Data from the June 2011 Social Security Political Risk Survey, designed by the authors and fielded by Knowledge Networks. The sample is restricted to individuals between the ages of 25 and 59 as of May 2011.

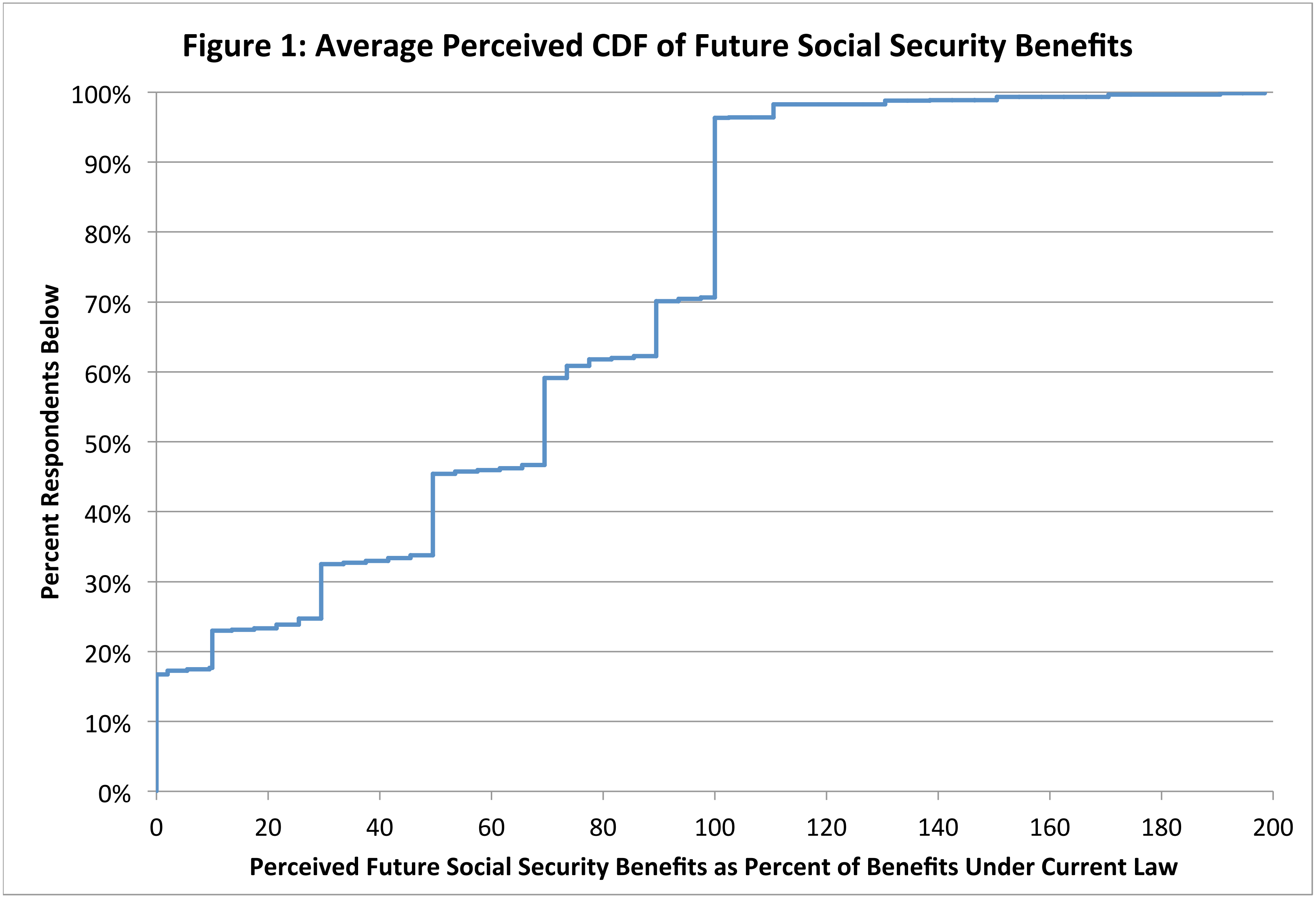


Figure 1: Average Perceived CDF of Future Social Security Benefits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
0
20
40
60
80
100
120
140
160
180
200
Perceived Future Social Security Benefits as Percent of Benefits Under Current Law

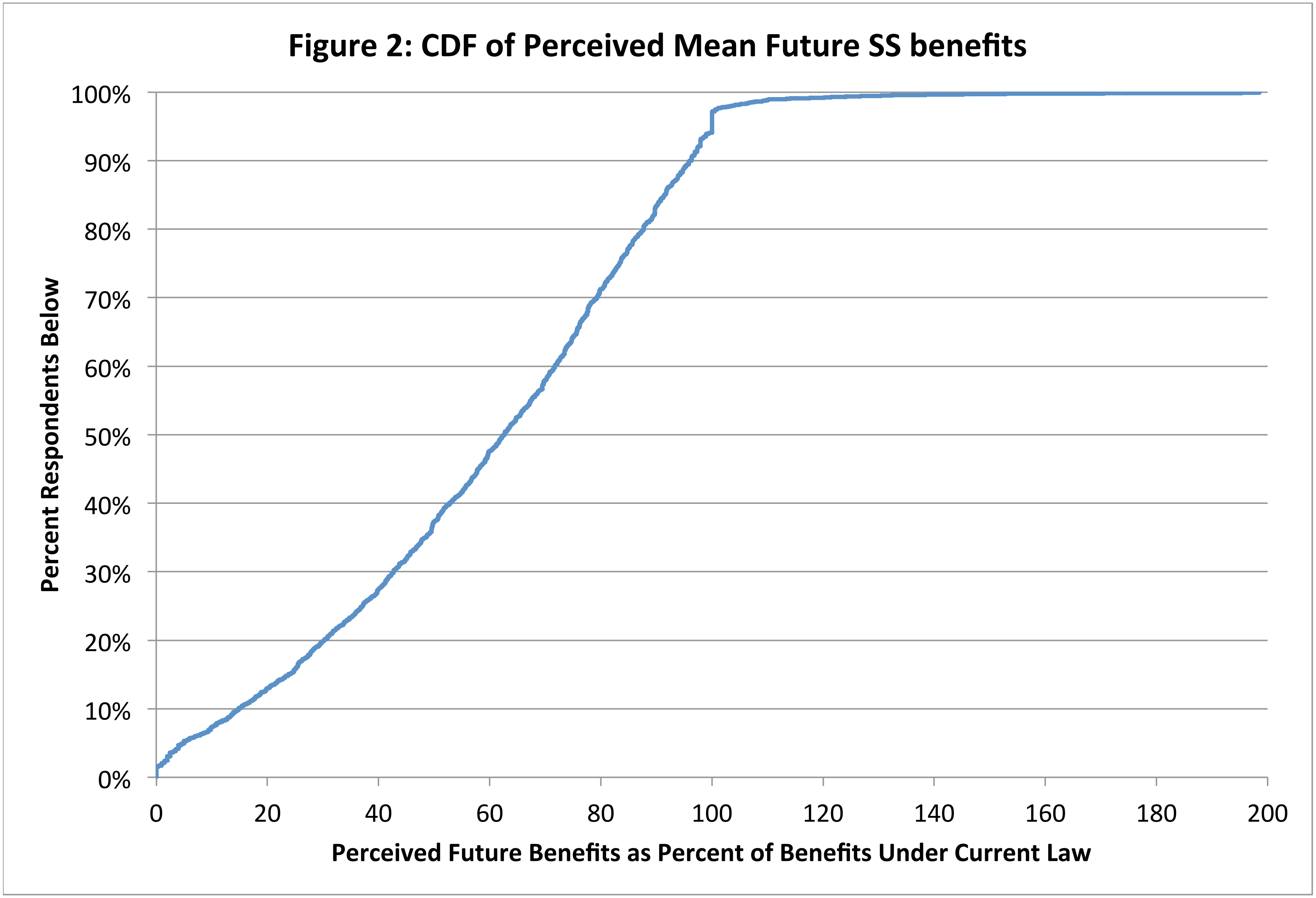


Figure 2: CDF of Perceived Mean Future SS benefits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
0
20
40
60
80
100
120
140
160
180
200
Perceived Future Benefits as Percent of Benefits Under Current Law

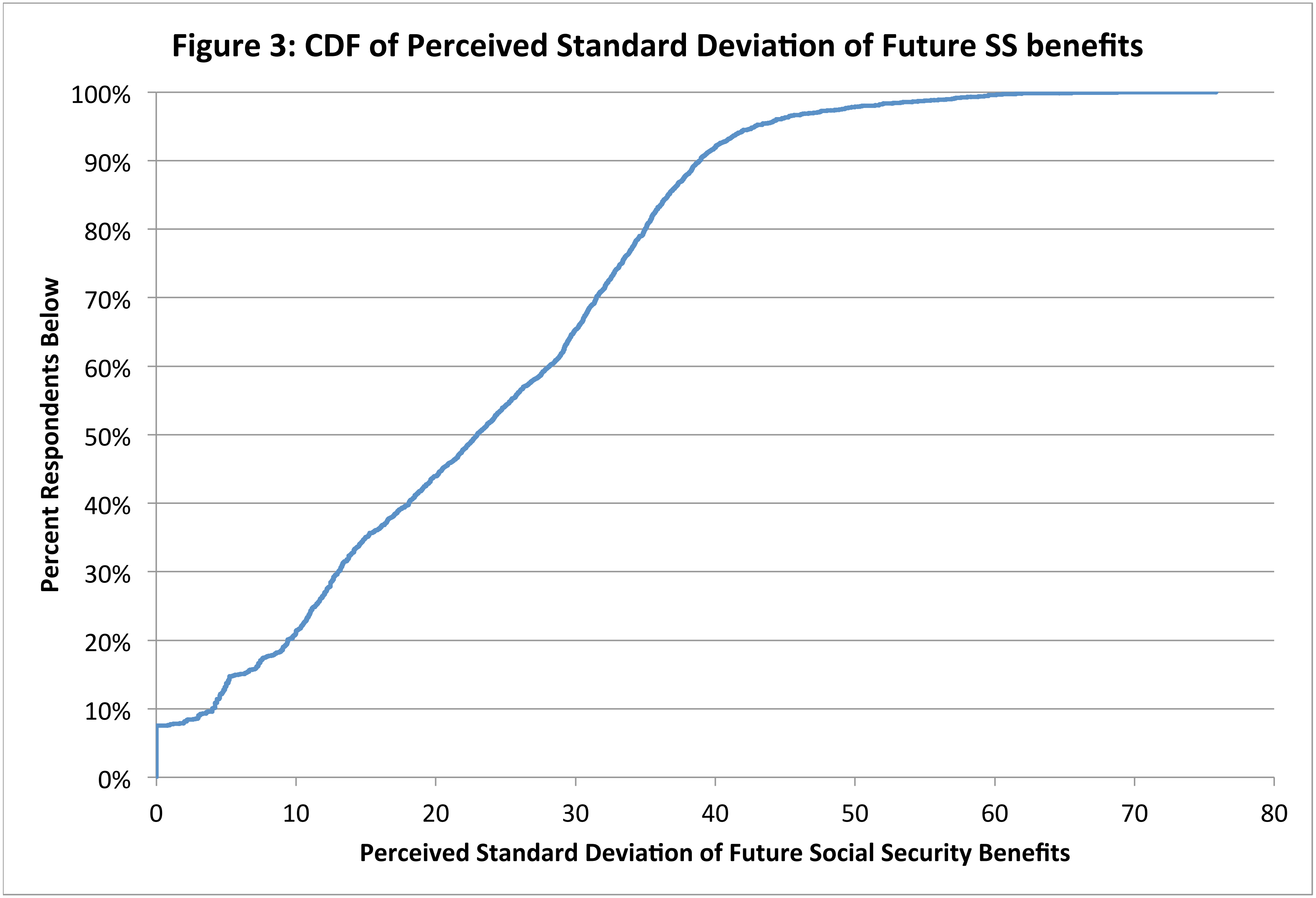


Figure 3: CDF of Perceived Standard Deviation of Future SS benefits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
0
10
20
30
40
50
60
70
80
Perceived Standard Deviation of Future Social Security Benefits

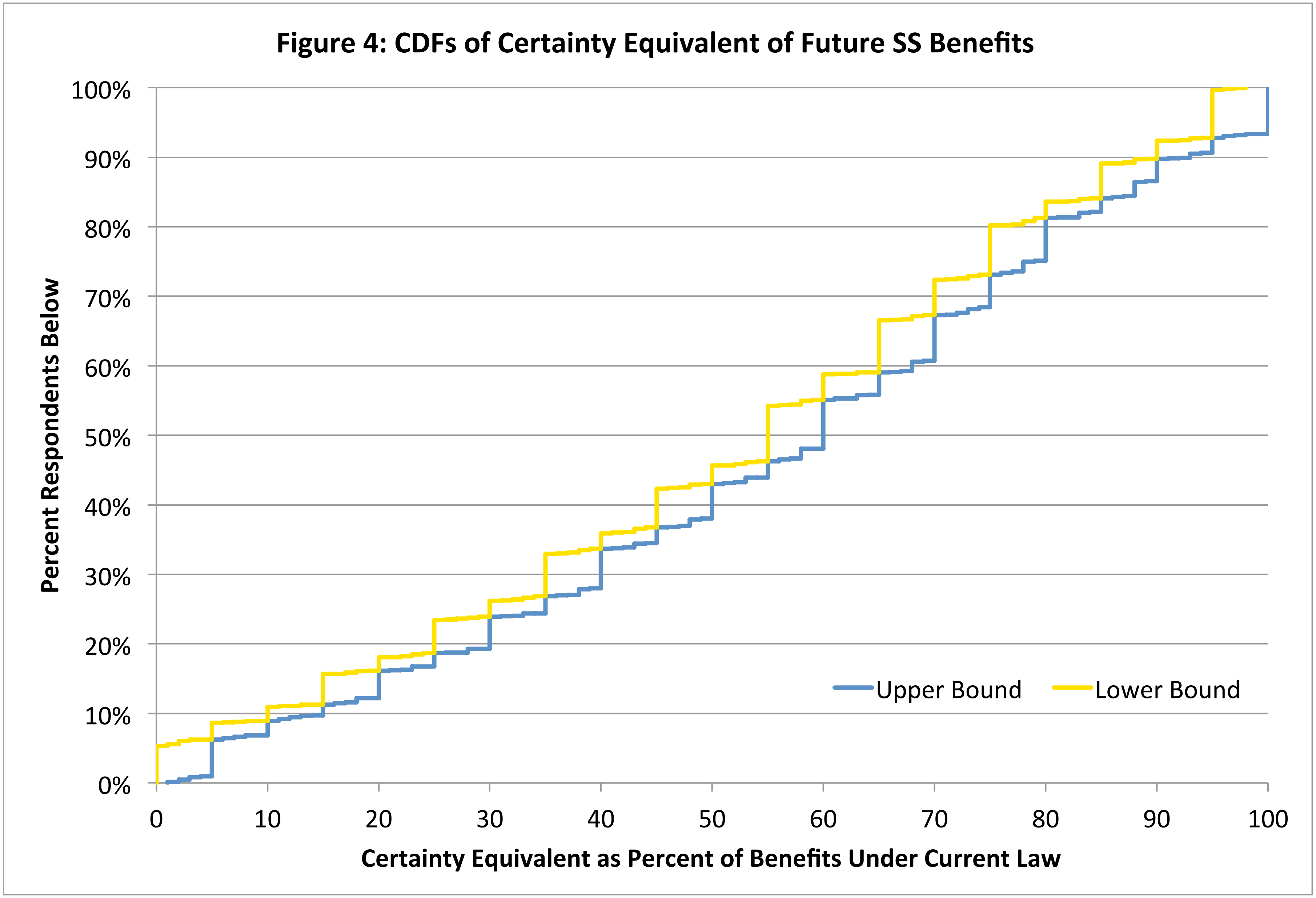


Figure 4: CDFs of Certainty Equivalent of Future SS Benefits
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
0
10
20
30
40
50
60
70
80
90
100
Certainty Equivalent as Percent of Benefits Under Current Law
Upper Bound
Lower Bound

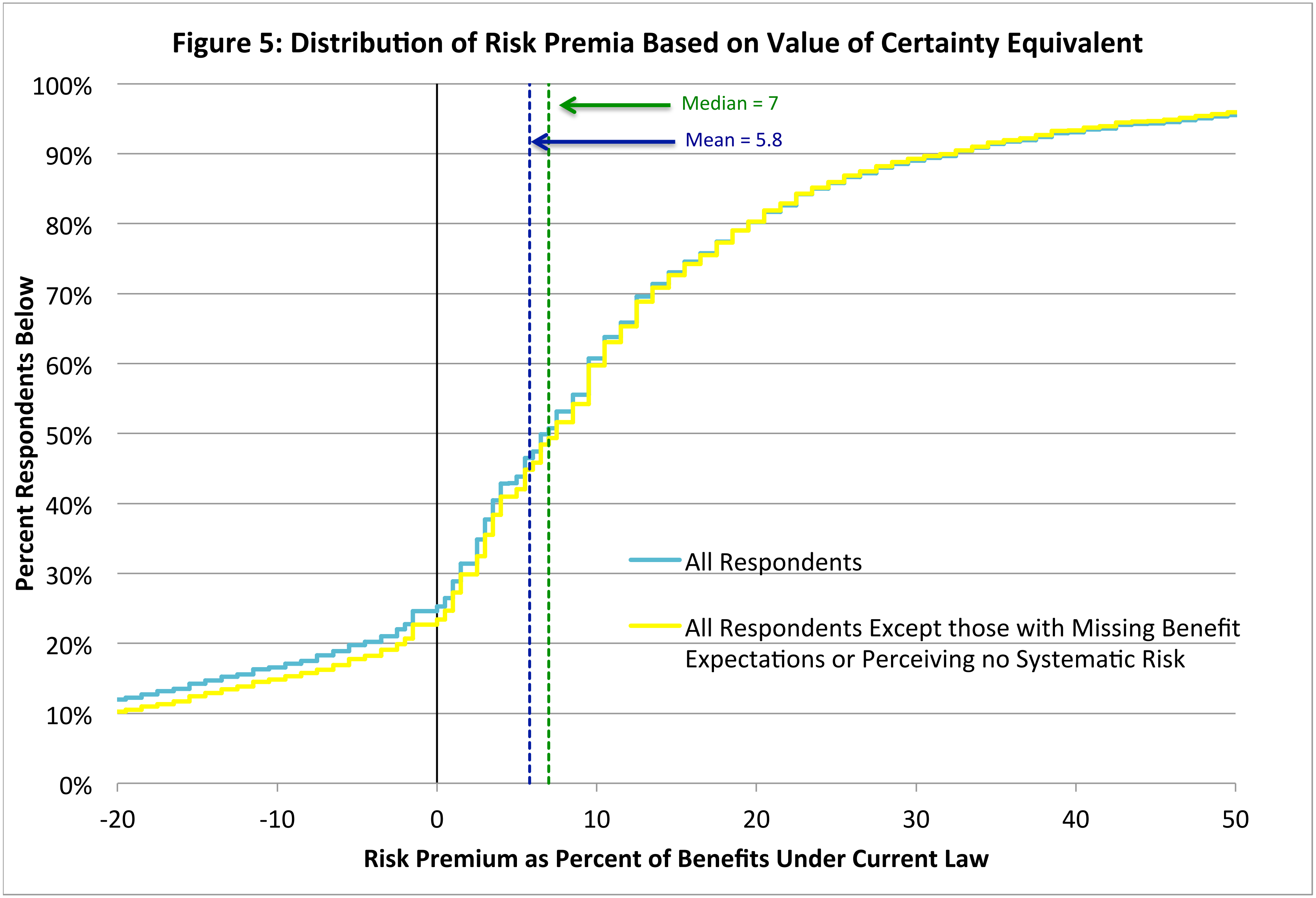


Figure 5: Distribution of Risk Premia Based on Value of Certainty Equivalent
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
Median = 7
Mean = 5.8
All Respondents
All Respondents Except those with Missing Benefit Expectations or Perceiving no Systematic Risk
-20
-10
0
10
20
30
40
50
Risk Premium as Percent of Benefits Under Current Law

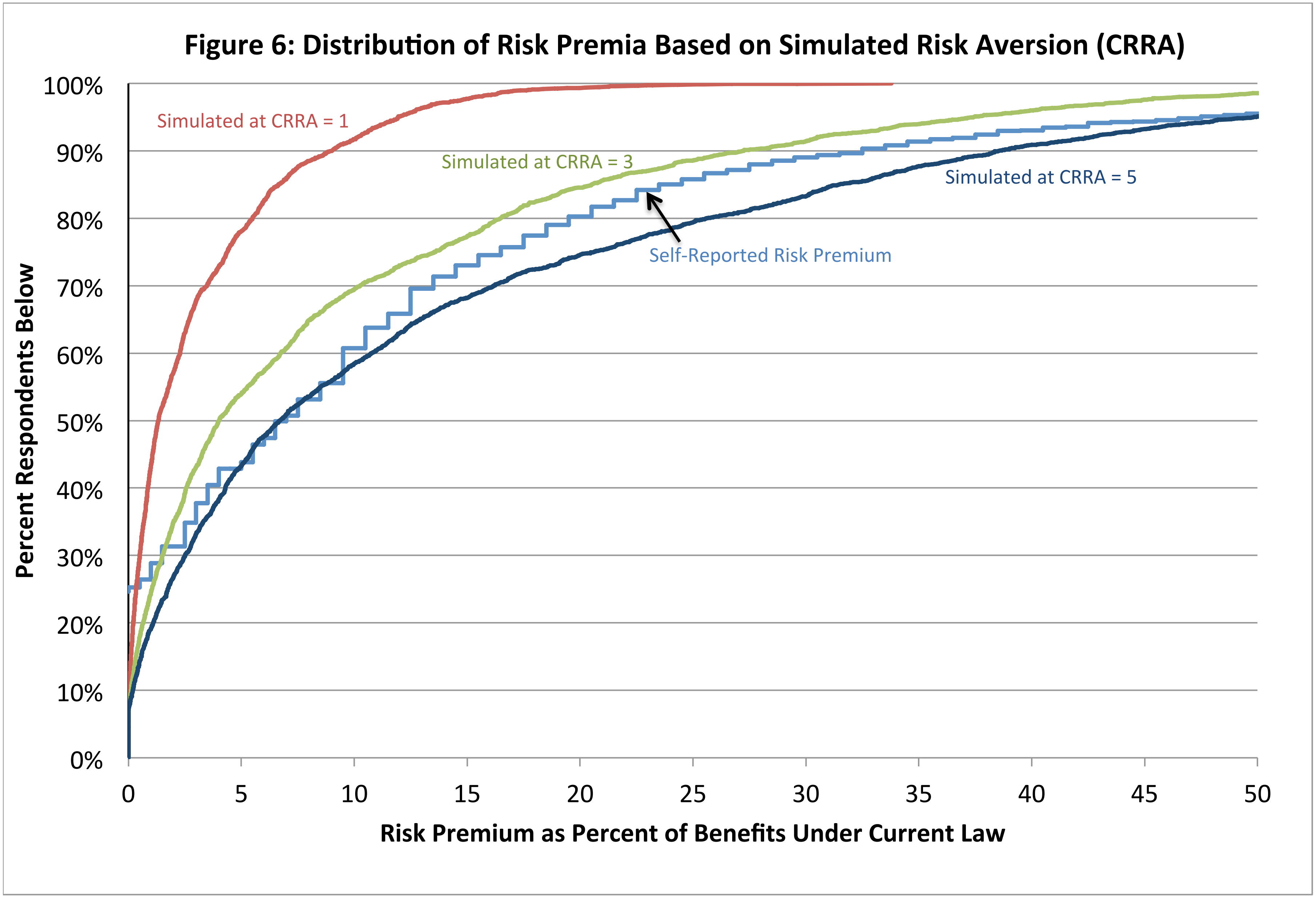


Figure 6: Distribution of Risk Premia Based on Simulated Risk Aversion (CRRA)
Percent Respondents Below
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
30
35
40
45
50
Risk Premium as Percent of Benefits Under Current Law
Simulated at CRRA = 1
Simulated at CRRA = 3
Simulated at CRRA = 5
Self-Reported Risk Premium

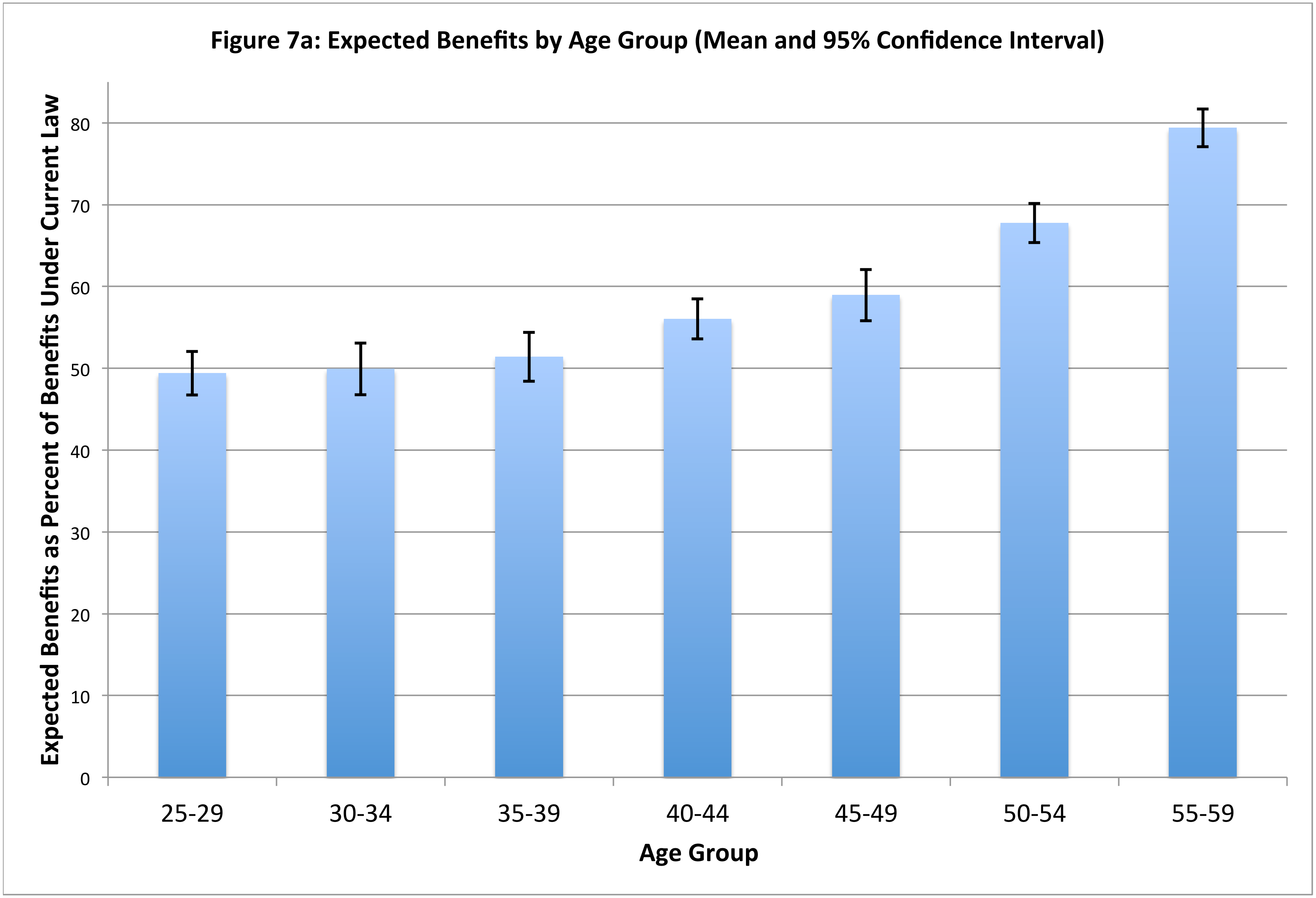


Figure 7a: Expected Benefits by Age Group (Mean and 95% Confidence Interval)
Expected Benefits as Percent of Benefits Under Current Law
0
10
20
30
40
50
60
70
80
25-29
30-34
35-39
40-44
45-49
50-54
55-59
Age Group

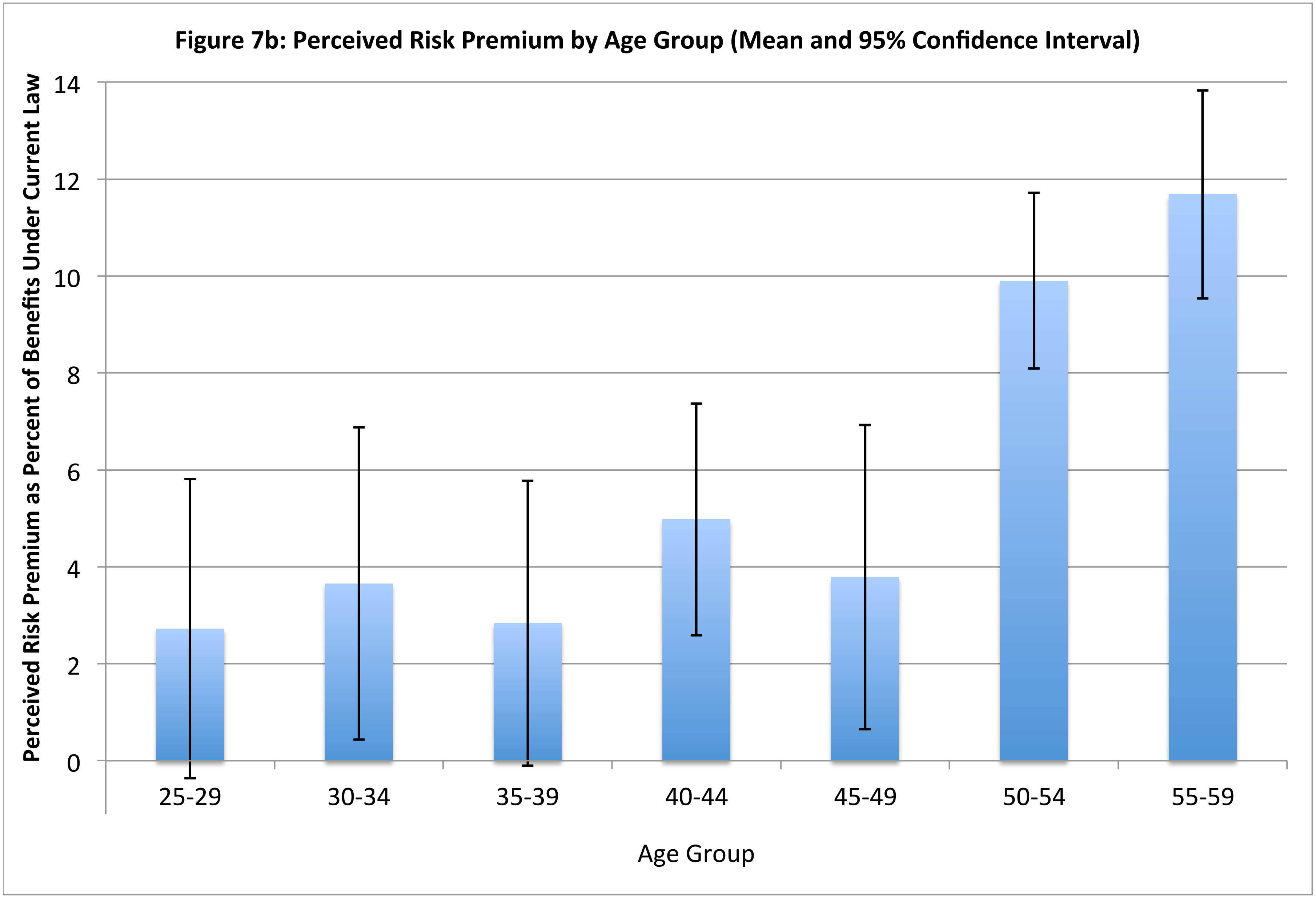
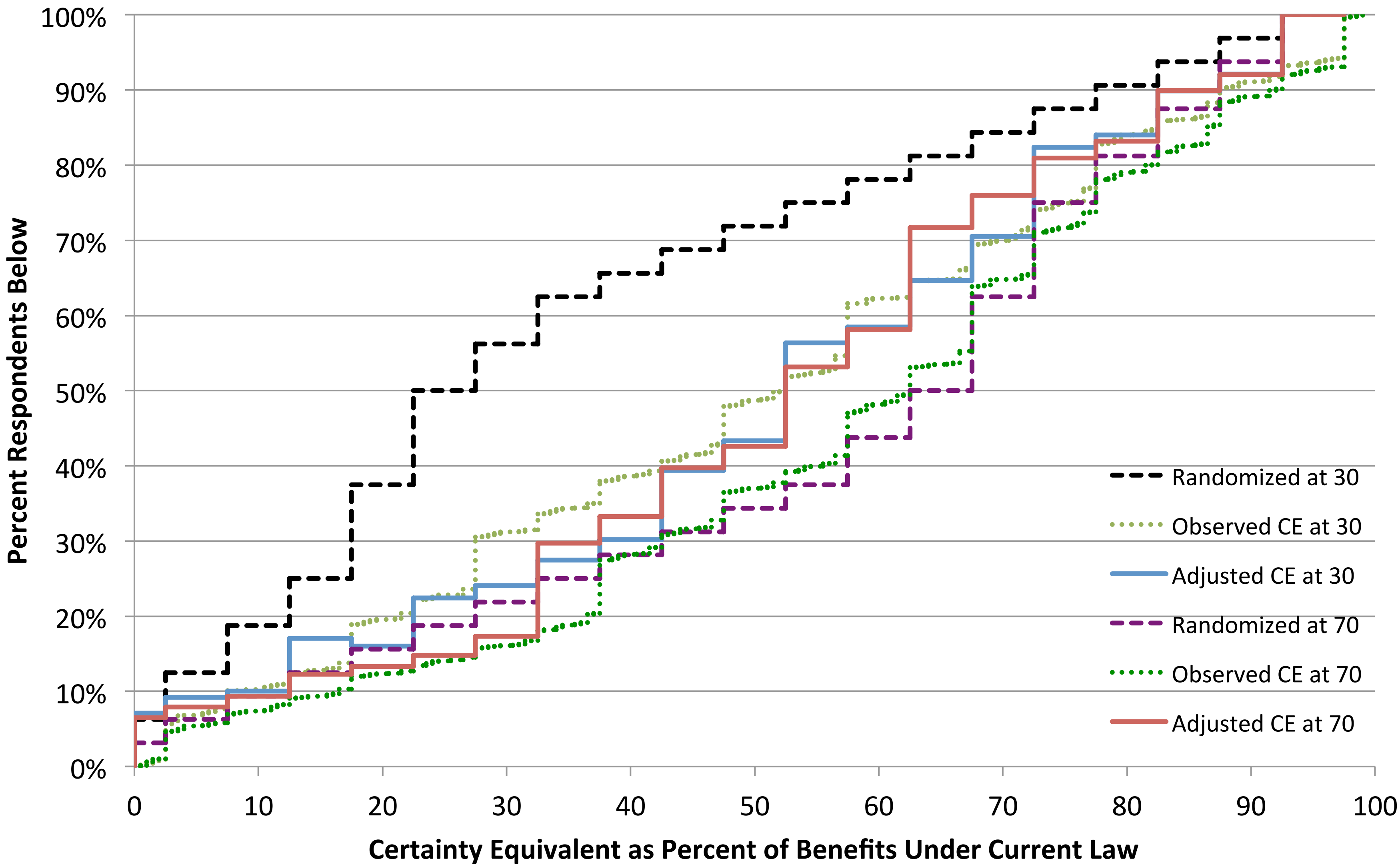


Figure 7b: Perceived Risk Premium by Age Group (Mean and 95% Confidence Interval)
Perceived Risk Premium as Percent of Benefits Under Current Law
0
2
4
6
8
10
12
14
25-29
30-34
35-39
40-44
45-49
50-54
55-59
Age Group

Figure 8: Predicted Certainty Equivalent (CE) for Randomizers, Observed CE, and Adjusted CE by Starting Value



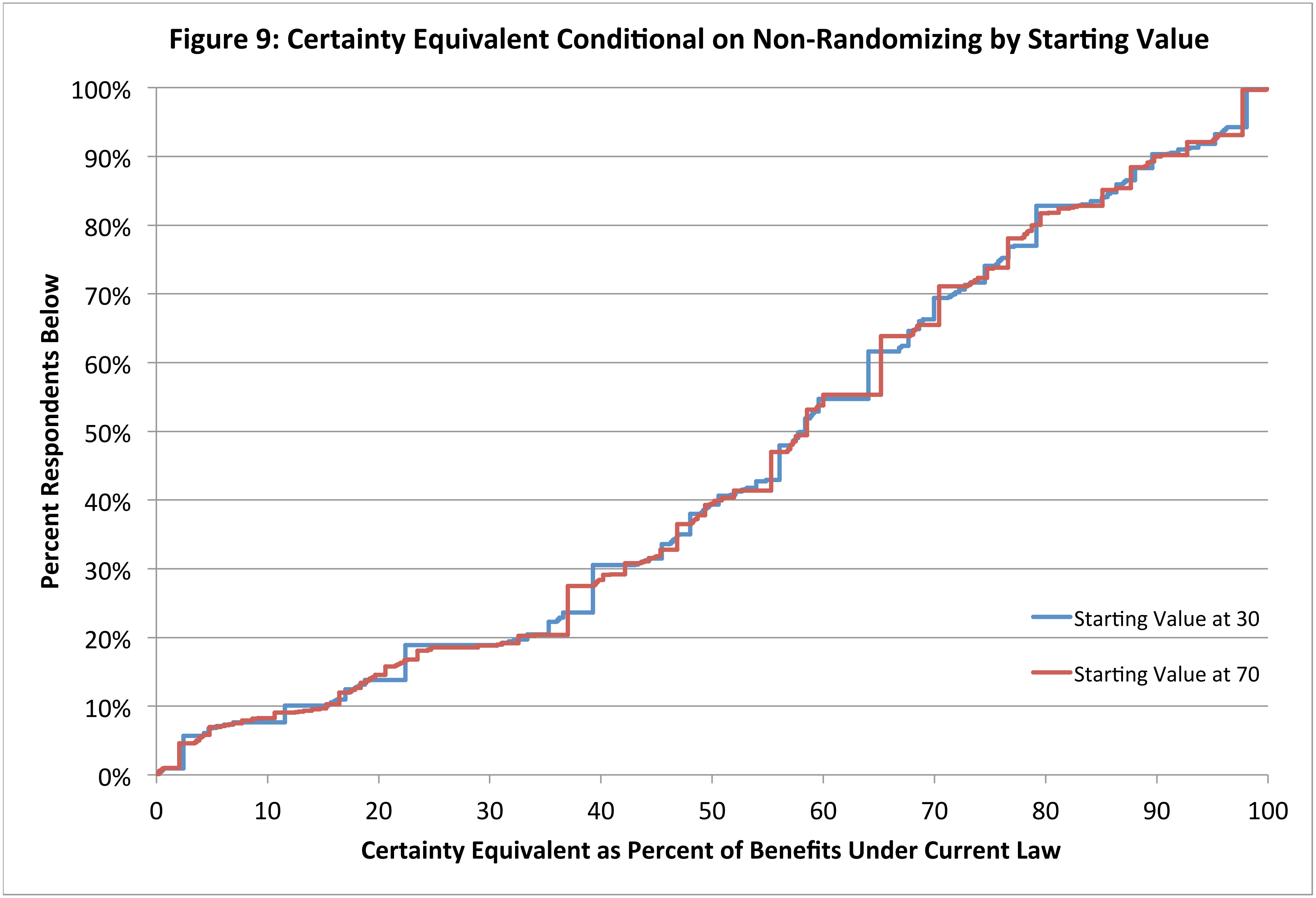


Figure 9: Certainty Equivalent Conditional on Non-Randomizing by Starting Value
Percent Respondents Below
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
10
20
30
40
50
60
70
80
90
100
Certainty Equivalent as Percent of Benefits Under Current Law
Starting Value at 30
Starting Value at 70

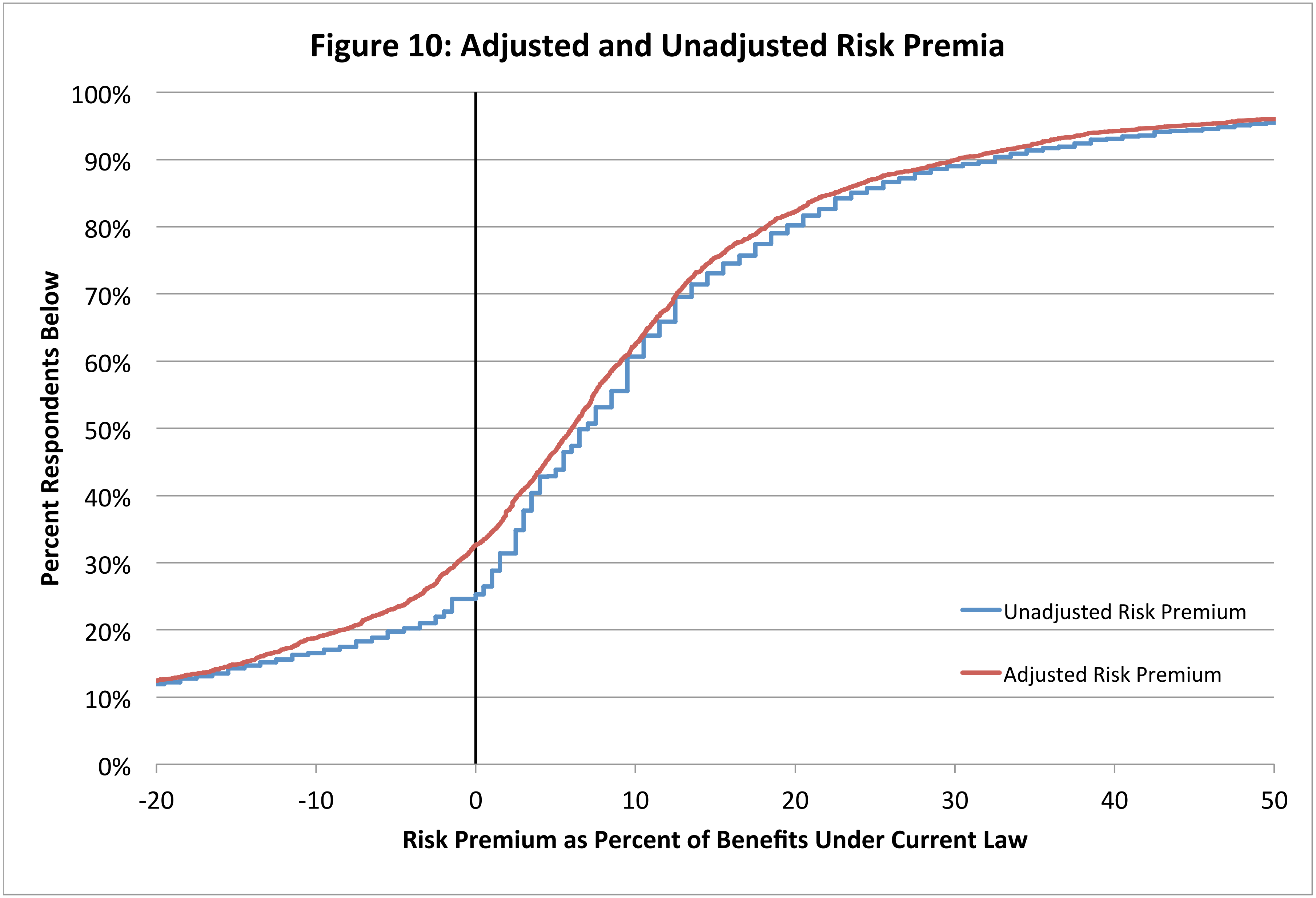


Figure 10: Adjusted and Unadjusted Risk Premia
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Respondents Below
-20
-10
0
10
20
30
40
50
Risk Premium as Percent of Benefits Under Current Law
Unadjusted Risk Premium
Adjusted Risk Premium