Simplicity and Risk

Indira Puri
ipuri@mit.edu

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Internet experiments on Amazon Mechanical Turk (AMT), to study behavior in response to a lottery's complexity.

This pre-registration consists of two modules:

1. A risk aversion module
2. A differences-in-differences complexity module

I also pre-register exclusion criteria, randomization, hypotheses, and maximum sample size.

MODULE 1: RISK AVERSION

I. Experimental setup and measurement of certainty equivalents

On AMT, subjects complete standard multiple price lists to elicit certainty equivalents (CEs) for lotteries, with enforced single switching. Lotteries have 2, 4, 8, or 16 monetary outcomes, generated in such a manner as to make moments similar regardless of the number of outcomes. A multiple price list for a lottery starts at 50 cents below the lottery's worst outcome, and goes up to the lottery's highest outcome. Each subject provides CEs for eight 2 outcome lotteries, eight 4 outcome lotteries, eight 8 outcome lotteries, and eight 16 outcome lotteries, for 32 lotteries total. For each subject, one of the rows in one of the lotteries is randomly selected for payment.

II. Raven's matrices

Each subject completes Raven's Advanced Progressive Matrices, Set I (a standard IQ task). To incentivize effort, subjects receive $0.25 of additional bonus for each Raven's question they answer correctly.

III. Exclusion Criteria

Following the experimental instructions, I implement a set of comprehension questions. I will drop subjects who incorrectly answer at least one comprehension question. I will also include recommended restrictions on the subset of AMT that can take the survey, in particular restricting to those who have successfully completed at least 95% of their prior tasks; have completed at least 100 HIITs; and who are CloudResearch approved participants. Finally, I will exclude anyone who attempts the survey multiple times.

MODULE 2: DIFFERENCES IN DIFFERENCES

I. Experimental setup and measurement of certainty equivalents

On AMT, subjects complete standard multiple price lists to elicit certainty equivalents (CEs) for lotteries, with enforced single switching. For two lotteries p and q with $n > m$ outcomes, respectively, subjects follow the below procedure:

1. Subject provides a certainty equivalent δ_q for lottery q.
2. Subject provides a certainty equivalent δ_p for lottery p.
3. Computer generates the lottery $r = \frac{1}{4}q + \frac{1}{4}p + \frac{1}{4}\delta_q + \frac{1}{4}\delta_p$, and subject provides certainty equivalent c for lottery $\frac{1}{2}\left(\frac{1}{2}p + \frac{1}{2}\delta_q\right) + \frac{1}{2}r$.
4. Computer generates lottery $\frac{1}{2}\left(\frac{1}{2}q + \frac{1}{2}\delta_p\right) + \frac{1}{2}r$, where r is as in step (3), and subject provides certainty equivalent c' for this lottery.

II. Raven's matrices

Subjects complete a Raven's matrices task identical to that completed by subjects in Module 1.

III. Exclusion Criteria

The exclusion criteria for this module are identical to those described for Module 1.

HYPOTHESES, RANDOMIZATION, AND MAXIMUM SAMPLE SIZE

I. Primary Hypotheses

1. In Module 1, that risk aversion increases in the complexity of a lottery. For example, that the α coefficient on a CRRA utility model increases in the lottery's complexity.
2. For Module 2: the intuition behind this procedure is that, if one considers complexity to be number of outcomes, then when mixing each lottery with r, complexity differences are removed. Consequently, if complexity matters to the subject, it should be the case that $c \geq c'$. The difference between this test and that in Module 1 is that Module 1 examines a possible relationship between risk aversion and complexity, whereas Module 2 keeps complexity identical in steps (3) and (4). Consequently, Module 1 is about levels while Module 2 is about differences.
3. That complexity aversion weakly increases as cognitive ability goes down. In the context of the first module, this means, for example, that risk aversion increases in complexity more quickly for below median (relative to the rest of the sample) cognitive ability individuals. In the context of the second module, this means for example that the probability of being strictly complexity averse ($c > c'$) increases as cognitive ability goes down, or that the difference $c - c'$ increases as cognitive ability goes down.
4. That dominance violations occur more frequently as complexity increases. Since each MPL starts at $0.50 below the worst outcome in the lottery, an individual may violate dominance for any lottery by choosing a CE at or below the lottery's worst outcome.
5. That these results may not be fully captured by existing theories. These include but are not restricted to: original and cumulative prospect theory, probability weighting that differs by number of outcomes, entropic cost, cognitive uncertainty, rational inattention, salience, and sparsity. To test for PT/CPT, I will fit models to the entire dataset and examine residuals; to test for CU I will check whether the CU correction removes the effects of risk aversion increasing in complexity; to test for rational inattention, I will use a maximum likelihood estimation to check whether the best-fitting attention parameter increases in complexity in a canonical RI model; to check for salience I will simulate salience-predicted risk premier; and to check for sparsity, I will use a Taylor expansion and check whether differences between lotteries' primary moments rationalize complexity aversion in the data.

II. Secondary Hypotheses

1. Results are consistent with separability between risk and complexity.
2. Confusion, for example as measured as within-person dispersion in risk aversion, may not be consistent across lotteries with different complexities.

III. Randomization

Each subject entering the survey is assigned uniformly at random to either the risk aversion module or the differences-in-differences module.

IV. Maximum Sample Size

I will collect no more than 600 clean responses total, where clean means passing exclusion criteria above.