Do No Harm? The Welfare Consequences of Behavioral Interventions

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[DRAFT]

ABSTRACT: We evaluate the consumer welfare implications of a wide range of behavioural interventions that are typically used in the promotion of index insurance products in developing countries. These interventions are aimed at increasing subjects’ understanding of the insurance decision context, or specifically designed to allow us to investigate the impact of nudging. Based on laboratory experiments in the lab in the U.S. and with herders in the field in Ethiopia, where subjects make risky choices, we estimate subject’s individual risk preferences, and then randomly assign subjects to our behavioural interventions before they make insurance purchase decisions. We then estimate the expected consumer surplus gained or foregone from observed take-up decisions and compare these across the intervention arms. We also elicit subjects’ cognitive functioning and bias and confidence in their understanding of general financial questions and specific insurance purchase tasks and consider to which extent this explains heterogeneity in gains and losses in consumer surplus. We show that while our treatments typically increase take-up on average, they reduce consumer welfare, and more so for those who already score low on literacy and cognitive functioning in the first place.

JEL classification: X

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1 Introduction

The rapid expansion of access to finance, low levels of financial literacy, and increasing complexity of financial products raises serious concerns about the extent to which the demand for these products increases expected surplus, or welfare, for consumers. Many studies suggest that households under-save (Van Rooij et al., 2012; Behrman et al., 2012; Lusardi and Mitchell, 2014; Choi et al., 2014), engage in excessive and expensive borrowing (Stango and Zinman, 2009; Gathergood, 2012; Agarwal and Mazumder, 2013; Gerardi et al., 2013; Karlan et al., 2016), and under-insure (Gaurav et al., 2011; Drexler et al., 2014; Sayinzoga et al., 2015). Despite this, efforts to increase adoption of financial products seem to be more abundant than those that encourage the improvement of the quality of financial decisions (Banerjee et al., 2013; Cole et al., 2013; Bursztyn et al., 2014; Cole et al., 2014; Norton et al., 2014; Takahashi et al., 2016; Casaburi and Willis, 2018). Welfare evaluations of interventions that promote financial products, rather than focusing on demand for the product or survey measures of wellbeing, ultimately require an understanding of consumers’ preferences and subjective beliefs: they are latent, and cannot be directly observed from surveys or behavior. Since consumer preferences, such as attitudes to risk and time are heterogeneous, and there exist optimal financial decisions that maximize welfare in terms of these preferences, interventions that promote financial products should do justice to this heterogeneity and be evaluated in terms of effects on consumer welfare.

We evaluate the consumer welfare implications of a wide range of behavioural interventions that are typically used in the promotion of insurance products. These interventions are aimed at increasing subjects’ understanding of the insurance decision context, or specifically designed to allow us to investigate the impact of nudging. Based on laboratory experiments where subjects make risky choices, we estimate subject’s individual risk preferences, and then randomly assign subjects to our behavioural interventions before they make insurance purchase decisions in which loss contingencies are objective. We then estimate the expected consumer surplus gained or foregone from observed take-up decisions and compare these across the intervention arms. We also elicit subjects’ cognitive functioning and bias and confidence in their understanding of general financial questions and specific insurance purchase tasks and consider to which extent this explains heterogeneity in gains and losses in consumer surplus.
We conduct our experiments with 308 student subjects at the Experimental Center (ExCEN) at Georgia State University and 61 low-income herders from remote pastoral regions in Ethiopia at the International Food Policy Research Institute (IFPRI) campus in Addis Abeba, Ethiopia. Building on the design of (Harrison et al., 2019), subjects participate in an experiment where they make 54 choices to purchase index insurance or not, where one choice will be chosen for payment. The idea of an index contract is that the insured gets coverage for an idiosyncratic personal risk of loss that they face that is positively correlated with an observable and verifiable index.¹ Payment of a claim depends solely on outcomes with respect to the index, not on personal losses. Index insurance can overcome asymmetric information problems and prevent costly state verification by claims adjusters, but the disadvantage is that the index is imperfectly correlated with personal losses. This leads to both downside basis risk, where the insured experiences a personal loss but the index is not triggered, and upside basis risk, where the insured does not experience a personal loss but the index is triggered and a claim paid. One classical motive for purchasing indemnity insurance is to reduce variability of risky outcomes, making it welfare enhancing for any risk averse subject with Expected Utility Theory (EUT) or Rank Dependent Utility Theory (RDU) preferences. Index insurance could rationally reduce demand for insurance by comparison, and even make the index contract unattractive for individuals with a range of characterisations of risk preferences.

The conditional nature of the expected consumer welfare of index insurance makes the decision to purchase or not purchase the insurance an especially interesting financial decision to study given our objectives. For each individual, after characterisation of their risk preferences (EUT, RDU, Cumulative Prospect Theory (CPT)), we calculate their expected consumer welfare, and have substantial variation in consumer welfare gained or lost after observing their actual purchase decisions. While financial decisions with respect to credit, savings, or pensions would have also been suitable to create sufficient variation in consumer welfare losses and gains, they would have involved payments over time and

¹Index insurance is best known in the form of ‘area-yield’ index insurance, which defines the loss to the insured by the average yield in some geographic area. Area-yield insurance was first written in Sweden in 1961, in Quebec in 1977, in the United States on a small scale in 1993, and then significantly in 1994 (Skees et al., 1997). Halcrow (1949) originally proposed the idea, which was resurrected and developed by Miranda (1991) and Mahul (1999). Recently, various forms of index insurance that use area-yield, rainfall, and more complex weather indices are being implemented in developing countries.
measurement of beliefs about future outcomes that would have been more difficult to measure in the lab. Since this is our first attempt at developing the methods to evaluate the consumer welfare of a wide range of behavioural interventions, the control over the decision context in the lab was deemed optimal.

Before subjects make their 54 insurance choices, they are randomly assigned to one of our control or treatment interventions. In our control intervention subjects receive basic information about the insurance. In our treatment interventions subjects:

- receive elaborate instructions;
- participate in two hypothetical insurance decisions where the personal and index event are realised, and hypothetical payoffs for each decision are revealed;
- participate in an experiment that tests their understanding of the insurance experiment.
- receive instructions that simulate a sales pitch by an insurance broker;
- receive information about the choices that their peers made for each of the 54 insurance decisions;
- have the option of choosing one of the treatments, or avoiding them altogether.

Before subjects are randomly assigned to the treatment or control conditions, they participate in a risk elicitation task that allows us to characterise them as behaving according to EUT, RDU, CPT. This characterisation allows us to predict the consumer welfare from the optimal choice for each of the 54 insurance decisions, compare the subjects’ actual decision to the optimal decision, and calculate their welfare gain or loss.

To better understand the manner in which subjects’ understanding of the decision task effects their insurance decisions as well as consumer welfare, subjects engage in several additional tasks. First, they participate in a cognitive functioning task based on Set I of the Raven Advanced Progressive Matrices (RAPM), a popular test of fluid intelligence (Raven et al., 1998). Second, they participate in a task that assesses subjects’ bias and confidence in their own answers to a set of standard financial literacy questions (Lusardi and Mitchell,
as well as a set of ten insurance choices randomly selected from the insurance experiment.

We find that, in the baseline, after receiving only basic information about the insurance decisions, subjects make decisions that only realize, on average, 50% of the potential welfare improvement that can be achieved. Roughly half the subjects could double the welfare gain from making decisions about insurance that are more in line with their risk preferences. We also find that none of the interventions creates substantial improvements in welfare, while the majority increases take-up. Three of the four informational interventions lead to lower welfare on average, while the peers intervention does not reduce welfare on average. The nudging intervention has the strongest impact on take-up, while exhibiting significant reductions in welfare.

Our research naturally connects to a literature that addresses the assessment of the quality of decision making in general (Andreoni and Miller, 2002; Choi et al., 2014) and financial decision making specifically (Ambuehl et al., 2014; Harrison and Ng, 2016; Ambuehl et al., 2017, 2018; Harrison and Ross, 2018; Benkert and Netzer, 2018). Unlike existing measures of the quality of financial decision making that rely on naive revealed preference, our measure is rooted in the principles of behavioural welfare analysis. Behavioural welfare economics demands that we focus on interventions that are likely to improve expected consumer welfare, while respecting the evidence that individuals are heterogenous in terms of the theories of decision making that best classify their behaviour. The approach also requires a refinement of the notion of revealed preference, such that it is possible to classify people’s choices as welfare reducing, either because of their misunderstanding of the choice context (Ambuehl et al., 2014, 2017), or because of imperfect sophistication about their own preferences. In effect, we must have a general metric for the normative evaluation of choices other than those choices themselves. Many evaluations of interventions, however, focus on observable outcomes, such as take up in the case of insurance (Cole et al., 2013; Banerjee et al., 2014; Casaburi and Willis, 2018), despite recognition (e.g. Clarke (2016)) that these products may be of low quality or not rational to purchase for subjects whose decision making behaviour can be characterised by a plausible set of risk preferences. The ethical point is that we should not be taking products into the field if we ex ante haven’t considered if, in expectation, they will “do no harm”. We use a general method to assess the expected welfare of a product for an individual by first eliciting
that individuals choices in a separate risky setting, then estimating their individual utility
function, and then measuring consumer welfare for each option in a financial decision.
Welfare losses and gains can then be derived from a comparison of actual choices to optimal
choices (see also Harrison and Ng (2016)).

Our work also contributes to a literature that evaluates the impact of behavioural
interventions on financial decision making (Ashraf et al., 2006; Bertrand et al., 2010; Berg
and Zia, 2017). Unfortunately, this literature does not evaluate whether the effects of these
interventions enhance consumer welfare, and the motivation for these interventions are
often paternalistic views of the importance of specific financial behaviour, such as high
saving or conservative risk taking. If we tinker with people’s choice architecture, the
potential for harm is inherent in the belief in the empirical validity of the behavioral bias
that is used to design the choice architecture nudge in the first place: that people tend to go
where they are nudged, and not think more about it. This can be helpful when such
behavioural interventions are clearly directed at unambiguously welfare reducing behaviour,
such as violence (Green et al., 2019), but can be misused through peer pressure, authority, or
perceived expert advise when they induce people to make decisions counter to their set of
preferences and beliefs. We evaluate both take-up and consumer welfare of a range of
interventions aimed at impacting financial decision making, of which some are targeted at
increasing the understanding of the decision context, while others are specifically designed
to nudge people towards taking up the product. Because it relies on welfare criteria that are
derived from an individual’s own choices, our approach avoids paternalistic judgments
about what people should do and allows us to understand to what extent different
interventions impact both take up and welfare.

2 Conceptual framework

To explain how we calculate consumer welfare of our insurance decisions, we first
need to consider a typical index insurance product that pays claim payments based on a
predetermined and objective index that is imperfectly correlated with losses. For instance,
assume that an individual has an initial endowment of $60, and will lose $35 if she
experiences a loss event. The individual is given an opportunity to purchase index
insurance, which would only pay a claim payment of $35 if the index is triggered. Assume an insurance contract that, when the index is triggered, covers the full loss, and that costs $9, which happens to be the actuarially fair premium if the correlation between the individual’s personal losses and the index is 0.6. The possible monetary outcomes and their corresponding probabilities for this decision are summarized in Figure A.1 in Appendix A. Basis risk is represented here by the probability of the individual’s outcome matching the index, m. Given this matching probability, the correlation is \( \rho = 1 - [2(1 - m)] \), so matching probabilities of 1, 0.9, 0.8, 0.7, 0.6 and 0.5 imply correlations of 1, 0.8, 0.6, 0.4, 0.2 and 0.

Notation necessarily becomes more complex with index insurance. There are 8 possible states, depending on the permutations of binary outcomes if the individual chooses to purchase insurance \( \{I_1, I_0\} \), if the index reflects a loss \( \{L_1, L_0\} \), and if the individual’s outcome matches the outcome of the index \( \{P_1, P_0\} \). For instance, if the individual chooses not to purchase insurance \( (I_0) \), the index reflects a loss outcome \( (L_1) \), and the individual’s outcome matches the index \( (P_1) \), the individual would also experience a loss \( (I_0L_1P_1) \) and be left with $25. If the individual’s outcome does not match the index \( (P_0) \), she does not experience a loss \( (I_0L_1P_0) \) and would keep her $60. By the same logic, \( I_0L_0P_1 = $60 \) and \( I_0L_0P_0 = $25 \).

If the individual chooses to purchase insurance \( (I_1) \) the outcomes are slightly more complex. If the index reflects a loss \( (L_1) \), and if the individual’s outcome matches the outcomes of the index \( (P_1) \), the individual experiences a loss and receives a payout \( (I_1L_1P_1) \), hence she will keep her initial endowment less the premium \( ($60 - $9 = $51) \). However, if the individual’s outcome does not match the index, and the index shows a loss \( (I_1L_1P_0) \), the individual does not experience a loss but still receives a payout of $35 on top of her initial endowment less premium \( ($60 - $9 + $35 = $86) \). This is the upside basis risk. Conversely if the individual’s outcome does not match the index when the index does not show a loss \( (I_1L_0P_0) \), then the individual experiences a loss but receives no payout from insurance \( ($60 - $9 - $35 = $16) \). This is the downside basis risk.

To calculate welfare for an individual that behaves consistently with EUT, the expected utility (EU) for both the choice to purchase and not purchase insurance needs to be calculated. Let \( W \) denote wealth, \( L \) denote the loss amount, \( \pi \) denote the insurance
premium, \( p \) denote the probability of the index indicating a loss, \( \rho \) denote the correlation between the index and the outcome to the individual, and \( U(\cdot) \) denote the utility function of the individual. The expected utility (EU) of the choice to not purchase insurance is

\[
EU_0 = ppU(W - L) + p(1 - \rho)U(W) + \rho(1 - p)U(W) + (1 - p)(1 - \rho)U(W - L) \tag{1}
\]

The EU of the choice to purchase insurance is:

\[
EU_1 = ppU(W - \pi) + p(1 - \rho)U(W - \pi + L) + \rho(1 - p)U(W - \pi) + (1 - p)(1 - \rho)U(W - \pi - L) \tag{2}
\]

We define the Certainty Equivalent (CE) as the wealth level that is equivalent to a lottery, so the CE of not purchasing insurance \( CE_0 \) is defined by \( U(CE_0) = EU_0 \), and the CE of purchasing insurance \( CE_1 \) is defined by \( U(CE_1) = EU_1 \). The expected welfare gain is measured by the consumer surplus (CS) from the option of purchasing insurance. This is the difference between the CE of purchasing insurance and the CE of not purchasing insurance: \( CS = CE_1 - CE_0 \).

If we assume RDU as the decision-making model, the determination of CS is similar once we calculate the corresponding CE values. The only complication is keeping track of how probabilities are transformed into decision weights: Appendix B explains this transformation in detail. The same logic for evaluating the welfare gain extends readily to other variants on EUT, such as Dual Theory due to Yaari (1987), Disappointment Aversion due to Gul et al. (1991), and CPT due to Tversky and Kahneman (1992).

The nature of the insurance decisions in the experiments requires us to account for the welfare consequences of the correlation between the personal loss and the index. To provide concrete illustrations, assume utility follows the constant relative risk aversion (CRRA) so that \( U(x) = x(1 - r)/(1 - r) \), where \( x \) is the monetary outcome and \( r \neq 1 \) is a parameter to be estimated. Thus \( r \) is the coefficient of CRRA under EUT. \( r = 0 \) corresponds to risk neutrality, \( r < 0 \) to risk loving, and \( r > 0 \) to risk aversion. Values between 0.3 and 0.7 are typical for our subjects. Figure A.2 in Appendix A shows how the CS varies for this index insurance product across the risk parameter \( r \), assuming the individual has EUT preferences. We assume an endowment of $60, a loss amount of $35, and a loss probability of 0.2. When there is 100% correlation and \( \rho = 1 \), so the outcome of
the individual always matches the outcome of the index, the CS is larger if the individual is more risk averse. This follows from the fact that more risk averse individuals are willing to pay more for insurance. This is a special case of the index insurance contract, where there is no basis risk and where the compound lottery collapses into a simple indemnity contract.

As correlation decreases, so the probability of the outcome of the individual matching the index outcome decreases, the downside basis risk causes the CS to decrease. Figure A.3 in Appendix A shows how the CS varies for an index insurance product by correlation between the personal loss and the index. As correlation decreases for this index insurance product, CS decreases to the point of becoming negative. This shows that the level of EUT risk preferences of the individual and the correlation can affect whether the individual’s decision to purchase insurance would result in an expected welfare gain or loss, as stressed by Clarke (2016). Section B.2 in Appendix B presents the transformation for the cases where we assume different decision-making models, and for subjects who violate the Reduction Of Compound Lotteries (ROCL) axiom.

The breakdown by treatment of actual choices compared to predicted choices provides an initial insight into potential welfare losses. But it does not weight these correct choices and incorrect choices: it is possible that all of the mistakes are de minimus in the sense that they entail minuscule losses in consumer surplus, and that the correct choices garner substantial consumer surplus, or vice versa. To address this issue we have to calculate and compare the size of the expected consumer surplus from all choices. In effect we compare the distribution of expected CS calculated from each insurance choice made in the control treatment to the expected CS calculated from each insurance choice made in the treatment with non-performance risk. The average CS in the control is indeed statistically significantly greater than the average CS in the treatment with non-performance risk, with a t test showing a p value $\leq 0.01$. It is important to stress that the mere existence of non-performance risk means that there is less consumer surplus possible from correct choices compared to the environment with no such risk.

A more informative metric in this case is efficiency, defined as the sum of the actual CS each subject earns from all their insurance choices as a ratio of the total CS they could have earned if they had made every choice consistently with their risk preferences. The efficiency metric was developed by Plott and Smith (1978), and is defined at the level of the individual subject, whereas the expected CS is defined at the level of each choice by each subject.
Efficiency provides a natural normalization of expected CS by comparing to the maximal expected CS for that choice and subject. Both metrics are of interest, and are complementary. Figure 13 displays the efficiency comparisons, with the same conclusion as with the CS comparisons: the control leads to significantly greater efficiency over the treatment with nonperformance risk.

3 Experiments

We conduct our experiments with 308 student subjects at the Experimental Economics Center (ExCEN) at Georgia State University and 61 low-income herders from remote pastoral regions in Ethiopia at the International Food Policy Research Institute (IFPRI) campus in Addis Abeba, Ethiopia. Our main financial decision task is an experiment where subjects make 54 choices in which they receive an endowment that is at risk of a loss from a personal risk event. In all 54 choices subjects can choose to purchase an index insurance or not, and at the end of the experiment one choice will be randomly selected for payment. In each choice a random personal event determines losses, and a correlated random index event determines insurance claim payments, if the subject chooses to purchase insurance. Appendix C.1.1 provides the instructions to the experiment. We consider an endowment of $60 for all choices. Appendix C displays the choice settings provided to each subject. Loss amounts are either $39 or $30. Loss probabilities are either 0.1 or 0.2. Premium loadings on actuarially-fair premia are -50%, 0% or +8%. Finally, the correlation of the index event and the idiosyncratic loss event is 100%, 80%, 60%, 40%, 20% or 0%.

Before the subjects make these 54 insurance choices they are randomly assigned to one of our control or treatment interventions. In our control intervention (Baseline) subjects receive basic instructions about the insurance. On the computer screens, the probability of the index experiencing a loss, and the probability of the personal outcome matching that of the index, are presented separately to the subjects. The monetary outcomes are also presented based on the outcomes of the index event and personal event matching as separate events. The figure in Appendix C.1.1 displays a typical screenshot from this treatment, using an example from the instructions.
In our first treatment (Full) subjects receive the exact same instructions as in the control intervention, but a section is added where we work through some examples of choices, realisations of losses, and payments. The displays are exactly the same as the displays in the Baseline treatment (see Appendix C.1.2). Assuming that subjects are sophisticated the proposition we are testing is that providing subjects with more details about the product increases their understanding and thereby allows them to make choices that are closer to their preferences. This intervention was designed after insurance interventions in Cole et al. (2013, 2014) and Takahashi et al. (2016).

In our second treatment (AE) the display on each computer screen for each of the 54 decisions is literally identical to the display for the Full treatment, with the addition of “pie displays” (see the second figure in Appendix C.1.3) showing the actuarially equivalent lotteries implied. The instructions are the same as for the Baseline treatment but there is extra information introducing and explaining the display. The logic of the contract and underlying risk is still explained in the same manner in the instructions for the Baseline and AE treatments. The proposition in the AE treatment is that by applying ROCL for the subject, violations of ROCL in the insurance decision will be avoided, leading the subject to make a more accurate comparison by the subject of the choice to purchase or not purchase insurance (Harrison et al., 2019).

In our third treatment (Practice), before subjects start with the 54 insurance choices they receive the same instructions and displays as in the Baseline treatment, but they get to play two hypothetical practice rounds where they make decisions to purchase insurance or not, and the personal loss event and index event are realised. It is then announced to them what their earnings would have been if these rounds would have not been hypothetical. This treatment was designed after (Norton et al., 2014; Cole et al., 2014) to test if hypothetical experience of decisions and realizations increases understanding ad thereby allow subjects to make choices that are closer to their preferences.

In our fourth treatment (Understand), subjects participate in an incentivized experiment that tests their bias and confidence in their own answers to a set of ten insurance choices randomly selected from the insurance experiment, described in detail below. This treatment tests the proposition that incentivizing subjects to better understand the insurance decision context aids their understanding and allows them to make decisions that
are closer to their preferences.

In our fifth treatment (Sales Pitch) subjects receive the exact same displays and instructions as in the Baseline treatment, except for the fact that there is a preface and epilogue that explain why insurance is an important way to protect oneself against monetary losses, reduce stress, and have peace of mind (see Appendix C.1.4). On the displays for each of the 54 decisions one sentence is added namely: “Recall that insurance is important to protect you against losses and reduce your worries.”.

In our sixth treatment (Peers), subjects receive the same instructions and displays as in the Baseline treatment, except for the fact that for each of the 54 choices they receive information about the average choices that their peers made. This information is presented to them in one sentence that is added on their display which states: “We already played several of these rounds of experiments with your peers in the last few weeks, and on average X% of your peers chose to purchase insurance when presented with this question”.

In our seventh and final treatment (Self-Select) subjects received basic information about all of the six other treatments, and were asked to self-select a treatment.

Before subjects are randomly assigned to the treatment or control conditions, they participate in a risk elicitation task that allows us to characterise the subjects as behaving according to EUT, RDU, and CPT (see Appendix C.2). This characterisation allows us to predict the consumer welfare from the optimal choice for each of the 54 insurance decisions, compare the subjects’ actual decision to the optimal decision, and calculate the welfare gain or loss. Each subject was asked to make choices for 100 pairs of lotteries. The battery is based on designs from Loomes and Sugden (1998) to test the Independence Axiom, designs from Harrison and Swarthout (2016) to evaluate CPT models of risk preferences, designs from Harrison et al. (2015) to test the ROCL axiom, and a series of lotteries that are actuarially-equivalent versions of some of our index insurance choices. Appendix C explains the first two design components in detail. Each subject faced a randomized sequence of choices from this battery of 100. The analysis of risk attitudes given these choices follows Harrison and Rutström (2008). The typical interface used is shown in the first figure in Appendix C.2, for instances of two simple lotteries. For compound lotteries, we used a simple “Double or Nothing” option, illustrated in the second figure in Appendix C.2.
To better understand the manner in which subjects’ understanding of the decision task effects their insurance decisions as well as consumer welfare, subjects engage in several additional tasks.

First, they participate in a cognitive functioning task based on Set I of the RAPM, a popular test of fluid intelligence (Raven et al., 1998).

Second, subjects participate in a Cognitive Reflection Test (CRT), which measures a person’s unincentivised tendency to override an incorrect “gut” response and engage in further reflection to find a correct answer (Frederick, 2005). A typical example of a CRT question is: “A bat and a ball cost $1.10. The bat costs $1.00 more than the ball. How much does the ball cost?” The intuitive answer or “gut” response that people typically give to this question is 10 cents, while the correct answer is five cents.

Third, they participate in two tasks that assess subjective beliefs about their own answers to a set of standard financial literacy questions (Financial Literacy Beliefs) (Lusardi and Mitchell, 2007, 2008, 2014) and a set of ten insurance decisions randomly selected from the 54 insurance choices (Index Insurance Beliefs). An example of a Financial Literacy Belief question is: “Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?” An example of an Index Insurance Belief question is: “What is your outcome if you decided not to purchase insurance, experienced a bad personal event, and the index outcome differs?” We elicit these beliefs following the method by Di Girolamo et al. (2015) and Harrison et al. (2017), who make use of the Quadratic Scoring Rule for payment: for each question subjects’ responses are elicited over a continuous range of possible answers presented in terms of ten intervals or ‘bins’ where one bin represents the correct answer. A computer interface is used to present the belief elicitation tasks to subjects and record their choices, allowing them to allocate tokens in accordance with their subjective beliefs. For each set of questions (financial literacy questions or insurance decision questions) one question is selected for payment (see Appendix C.3 and Appendix C.4). From the belief elicitation task we produce two measures: the Literacy Index, representing the accuracy of the subject’s belief, and the Efficiency Index, representing the confidence of the subject’s belief. It is hypothesised that, in the Baseline treatment, those subjects with higher scores on the RAPM, the CRT, and both indices for the Financial Literacy Beliefs questions, and
both indices for the **Index Insurance Beliefs** questions will have lower welfare losses than those with lower scores on these measures.

Finally, and only for those subjects participating in the **Peers** treatment, we also elicit their beliefs about their performance in the insurance task relative to their peers’ performance in the insurance task (**Peer Beliefs**) by asking “*In the past several weeks we organized multiple sessions where your peers participated in the same insurance task. The minimum earnings in this task are $0 and the maximum earnings are $97. We would now like to ask you how you think you performed relative to your peers. How much more or less do you expect to earn in the insurance task, in comparison to the average of the earnings of your peers?*” No specific hypotheses are developed for the predicted welfare gains and losses based on the **Peer Beliefs** task, because these **Peer Beliefs** will depend on the subjects’ accuracy and confidence in their own understanding of the tasks, as well as their beliefs about the performance of their peers.

The objective of the treatments is to investigate the extent to which they impact the demand for the insurance products and consumer welfare for individual subjects. The treatments II, AE, **Practice**, and **Understand** are all informational treatments. The objective of these treatments is to vary the nature of the information provided to the subjects, either through more elaborate instructions, through additional information on each of the 54 displays, or through focused practice before starting with the 54 decisions. It is hypothesized that these information treatments will create a better understanding among the subjects about the decision context, and thereby better align the decisions of subjects with their preferences, and hence increase consumer welfare. It is therefore hypothesized that these treatments will increase welfare for all subjects, but that they will be especially effective in terms of decreasing welfare losses or increasing welfare gains for those who score low on the RAPM, and the Literacy and Efficiency Index of the **Financial Literacy Beliefs** and **Index Insurance Beliefs**.

The **Sales Pitch** instructions are specifically designed to nudge people towards purchasing insurance by addressing their worries about risks. The treatment is designed from examples of marketing tools from insurance companies and insurance brokers. It is hypothesized that this treatment will increase the take up of insurance, but not necessarily increase consumer welfare. It is also hypothesized that those subjects with lower scores on
The RAPM, and the Literacy and Efficiency Index of the Financial Literacy Beliefs and Index Insurance Beliefs are more susceptible to this treatment, increasing demand for insurance without regard to risk preferences, and hence reducing welfare.

The Peers treatment is designed to mimic the fact that many individuals, when they make purchasing decisions, will ask family and friends for advice. It is hypothesised that treatment effects in the Peers treatment will be heterogenous, based on people’s beliefs about their own understanding of the insurance decision task (as elicited in the Index Insurance Beliefs task), as well as their beliefs about their own performance relative to their peers’ performance (as elicited in the Peer Beliefs task). More specifically, it is hypothesised that subjects with lower confidence in their answers to the Index Insurance Beliefs task will have a larger treatment effect, weather it be positive or negative, in the Peers treatment compared to the Baseline treatment. Similarly, it is hypothesised that subjects who believe that they performed worse than their peers did on average will also have a larger treatment effect in the Peers treatment compared to the Baseline treatment.

Finally, the objective of the Self-Select treatment is to investigate to what extent subjects are sophisticated about their decision-making biases, and are capable of selecting a treatment that has high potential to increase their consumer welfare. It is hypothesised that consumer welfare increases most compared to the Baseline treatment when subjects are self-selecting their treatment.

4 Descriptives [DRAFT ONLY]

Table 1 shows the means of key characteristics of the subjects in our sample by treatment status. The statistic in brackets gives the t-statistic for a regression of the specific treatment compared to the baseline on each covariate. Overall, our treatments appear balanced. Despite this and the random treatment assignment, with finite samples there is some variation in sample composition. A more careful analysis of covariate balance is presented in Figure 1. The left panel presents the propensity score of the raw data and the right panel the propensity score of the data after inverse-probability weighting on observable covariates.
Table 1: Covariate Means and Balance

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<th>Baseline</th>
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<th>Sales Pitch</th>
<th>AE</th>
<th>Understand</th>
<th>Peers</th>
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Note: Significance levels $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$. The first column presents the means in the baseline sample, while the second through to the seventh column present the means in the treatment samples. Column (2)-Column (7), below the mean, in brackets also present the t-statistic for regressions of the specific treatment compared to the baseline on each covariate. "High GPA" is compared to "Very high GPA", "Medium GPA", "Low GPA", and "Very low GPA". "Raven score" is a score out of 12 from Set I of Raven Advanced Progressive Matrices test. "Cognitive reflection test" is a score out of 6. "Financial literacy score" is a score from 0 to 10 on hypothetical financial literacy questions.
As an example of how consumer surplus (CS) of subjects is estimated, we present the risk parameters for Subject #2 in Figure 2. The risk parameters were estimated based on her choices on lotteries in the risk task and are displayed in Panel 2a. If Subject #2 was classified as EUT, she would be moderately risk averse with a modestly concave utility function ($r = 0.58$). However, the preferred model is selected based on the hypothesis test that $\omega(p) = p$, and for Subject #2 the preferred model is RDU with the Prelec probability weighting function. Classifying Subject #2 as RDU (Prelec) means the utility function is actually less concave ($r = 0.44$).

Panel 2b and 2c show the importance of this classification for the welfare calculations for Subject #2. Each chart shows the CS calculated for each insurance choice made. Light blue bars indicate that the subject had chosen to purchase insurance and red bars indicate that the subject had chosen not to purchase insurance. Panel 2b shows the CS distribution if
we had assumed Subject #2 had EUT risk preferences, and Panel 2c shows the CS distribution assuming Subject #2 had RDU risk preferences with the Prelec probability weighting function. Different models of risk preference type can lead to different insurance decisions being recommended. For choices 28 and 29 under EUT, the subject chose to purchase insurance, but that resulted in a negative CS. Under RDU, however, the same choices resulted in a positive welfare gain. There are several such examples. Using a different model of risk preference type can also impact the size of the expected welfare gain from an insurance choice, and not just the sign. Choices 3 and 4 becomes less harmful when Subject #2 is correctly classified as RDU compared to EUT.
Figure 2: Estimated Risk Parameters and Consumer Surplus for Subject #2

(a) Subject #2 is classified RDU with EUT p-value = 0.038 (< 0.05)

(b) Consumer Surplus of Choices of Subject #2 under EUT

(c) Consumer Surplus of Choices of Subject #2 under RDU (Prelec)
5 The Results [DRAFT ONLY]

Figure 3 presents the distribution of Efficiency for each of 83 subjects that participated in the Baseline condition. The range of Efficiency is between 0% and 100%, reflecting the percentage of Expected Consumer Surplus the subject extracted from their observed choices divided by the maximum Expected Consumer Surplus they could have extracted if they had made the right choices given their risk preferences. The fact that we do not have a significant spike at, or close to, 100% tells us that there is room for welfare improvement in the decisions that subjects make. The average is 50%, and the median is 52%, so roughly half the subjects could double the welfare gain from making decisions about index insurance that are more in line with their risk preferences.

Figure 3: Baseline Distribution of Efficiency of Choice

Note: N=83, one efficiency measure per individual
This distribution sets the stage for examining the effect of the treatment arms. Figure 4 below shows the change in the distribution of Efficiency compared to the distribution in the Baseline condition shown above. Hence these changes range between -100% and +100%, with 0% being no change compared to Baseline. There are three insights from these distributions. First, none of them exhibit the negative skew that would point to a treatment that significantly moves Efficiency to 100%. Second, all of them include significant fractions of subjects that do worse with the treatment compared to the Baseline, as shown by the fraction of each distribution to the left of 0%. Third, most appear to exhibit a tendency to lower welfare on average in comparison to Baseline (Full Information, Sales Pitch, Understand, Practice, and Peer Choices), and only one appears to exhibit a tendency to raise welfare on average in comparison to Benchmark (AE). This result confirms the finding from (Harrison et al., 2019). Additional observation are that the Understand treatment had the bulk of its impact, to reduce welfare, in the top tail of the Efficiency distribution. In other words, those that were more relatively Efficient to begin with suffered the most from this intervention. Second, the impact of the AE treatment is clearest for the lower tail of the Efficiency distribution, and had virtually no impact on the highest end of the Efficiency distribution (certainly when one accounts for the much wider 95% confidence interval at the highest end).
Figure 4: Distribution of Change in Efficiency in Treatment Arms

Figure 5 presents the average treatment effects (ATE) on Efficiency and Take-up. Panel 5a replicates the results presented above, but Panel 5b shows that, even though the 95% confidence intervals are wide, the general pattern is that while the treatments typically reduce welfare, they appear to increase the probability of take-up by approximately 5 percentage points.
Figure 5: Average Treatment Effects on Efficiency and Take-up

(a) Average Treatment Effects on Percent Efficiency

(b) Average Treatment Effects on Probability of Take-up

Note: Panel 5a shows the Efficiency comparison of baseline and treatments and presents the Average Treatment Effect. Efficiency is measured between -100% and +100%. Panel 5b shows the comparison of baseline and treatments and presents the Average Treatment Effect on the probability of take-up.
At the time of submission we are adding additional sessions in the ExCEN lab and in the field in Ethiopia to increase the number of participants per treatment and to run the Self-select treatment. Those additional sessions will be completed before the end of December with detailed analysis updated as new data comes in.
References


A Appendix A

Figure A.1: Decision Tree for Index Insurance Product

Note:
Figure A.2: Consumer Surplus Across EUT CRRA Coefficients

Note:
Figure A.3: Valuation of Index Insurance Contracts under EUT, with Varying Risk of Contract Failure

![Graph showing the valuation of index insurance contracts under EUT with varying risk of contract failure. The graph plots the certainty equivalent against the probability of contract failure for different insurance scenarios.]

Note:

B Appendix B

B.1 Welfare calculation with RDU decision-making model

B.2 Welfare calculations accounting for correlation between index and personal loss

Figure 3 shows how CS varies as correlation decreases assuming an RDU decision-making model with a Power probability weighting function $\omega(p) = p^\gamma$. In this case $\gamma \neq 1$ is
consistent with a deviation from the conventional EUT representation. The probability weighting parameter $\gamma$ spans our expected range of 0.7 to 1.3, and the CRRA coefficient $r$ is held constant at 0.6. Convexity of the probability weighting function, with $\gamma > 1$, is said to reflect “pessimism” and generates, if one assumes for simplicity a linear utility function, a risk premium. The converse is true for $\gamma < 1$, and is said to reflect “optimism.” When there is perfect correlation ($\rho = 1$) the insurance purchase lottery collapses to a two-outcome lottery, each with the same monetary outcome, since there is zero chance of basis risk. In this case the presence of optimism causes the CS of purchasing insurance to be lower, since the probability of no loss occurring is over-weighted, and this makes the insurance non-purchase lottery more attractive. As the correlation decreases, this optimism increases the impact of underweighting of the downside basis risk and overweighting of the upside basis risk when purchasing insurance, which causes the expected welfare gain of purchasing insurance to increase as correlation decreases for optimistic individuals. The converse is true for pessimistic individuals with $\gamma > 1$. The effect of probability weighting is subtle, particularly for correlations less than 1, because then the index insurance contract generates three distinct monetary outcomes (from four states of nature), and rank-ordering plays a critical role in evaluation of the purchase lottery.

As a matter of theoretical and policy analysis it is important to understand the distinct possibility that higher correlation between the index and the individual loss can decrease welfare. It should be important for those interested in providing index insurance if there are potential buyers that perceive index insurance products as some sort of lottery because they focus heavily on the upside risk of the product. This would be the case of individuals with optimistic probability weighting.

When probability weighting makes decision-makers globally optimistic or pessimistic for all probabilities, as is the case with the Power probability weighting function, the effects are relatively straightforward. Particularly interesting complications arise, however, when probability weighting allows for locally optimistic and locally pessimistic behavior towards different probabilities. Figure 4 shows how the CS is affected if we vary the parameter of an Inverse-S probability weighting function $\omega(p) = p^\gamma/(p^\gamma + (1 - p)^\gamma)^{1/\gamma}$ for an RDU decision making model while decreasing the correlation $\rho$. This function exhibits inverse-S probability weighting (optimism for small $p$, and pessimism for large $p$) for $\gamma < 14$, and S-shaped probability weighting (pessimism for small $p$, and optimism for
large $p$) for $\gamma > 1$. Once again the probability weighting parameter $\gamma$ spans our expected typical range of 0.7 to 1.3, and the CRRA coefficient $r$ is held constant at 0.6. A smaller $\gamma < 1$ reflects an overweighting of the probabilities of extreme outcomes, while a larger $\gamma > 1$ reflects an underweighting of the probabilities of extreme outcomes.

Figure 5 shows the effect of $\gamma = 1.4 > 1$ on decision weights in the case that concerns us. When no insurance is purchased there are just two outcomes. When correlation is anything less than 100%, the Index Insurance contract with full indemnity has three rank-ordered monetary outcomes: the “carrot” of no loss but a payout from the index, initial wealth minus the premium when the index matches the loss outcome (whether it is good or bad), and the “stick” of a loss but no payout from the index. In the right panel of Figure 5 we assume equi-probable 2-outcome lotteries or 3-outcome lotteries, to show the pure effect of probability weighting. From Figure 5 we see that the effect of S-shaped probability weighting, ceteris paribus the effect from $U'' < 0$, is to make the decision maker risk averse with respect to the implied lottery when deciding not to purchase insurance. The worst outcome, a loss, is given greater weight, and the best outcome, no loss, is given less weight.

Figure 5 tells a more nuanced story when it comes to the implied lottery when deciding to purchase index insurance. The intermediate outcome, when the index matches the loss outcome, is given greater weight because of probability weighting. The worst outcome is given slightly smaller weight, in this case almost imperceptibly smaller. But the best outcome, the carrot of index insurance, is given much lower weight. This is due to the general over-weighting of extremes noted above, but highlights the asymmetric weighting of extremes in this instance.20 Hence we have what we call a “rotten carrot” effect from probability weighting: the lure of the good extreme outcome from basis risk is given less weight than it should have from the actuarial probabilities alone, and is also given less weight in a proportional sense than the curse of the bad extreme outcome from basis risk. Both effects of probability weighting serve to make the index insurance contract less attractive to somebody with these risk preferences, irrespective of the effects from $U'' < 0$.

It is quite possible, even with low aversion to extremes from $U''$, that the effect of probability weighting is to make the index insurance contract less attractive than facing the loss uninsured. And we know from Clarke (2016) that if there is also high enough aversion to extremes from $U''$, that the index contract could already be less attractive than being
uninsured.

Using this methodology to calculate expected welfare gains implicitly assumes the Reduction Of Compound Lotteries (ROCL) axiom holds when we multiply the compound probabilities from the multiple steps to calculate EU or RDU. It would hence be inappropriate to use expected welfare calculated in this way to compare the effects of violating the ROCL axiom, which one might expect to be a potentially significant behavioral factor with index insurance products. We make use of two models of risk preferences that do not assume ROCL, while still maintaining the Independence Axiom (IA). We explain this variant in detail later.

The analysis of the importance of ROCL for the demand of index insurance is relevant to our broader objective because attitudes towards compound lotteries are one part of the possible range of attitudes towards risk that people can have (see Harrison et al. (2015)). As explained earlier, index insurance has a compound lottery nature because the individual faces one layer of risk when it comes to the individual loss and a second layer of risk because the index might not match the actual loss. If individuals care about compound risk per se, and therefore violate ROCL, attitudes towards this type of risk are relevant to understanding the demand for index insurance. If the target population for the index insurance product displays aversion towards compound risk, investments in technology to increase the correlation between the index and the actual loss should improve welfare of individuals, because in the limit this would make the compounding disappear. Conversely, if potential customers are compound risk lovers, then improvements in correlation would actually decrease welfare of individuals, because the compounding would disappear in the limit when the index insurance product becomes a regular indemnity product. This is yet another theoretically distinct possibility that highlights the importance of knowing the level and type of risk aversion that potential buyers of index insurance have.
C Appendix C

C.1 Instructions to the interventions and insurance decisions

C.1.1 Baseline treatment

Choices Over Insurance Prospects

In this task you will make choices about whether to insure against possible monetary loss. In each choice you will start out with an initial amount of money and, in the event of a loss, the loss amount will be taken from this initial stake. In each choice you will have the option to buy insurance to protect you against the possible loss, although you are not required to buy the insurance.

You will make 54 choices in this task. You will actually get the chance to play one of the choices you make, and you will be paid in cash according to the outcome of that choice. So you should think carefully about how much each insurance choice is worth to you.

Each choice has two random events: a Personal Event and an Index Event. Each event has two possible outcomes: Good or Bad. If the Personal Event outcome is Bad, then you will suffer a loss. Before you know the outcome of the Personal Event, you must decide whether to purchase insurance against this possible loss. However, the insurance only pays a claim if the Index Event outcome is Bad.

If you do not purchase insurance, then only the outcome of the Personal Event will decide your earnings:

If you do purchase insurance, it is important for you to understand that an insurance claim is not paid according to whether you actually suffer a loss. Instead, an insurance claim is paid only according to the Index Event. Both events will decide your earnings:

So there are four possible outcomes if you purchase insurance. You might suffer a loss and receive an insurance claim payment. Or you might suffer a loss but not receive an insurance claim payment. You might not suffer a loss and also receive no insurance claim payment. Finally, you might receive an insurance claim payment even when you do not suffer a loss.
Each event is determined by randomly drawing a colored chip from a bag. In general, each draw will involve two colors, and each decision you make will involve different amounts and mixtures of two colors. When making each decision, you will know the exact amounts and mixtures of colored chips associated with the decision. After you have decided whether or not to purchase insurance, the two events will be determined as follows.

First, the Personal Event will be determined with blue and red chips.

- If you draw a blue chip, then the Personal Event outcome is Good and you do not suffer a loss.
- If you draw a red chip, then the Personal Event outcome is Bad and you suffer a loss.

Next, if you purchased insurance, the Index Event will be determined with green and black chips.

- If you draw a green chip, then the Index Event outcome Matches the Personal Event outcome
- If you draw a black chip, then the Index event outcome Differs from the Personal Event outcome

Here is an example of what your decision would look like on the computer screen. The display on your screen will be bigger and easier to read.
In this example you start out with an initial stake of $75. If the outcome of the Personal Event is Bad you will lose $45, and if the outcome of the Personal Event is Good you will not lose any money. If you faced the choice in this example and chose to purchase insurance, you would pay $5.75 from your initial stake. You would pay this $5.75 before you drew any chips, so you would pay it regardless of the outcomes of your draws.

You will be drawing colored chips from bags to determine the outcomes of both events. First, you will draw a chip to determine the Personal Event outcome. The image on the left shows that there is a 10% chance that the Personal Event outcome is Bad, and a 90% chance that the Personal Event outcome is Good. This means there will be 9 blue chips and 1 red chip in a bag, and the color of the chip you randomly draw from the bag represents the outcome of the Personal Event. If a blue chip is drawn, the Personal Event outcome is Good, and if a red chip is drawn the Personal Event outcome is Bad.

Next, you will draw a chip to determine the Index Event outcome. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome and a 20% chance that the Index Event outcome Differs from the Personal Event outcome. This means there will be 8 green chips and 2 black chips in a bag. If a green chip is drawn the Index Event outcome Matches the Personal Event outcome, and if a black chip is drawn the Index
Event outcome Differs from the Personal Event outcome.

You will indicate your choice to purchase, or not purchase, the insurance by clicking on your preferred option on the computer screen.

There are 54 decisions like this one to be made, each shown on a separate screen on the computer. Each decision might have different chances for the Personal Event outcome, the Index Event outcome, the initial stake, or the cost of insurance, so pay attention to each screen. After you have worked through all of the insurance decisions, please wait in your seat and an experimenter will come to you. You will then roll two 10-sided dice to determine which insurance decision will be played out. Since there are only 54 decisions, you will keep rolling the dice until a number between 1 and 54 comes up. There is an equal chance that any of your 54 choices will be selected, so you should approach each decision as if it is the one that you will actually play out to determine your payoff. Once the decision to play out is selected, you will draw chips from the Index bag and the Personal bag to determine the outcome.

In summary:

- You will decide whether or not to purchase insurance in each of the 54 scenarios.
- One of your decisions will be randomly selected to be played for cash.
- You will suffer the specified monetary loss only if the Personal Event outcome is Bad.
- If you purchase insurance, it will pay a claim payment only if the Index Event outcome is Bad. This can happen in two ways:
  1. Your Index draw Matches a bad Personal Event outcome;
  2. Your Index draw Differs from a good Personal Event outcome.

Whether or not you prefer to buy the insurance is a matter of personal taste. You may choose to buy insurance on some or all of your 54 choices, or none of the choices. The people next to you may be presented with different choices, insurance prices, and may have different preferences, so their responses should not matter to you. Please work silently, and make your choices by thinking carefully about each prospect.
Your payoff from this task is in cash and is in addition to the show-up payment that you receive just for being here, as well as any other earnings in other tasks. If you have a question, raise your hand and someone will come over and answer it.

C.1.2 II treatment

Choices Over Insurance Prospects

In this task you will make choices about whether to insure against possible monetary loss. In each choice you will start out with an initial amount of money and, in the event of a loss, the loss amount will be taken from this initial stake. In each choice you will have the option to buy insurance to protect you against the possible loss, although you are not required to buy the insurance.

You will make 54 choices in this task. You will actually get the chance to play one of the choices you make, and you will be paid in cash according to the outcome of that choice. So you should think carefully about how much each insurance choice is worth to you.

Each choice has two random events: a Personal Event and an Index Event. Each event has two possible outcomes: Good or Bad. If the Personal Event outcome is Bad, then you will suffer a loss. Before you know the outcome of the Personal Event, you must decide whether to purchase insurance against this possible loss. However, the insurance only pays a claim if the Index Event outcome is Bad.

If you do not purchase insurance, then only the outcome of the Personal Event will decide your earnings:

If you do purchase insurance, it is important for you to understand that an insurance claim is not paid according to whether you actually suffer a loss. Instead, an insurance claim is paid only according to the Index Event. Both events will decide your earnings:

So there are four possible outcomes if you purchase insurance. You might suffer a loss and receive an insurance claim payment. Or you might suffer a loss but not receive an insurance claim payment. You might not suffer a loss and also receive no insurance claim payment. Finally, you might receive an insurance claim payment even when you do not suffer a loss.
Each event is determined by randomly drawing a colored chip from a bag. In general, each draw will involve two colors, and each decision you make will involve different amounts and mixtures of two colors. When making each decision, you will know the exact amounts and mixtures of colored chips associated with the decision. After you have decided whether or not to purchase insurance, the two events will be determined as follows.

First, the Personal Event will be determined with blue and red chips.

- If you draw a blue chip, then the Personal Event outcome is Good and you do not suffer a loss.
- If you draw a red chip, then the Personal Event outcome is Bad and you suffer a loss.

Next, if you purchased insurance, the Index Event will be determined with green and black chips.

- If you draw a green chip, then the Index Event outcome Matches the Personal Event outcome
- If you draw a black chip, then the Index Event outcome Differs from the Personal Event outcome

Here is an example of what your decision would look like on the computer screen. The display on your screen will be bigger and easier to read.
In this example you start out with an initial stake of $75. If the outcome of the Personal Event is Bad you will lose $45, and if the outcome of the Personal Event is Good you will not lose any money. If you faced the choice in this example and chose to purchase insurance, you would pay $5.75 from your initial stake. You would pay this $5.75 before you drew any chips, so you would pay it regardless of the outcomes of your draws.

You will be drawing colored chips from bags to determine the outcomes of both events. First, you will draw a chip to determine the Personal Event outcome. The image on the left shows that there is a 10% chance that the Personal Event outcome is Bad, and a 90% chance that the Personal Event outcome is Good. This means there will be 9 blue chips and 1 red chip in a bag, and the color of the chip you randomly draw from the bag represents the outcome of the Personal Event. If a blue chip is drawn, the Personal Event outcome is Good, and if a red chip is drawn the Personal Event outcome is Bad.

Next, you will draw a chip to determine the Index Event outcome. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome and a 20% chance that the Index Event outcome Differs from the Personal Event outcome. This means there will be 8 green chips and 2 black chips in a bag. If a green chip is drawn the Index Event outcome Matches the Personal Event outcome, and if a black chip is drawn the Index
Event outcome Differs from the Personal Event outcome.

The possible outcomes if you choose not to purchase insurance are therefore as follows:

- If a red chip is drawn from the Personal bag your Personal Event outcome is Bad. You will lose $45 and be left with $30.
- If a blue chip is drawn from the Personal bag your Personal Event outcome is Good. You will lose nothing and be left with $75.

You can choose to purchase insurance, which will cost you $5.75, and if you chose to purchase insurance you would pay this $5.75 regardless of the outcomes of your draws. The possible outcomes if you choose to purchase insurance are therefore as follows:

- If a red chip is drawn from the Personal bag and a green chip from the Index bag, you will lose $45 but the insurance claim payment will cover the loss. You will keep $69.25.
- If a red chip is drawn from the Personal bag and a black chip from the Index bag, you will lose $45 but you will not receive an insurance claim payment from insurance. You will keep $24.25.
- If a blue chip is drawn from the Personal bag and a green chip from the Index bag, you will not lose any money. You will keep $69.25.
- If a blue chip is drawn from the Personal bag and a black chip from the Index bag, you will not lose any money, but you receive a claim payment from insurance. You will keep $114.25.

You will indicate your choice to purchase, or not purchase, the insurance by clicking on your preferred option on the computer screen.

There are 54 decisions like this one to be made, each shown on a separate screen on the computer. Each decision might have different chances for the Personal Event outcome, the Index Event outcome, the initial stake, or the cost of insurance, so pay attention to each
screen. After you have worked through all of the insurance decisions, please wait in your seat and an experimenter will come to you. You will then roll two 10-sided dice to determine which insurance decision will be played out. Since there are only 54 decisions, you will keep rolling the dice until a number between 1 and 54 comes up. There is an equal chance that any of your 54 choices will be selected, so you should approach each decision as if it is the one that you will actually play out to determine your payoff. Once the decision to play out is selected, you will draw chips from the Index bag and the Personal bag to determine the outcome.

In summary:

- You will decide whether or not to purchase insurance in each of the 54 scenarios.
- One of your decisions will be randomly selected to be played for cash.
- You will suffer the specified monetary loss only if the Personal Event outcome is Bad.
- If you purchase insurance, it will pay a claim payment only if the Index Event outcome is Bad. This can happen in two ways:
  1. Your Index draw Matches a bad Personal Event outcome;
  2. Your Index draw Differs from a good Personal Event outcome.

Whether or not you prefer to buy the insurance is a matter of personal taste. You may choose to buy insurance on some or all of your 54 choices, or none of the choices. The people next to you may be presented with different choices, insurance prices, and may have different preferences, so their responses should not matter to you. Please work silently, and make your choices by thinking carefully about each prospect.

Your payoff from this task is in cash and is in addition to the show-up payment that you receive just for being here, as well as any other earnings in other tasks. If you have a question, raise your hand and someone will come over and answer it.

**C.1.3 AE treatment**

**Choices Over Insurance Prospects**
In this task you will make choices about whether to insure against possible monetary loss. In each choice you will start out with an initial amount of money and, in the event of a loss, the loss amount will be taken from this initial stake. In each choice you will have the option to buy insurance to protect you against the possible loss, although you are not required to buy the insurance.

You will make 54 choices in this task. You will actually get the chance to play one of the choices you make, and you will be paid in cash according to the outcome of that choice. So you should think carefully about how much each insurance choice is worth to you.

Each choice has two random events: a Personal Event and an Index Event. Each event has two possible outcomes: Good or Bad. If the Personal Event outcome is Bad, then you will suffer a loss. Before you know the outcome of the Personal Event, you must decide whether to purchase insurance against this possible loss. However, the insurance only pays a claim if the Index Event outcome is Bad.

If you do not purchase insurance, then only the outcome of the Personal Event will decide your earnings:

If you do purchase insurance, it is important for you to understand that an insurance claim is not paid according to whether you actually suffer a loss. Instead, an insurance claim is paid only according to the Index Event. Both events will decide your earnings:

So there are four possible outcomes if you purchase insurance. You might suffer a loss and receive an insurance claim payment. Or you might suffer a loss but not receive an insurance claim payment. You might not suffer a loss and also receive no insurance claim payment. Finally, you might receive a claim payment even when you do not suffer a loss.

Each event is determined by randomly drawing a colored chip from a bag. In general, each draw will involve two colors, and each decision you make will involve different amounts and mixtures of two colors. When making each decision, you will know the exact amounts and mixtures of colored chips associated with the decision. After you have decided whether or not to purchase insurance, the two events will be determined as follows.

First, the Personal Event will be determined with blue and red chips.

- If you draw a blue chip, then the Personal Event outcome is Good and you do not
suffer a loss.

- If you draw a red chip, then the Personal Event outcome is Bad and you suffer a loss.

Next, if you purchased insurance, the Index Event will be determined with green and black chips.

- If you draw a green chip, then the Index Event outcome Matches the Personal Event outcome
- If you draw a black chip, then the Index event outcome Differs from the Personal Event outcome

Here is an example of what your decision would look like on the computer screen. The display on your screen will be bigger and easier to read.

In this example you start out with an initial stake of $75. If the outcome of the Personal Event is Bad you will lose $45, and if the outcome of the Personal Event is Good you will not lose any money. If you faced the choice in this example and chose to purchase
insurance, you would pay $5.75 from your initial stake. You would pay this $5.75 before you drew any chips, so you would pay it regardless of the outcomes of your draws.

You will be drawing colored chips from bags to determine the outcomes of both events. First, you will draw a chip to determine the Personal Event outcome. The image on the left shows that there is a 10% chance that the Personal Event outcome is Bad, and a 90% chance that the Personal Event outcome is Good. This means there will be 9 blue chips and 1 red chip in a bag, and the color of the chip you randomly draw from the bag represents the outcome of the Personal Event. If a blue chip is drawn, the Personal Event outcome is Good, and if a red chip is drawn the Personal Event outcome is Bad.

Next, you will draw a chip to determine the Index Event outcome. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome and a 20% chance that the Index Event outcome Differs from the Personal Event outcome. This means there will be 8 green chips and 2 black chips in a bag. If a green chip is drawn the Index Event outcome Matches the Personal Event outcome, and if a black chip is drawn the Index Event outcome Differs from the Personal Event outcome.

You will indicate your choice to purchase, or not purchase, the insurance by clicking on your preferred option on the computer screen. There are 54 decisions like this one to be made, each shown on a separate screen on the computer. Each decision might have different chances for the Personal Event outcome, the Index Event outcome, the initial stake, or the cost of insurance, so pay attention to each screen.

The screen that you will actually see has one additional piece of information, shown in this display. In this case you should note that the initial stakes are now $60, that the loss is now $35, and that the cost of the insurance is now $14.50. This shows how these values might change from screen to screen, as mentioned earlier. The additional information is contained in the two “pie displays” on the right hand side. These additional displays are just another way to view the same information, and may or may not help you make your choice to purchase insurance or not to purchase insurance.
In this example you start out with an initial stake of $60. If the outcome of the Personal Event is Bad you will lose $35, and if the outcome of the Personal Event is Good you will not lose any money. If you faced the choice in this example and chose to purchase insurance, you would pay $14.50 from your initial stake. You would pay this $14.50 before you drew any chips, so you would pay it regardless of the outcomes of your draws.

In this example there is a 20% chance that the outcome of the Personal Event is Bad, and an 80% chance that the Personal Event outcome is Good. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome and a 20% chance that the Index Event outcome Differs from the Personal Event outcome. Based on these probabilities, the pie charts show the overall probabilities of the possible earnings and their respective amounts.

The top pie chart shows the possible earnings if you choose not to purchase insurance. Without insurance, the payouts depend only on the outcome of the Personal Event. Given that there is a 20% chance that the Personal Event outcome is Bad and an 80% chance that the Personal Event outcome is Good, the pie chart shows that there is a 20% chance you earn $25 (= $60 - $35) and an 80% chance that you earn $60.
The bottom pie chart shows the possible earnings if you choose to purchase insurance. Since the insurance claim is only paid out according to the outcome of the Index Event, outcomes from both the Index Event and the Personal Event will decide your earnings. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome. Hence there is an 80% chance you will either receive a claim payment when you suffer a loss or not receive a claim payment when you do not suffer a loss. If either of these happen your payout will be $45.50: your initial stake of $60 less the $14.50 cost of insurance. In the case in which you receive a claim payment when you suffer a loss the payout of $35 completely offsets the loss of $35.

According to the bottom pie chart the chance that the Personal Event outcome is Bad, but the Index Event outcome Differs, is 4% \( (= 20\% \times 20\%) \). This means that there is a 4% chance that the Personal Event outcome is Bad without receiving an insurance claim payment. In this case you will receive $10.50: your initial stake of $60 less the $14.50 cost of insurance less the $35 loss. The chance that the Personal Event outcome is Good, and the Index Event outcome Differs, is 16% \( (= 80\% \times 20\%) \). This means that there is a 16% chance that the Personal Event outcome is Good and you still receive an insurance claim payment. In this case you will receive $80.50: your initial stake of $60 less the $14.50 cost of insurance plus the $35 claim payment from the insurance.

There are 54 decisions like this one to be made, each shown on a separate screen on the computer. Each decision might have different chances for the Personal Event outcome, the Index Event outcome, the initial stake, or the cost of insurance, so pay attention to each screen. After you have worked through all of the insurance decisions, please wait in your seat and an experimenter will come to you. You will then roll two 10-sided dice to determine which insurance decision will be played out. Since there are only 54 decisions, you will keep rolling the dice until a number between 1 and 54 comes up. There is an equal chance that any of your 54 choices will be selected, so you should approach each decision as if it is the one that you will actually play out to determine your payout. Once the decision to play out is selected, you will draw chips from the Index bag and the Personal bag to determine the outcome.

In summary:
• You will decide whether or not to purchase insurance in each of the 54 scenarios.
• One of your decisions will be randomly selected to be played for cash.
• You will suffer the specified monetary loss only if the Personal Event outcome is Bad.
• If you purchase insurance, it will pay a claim payment only if the Index Event outcome is Bad. This can happen in two ways:
  1. Your Index draw Matches a bad Personal Event outcome;
  2. Your Index draw Differs from a good Personal Event outcome.

Whether or not you prefer to buy the insurance is a matter of personal taste. You may choose to buy insurance on some or all of your 54 choices, or none of the choices. The people next to you may be presented with different choices, insurance prices, and may have different preferences, so their responses should not matter to you. Please work silently, and make your choices by thinking carefully about each prospect.

Your payoff from this task is in cash and is in addition to the show-up payment that you receive just for being here, as well as any other earnings in other tasks. If you have a question, raise your hand and someone will come over and answer it.

C.1.4 Sales Pitch treatment

Choices Over Insurance Prospects

In this task you will make choices about whether to insure against possible monetary loss. Insurance is an important way to protect yourself against monetary losses. In each choice you will start out with an initial amount of money and, in the event of a loss, the loss amount will be taken from this initial stake. In each choice you will have the option to buy insurance to protect you against the possible loss, although you are not required to buy the insurance.

Some people believe that they can save enough money to replace their assets should anything happen to them. The problem is that, in most cases, the expenses incurred after an accident, the death of a loved one, or a disability, are beyond any savings or wealth that a
person has accumulated. For this reason, insurance has become an important component of the financial planning for most people.

You will make 54 choices in this task. You will actually get the chance to play one of the choices you make, and you will be paid in cash according to the outcome of that choice. So you should think carefully about how much each insurance choice is worth to you.

Each choice has two random events: a Personal Event and an Index Event. Each event has two possible outcomes: Good or Bad. If the Personal Event outcome is Bad, then you will suffer a loss. Before you know the outcome of the Personal Event, you must decide whether to purchase insurance against this possible loss. However, the insurance only pays a claim if the Index Event outcome is Bad.

If you do not purchase insurance, then only the outcome of the Personal Event will decide your earnings:

If you do purchase insurance, it is important for you to understand that an insurance claim is not paid according to whether you actually suffer a loss. Instead, an insurance claim is paid only according to the Index Event. Both events will decide your earnings:

So there are four possible outcomes if you purchase insurance. You might suffer a loss and receive an insurance claim payment. Or you might suffer a loss but not receive an insurance claim payment. You might not suffer a loss and also receive no insurance. Finally, you might receive an insurance claim payment even when you do not suffer a loss.

Each event is determined by randomly drawing a colored chip from a bag. In general, each draw will involve two colors, and each decision you make will involve different amounts and mixtures of two colors. When making each decision, you will know the exact amounts and mixtures of colored chips associated with the decision. After you have decided whether or not to purchase insurance, the two events will be determined as follows.

First, the Personal Event will be determined with blue and red chips.

• If you draw a blue chip, then the Personal Event outcome is Good and you do not suffer a loss.

• If you draw a red chip, then the Personal Event outcome is Bad and you suffer a loss.
Next, if you purchased insurance, the Index Event will be determined with green and black chips.

- If you draw a green chip, then the Index Event outcome Matches the Personal Event outcome
- If you draw a black chip, then the Index event outcome Differs from the Personal Event outcome

Here is an example of what your decision would look like on the computer screen. The display on your screen will be bigger and easier to read.

In this example you start out with an initial stake of $75. If the outcome of the Personal Event is Bad you will lose $45, and if the outcome of the Personal Event is Good you will not lose any money. If you faced the choice in this example and chose to purchase insurance, you would pay $5.75 from your initial stake. You would pay this $5.75 before you drew any chips, so you would pay it regardless of the outcomes of your draws.

You will be drawing colored chips from bags to determine the outcomes of both events. First, you will draw a chip to determine the Personal Event outcome. The image on
the left shows that there is a 10% chance that the Personal Event outcome is Bad, and a 90% chance that the Personal Event outcome is Good. This means there will be 9 blue chips and 1 red chip in a bag, and the color of the chip you randomly draw from the bag represents the outcome of the Personal Event. If a blue chip is drawn, the Personal Event outcome is Good, and if a red chip is drawn the Personal Event outcome is Bad.

Next, you will draw a chip to determine the Index Event outcome. There is an 80% chance that the Index Event outcome Matches the Personal Event outcome and a 20% chance that the Index Event outcome Differs from the Personal Event outcome. This means there will be 8 green chips and 2 black chips in a bag. If a green chip is drawn the Index Event outcome Matches the Personal Event outcome, and if a black chip is drawn the Index Event outcome Differs from the Personal Event outcome.

You will indicate your choice to purchase, or not purchase, the insurance by clicking on your preferred option on the computer screen.

There are 54 decisions like this one to be made, each shown on a separate screen on the computer. Each decision might have different chances for the Personal Event outcome, the Index Event outcome, the initial stake, or the cost of insurance, so pay attention to each screen. After you have worked through all of the insurance decisions, please wait in your seat and an experimenter will come to you. You will then roll two 10-sided dice to determine which insurance decision will be played out. Since there are only 54 decisions, you will keep rolling the dice until a number between 1 and 54 comes up. There is an equal chance that any of your 54 choices will be selected, so you should approach each decision as if it is the one that you will actually play out to determine your payoff. Once the decision to play out is selected, you will draw chips from the Index bag and the Personal bag to determine the outcome.

In summary:

- You will decide whether or not to purchase insurance in each of the 54 scenarios.
- One of your decisions will be randomly selected to be played for cash.
- You will suffer the specified monetary loss only if the Personal Event outcome is Bad.
If you purchase insurance, it will pay a claim payment only if the Index Event outcome is Bad. This can happen in two ways:

1. Your Index draw Matches a bad Personal Event outcome;
2. Your Index draw Differs from a good Personal Event outcome.

Insurance is important because:

1. **It protects individuals and their families**
   Your family depends on financial support to enjoy a decent standard of living, which is why insurance is particularly important once you start a family. It means that the people who matter most in your life will be protected from financial hardship if the unexpected happens.

2. **It reduces stress during difficult times**
   None of us know what lies around the corner. Unforeseen tragedies, such as illness, injury, or permanent disability, even death, can leave you and your family facing tremendous emotional stress, and even grief. For most people, with insurance in place, their financial stress will be reduced so that they can focus on recovery and rebuilding their lives.

3. **To enjoy financial security**
   No matter what your financial position is today, an unexpected event can see it all unravel very quickly. Buying insurance offers the certainty of a claim payment so that if there is an unforeseen event you can hopefully continue to move forward.

4. **Peace of mind**
   No amount of money can replace your health and wellbeing – or the role you play in your family. Because of insurance, most people can have peace of mind knowing that if anything happened to them, at least their family’s financial security is assisted by insurance.

For each of the 54 choices you decide if you want to purchase insurance or not, knowing that insurance is important to protect yourself against the risk of monetary loss. The people next to you may be presented with different choices, insurance prices, and may
have different preferences, so their responses should not matter to you. Please work silently, and make your choices by thinking carefully about each prospect.

Your payoff from this task is in cash and is in addition to the show-up payment that you receive just for being here, as well as any other earnings in other tasks. If you have a question, raise your hand and someone will come over and answer it.

C.1.5 Practice treatment

C.1.6 Understand treatment

C.1.7 Peers treatment

C.1.8 Self-Select treatment

C.2 Instructions to the risk preferences elicitation

Choices Over Risky Prospects

This is a task where you will choose between prospects with varying prizes and chances of winning each prize. You will be presented with a series of pairs of prospects where you will choose one of them. For each pair of prospects, you should choose the prospect you prefer. You will actually get the chance to play one of these prospects for earnings, and you will be paid according to the outcome of that prospect, so you should think carefully about which prospect you prefer on each decision screen.

Here is an example of what the computer display of such a pair of prospects will look like.
The outcome of the prospects will be determined by the draw of a random number between 1 and 100. Each number between, and including, 1 and 100 is equally likely to occur. In fact, you will be able to draw the number yourself using two 10-sided dice.

You might be told your cash endowment for each decision at the top of the screen. In this example it is $35, so any earnings would be added to or subtracted from this endowment. The endowment may change from choice to choice, so be sure to pay attention to it. The endowment you are shown only applies for that choice.

In this example the left prospect pays twenty-five dollars ($25) if the number drawn is between 1 and 5, pays negative five dollars ($-5) if the number is between 6 and 55, and pays negative thirty-five dollars ($-35) if the number is between 56 and 100. The blue color in the
pie chart corresponds to 5% of the area and illustrates the chances that the number drawn will be between 1 and 5 and your prize will be $25. The orange area in the pie chart corresponds to 50% of the area and illustrates the chances that the number drawn will be between 6 and 55 and your prize will be $-5. The green area in the pie chart corresponds to 45% of the area and illustrates the chances that the number drawn will be between 56 and 100. When you select the decision screen to be played out the computer will confirm the die rolls that correspond to the different prizes.

Now look at the pie on the right. It pays twenty-five dollars ($25) if the number drawn is between 1 and 15, negative five dollars ($-5) if the number is between 16 and 25, and negative thirty-five dollars ($-35) if the number is between 26 and 100. As with the prospect on the left, the pie slices represent the fraction of the possible numbers which yield each payoff. For example, the size of the $25 pie slice is 15% of the total pie.

Even though the screen says that you might win a negative amount, this is actually a loss to be deducted from your endowment. So if you win $-5, your earnings would be $30 = $35 − $5.

Each pair of prospects is shown on a separate screen on the computer. On each screen, you should indicate which prospect you prefer to play by clicking on one of the buttons beneath the prospects.

Some decision screens could also have a pair of prospects in which one of the prospects will give you the chance for “Double or Nothing”. For instance, the right prospect in this screen image pays “Double or Nothing” if the Green area is selected, which happens if the number drawn is between 51 and 100. The right pie chart indicates that if the number is between 1 and 50 you get $10. However, if the number is between 51 and 100 we will flip a coin with you to determine if you get either double the amount or $0. In this example, if it comes up Heads you get $40, otherwise you get nothing. The prizes listed underneath each pie refer to the amounts before any “Double or Nothing” coin toss.
After you have worked through all of the pairs of prospects, please wait quietly until further instructions. When it is time to play this task out for earnings, you will then roll two 10-sided dice until a number comes up to determine which pair of prospects will be played out. If there are 40 pairs we will roll the dice until a number between 1 and 40 comes up, if there are 80 pairs we will roll until a number between 1 and 80 comes up, and so on. Since there is a chance that any of your choices could be played out for real, you should approach each pair of prospects as if it is the one that you will play out. Finally, you will roll the two ten-sided dice to determine the outcome of the prospect you chose, and if necessary we will then toss a coin to determine if you get “Double or Nothing”.

Here is an example: suppose your first roll was 81. We would then pull up the 81st
decision that you made and look at which prospect you chose – either the left one or the right one. Let’s say that the 81st lottery was the same as the last example, and you chose the left prospect. If the random number from your second roll was 37, you would win $0; if it was 93, you would get $20.

If you picked the prospect on the right and drew the number 37, you would get $10; if it was 93, we would have to toss a coin to determine if you get “Double or Nothing”. If the coin comes up Heads then you would get $40. However, if it comes up Tails you would get nothing from your chosen prospect.

It is also possible that you will be given a prospect in which there is a “Double or Nothing” option no matter what the outcome of the random number. This screen image illustrates this possibility.
In summary, your payoff is determined by five things:

- by your endowment, if there is one, shown at the top of the screen;
- by which prospect you selected, the left or the right, for each of these pairs;
- by which prospect pair is chosen to be played out in the series of pairs using the two 10-sided dice;
- by the outcome of that prospect when you roll the two 10-sided dice; and
- by the outcome of a coin toss if the chosen prospect outcome is of the “Double or Nothing” type.

Which prospects you prefer is a matter of personal choice. The people next to you may be presented with different prospects, and may have different preferences, so their responses should not matter to you or influence your decisions. Please work silently, and make your choices by thinking carefully about each prospect.

All payoffs are in cash, and are in addition to the $5 show-up fee that you receive just for being here, as well as any other earnings in other tasks from the session today.

C.3 Instructions to the financial literacy beliefs

C.4 Instructions to the index insurance beliefs

Beliefs over Potential Outcomes, Monetary Endowments, and Insurance Purchases

In this task you will be presented with possible outcomes of monetary endowments that are exposed to random events that can be protected through insurance or not. In this task you will be paid according to how accurate your beliefs are about the outcomes of these endowments, shocks, and insurance purchases. In this task you will not be asked to make any insurance purchases yourself. You will be presented with some questions and asked to place some bets on your beliefs about the answers to each question. You will be rewarded for your answer to one of these questions, so you should think carefully about your answer.
to each question. The question that is chosen for payment will be determined after you have made all decisions, and that process is explained below.

Here is an example of the outcomes that will be presented to you on paper. The paper display will be bigger and easier to read. From the top left corner, note that this display refers to Figure X.

![Figure X](image1)

We will ask you 10 questions about potential outcomes of initial stakes, the personal event and the index event, and the effect of purchasing insurance or not.

Examples of the questions we might ask you are:

- **Consider Figure X.** What is your outcome if you decided not to purchase insurance, experienced a good personal event, and the index outcome matches? There will be 10 categories of possible answers: $0-$9; $10-$19; $20-$29; $30-$39; $40-$49; $50-$59; $60-$69; $70-$79; $80-$89; $90-$100.

- **Consider Figure X.** What is your outcome if you decided to purchase insurance, experienced a bad personal event, and the index outcome differs? There will be 10
categories of possible answers: $0-$9; $10-$19; $20-$29; $30-$39; $40-$49; $50-$59; $60-$69; $70-$79; $80-$89; $90-$100.

We will then ask you to place some bets on your beliefs about the answers to each question.

Here is an example from the first question shown above. You will probably recall this task from a previous session. You have 10 sliders to adjust, shown at the bottom of the screen, and you have 100 tokens to allocate across the sliders. Each slider allows you to allocate tokens to reflect your belief about the answer to this question. You must allocate all 100 tokens, and in this example we start with 0 tokens allocated to each slider. As you allocate tokens, by adjusting sliders, the payoffs displayed on the screen will change. Your earnings are based on the payoffs that are displayed after you have allocated all 100 tokens.

You can earn up to $10 in this task.
Where you position each slider depends on your beliefs about the correct answer to the question. Note that the bars above each slider correspond to that particular slider. Each bar shows the amount of money you could earn if the true outcome is in the interval shown under the bar.

To illustrate how you use these sliders, you might make these choices:

Your earnings depend on your reported beliefs and, of course, the true answer. For instance, suppose you allocated you tokens as just shown. If the true answer had been $13, you would have earned $2.78. If the true answer had been $33, you would have earned $8.78, and so on. If the true answer contains cents, we will round it to the nearest whole dollar. So if the true answer had been $13.26, we would have rounded it to $13.

Suppose you had put all of your eggs in one basket, and allocated all 100 tokens to the interval corresponding to an outcome between $80 and $89. Then you would have faced the earnings outcomes shown here:
Note the “good news” and “bad news” here. If the true answer had been $85, you would have earned $10. But if the true answer had been $15, or even $79, you would have earned nothing in this task.

It is up to you to balance the strength of your personal beliefs with the possibility of them being wrong. There are three important points for you to keep in mind when making your decisions:

- First, your belief about the correct answer to each question is a personal judgment that depends on the information you have about the topic of the question.
- Second, depending on your choices and the correct answer you can earn up to $10.
- Third, your choices might also depend on your willingness to take risks or to gamble.

The decisions you make are a matter of personal choice. Please work silently, and make your choices by thinking carefully about the questions you are presented with.
When you are satisfied with your decisions, you should click on the Submit button and confirm your choices. When you are finished we will roll dice to determine which question will be played out. The experimenter will record your earnings according to the correct answer and the choices you made. All payoffs are in cash, and are in addition to the show-up fee that you receive just for being here, as well as any other earnings in the session today.