

Internal Uncertainty in Belief Formation and Choice Under Risk (Part 2)

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This version: October 13, 2019

Internet experiments on Amazon Mechanical Turk (AMT) to study the relationship between internal uncertainty and belief formation / choice under ambiguity.

All experiments that were pre-registered in the first document (dated July 26, 2019), have been completed.

This pre-registration consists of three distinct sets of experiments that we describe in turn:

1. Choice under ambiguity
2. Stake size increases in choice under risk and belief formation
3. Survey expectations about the future

PART 1: CHOICE UNDER AMBIGUITY

I. Experimental setup and measurement of internal uncertainty

On AMT, subjects complete six multiple price list tasks to elicit probability equivalents for ambiguous lotteries. The ambiguous lottery is represented by an urn that comprises 100 balls of 10 different colors. The precise composition of colored balls is unknown to subjects. Some colors are “winning colors”, while others result in a zero payout. Across tasks, the number of winning colors varies between one and nine. The payout in case a winning color is drawn varies across tasks and is given by \$15, \$20 or \$25.

Subjects complete six price lists. One of the choices gets randomly selected for payment if the ambiguity part of the experiment is selected for payment (probability 50%).

After each price list, the subsequent screen elicits a measure of internal uncertainty. Here, we ask subjects to indicate a range of a known number of winning balls such that they are certain that their true valuation for the ambiguous lottery is contained in the range of valuations of the risky lottery with a known number of winning balls.

II. Hypotheses

Subjects with higher internal uncertainty exhibit more pronounced (more compressed) ambiguity “weighting functions.”

III. Exclusion Criteria

1. We will implement a set of control questions after subjects have read the experimental instructions. Any subject that gets a control question wrong on the first attempt will be excluded from the study immediately, i.e., will proceed to the final payment screen of the study after the control questions.
2. We also implement an attention check. Any subject that gets the attention check wrong will be excluded from the analysis, and not count towards the number of completes.
3. We implement the following analyses:
 - a. Analyses that include all data points (subject to the restrictions above).
 - b. Analyses in which we drop all observations that have the following characteristic: denote by p the switching probability between ambiguous and risky lottery and by w the number of winning colors. We exclude a data point if:
 - i. $w < 3$ and $p > 75\%$
 - ii. $w > 8$ and $p < 25\%$
 - c. Analyses in which we exclude respondents in the bottom decile of the response time distribution.

V. Sample size

We will recruit 200 completes, i.e., participants who do not fail the control questions and finish the experiment.

PART 2: STAKE SIZE INCREASES IN CHOICE UNDER RISK AND BELIEF UPDATING

I. Experimental setup

We again implement the same choice under risk and belief updating tasks as described in the first pre-registration (parts I. and II.), except that we only implement gain lotteries. Each subject completes six tasks / choice lists. The probability that one of these tasks determines payment is 50%.

Within the six tasks, the probability that a given task determines payment is 1% for five tasks each and 95% for the sixth task. Here, the task that has a higher probability of being payout-relevant is randomly selected, and the tasks are presented in random order.

We again elicit subjects' internal uncertainty as described in the first pre-registration, but not subjects' WTP for the optimal guess in the belief updating tasks.

II. Hypotheses

1. In tasks that have a higher probability of being payoff-relevant, subjects exhibit longer response times.
2. In tasks that have a higher probability of being payoff-relevant, the estimated "weighting functions" are less compressed (less insensitive).

III. Exclusion Criteria

We implement the same exclusion criteria as described in the first pre-registration.

IV. Sample size

We will recruit the following number of completes:

- Choice under risk: 150
- Belief updating: 150

PART 3: SURVEY EXPECTATIONS ABOUT THE FUTURE

I. Experimental setup

We implement the same survey expectations tasks as described in the first pre-registration, except for two variations:

- We elicit beliefs about future realizations of inflation rates, stock returns and the structure of the national income distribution (as opposed to about past values).
- These beliefs are not financially incentivized.

II. Hypotheses

1. All belief weighting functions are inverse S-shaped: stated beliefs are too high for low probability events and too low for high probability events.
2. Subjects with higher internal uncertainty exhibit more pronounced (more compressed to 50%) belief weighting functions.

III. Exclusion Criteria

1. The same exclusion criteria regarding control questions and attention checks as above for Parts 1 and 2 apply here since survey expectations are elicited from the same sets of respondents.
2. We implement the following analyses:
 - a. Analyses that include all data points (subject to the restrictions above).
 - b. Analyses in which we drop all observations that have the following characteristic:
Let the true probability be b and the response r . We exclude a data point if
 - i. $B < 25\%$ and $r > 75\%$
 - ii. $B > 75\%$ and $r < 25\%$
 - c. Analyses in which we drop the bottom decile of the response time distribution.

V. Randomization and Sample size

Because these questions are added to the treatments described in Parts 1 and 2, the sample size follows automatically and is given by 500.

PART 4: CORRELATES OF INTERNAL UNCERTAINTY

Here, we take the internal uncertainty measures from Parts 1-3. We correlate them with the respondent's:

- Gender
- Age
- Score on a Raven matrices test
- Educational attainment