Online Appendix:
Menu-Dependent Risk Attitudes: Theory and Evidence

Zhuo Chen Russell Golman Jason Somerville*

October 25, 2023

A Experimental Instructions

Page 1: Instructions

This screen provides instructions about what the survey entails. It is very important that you understand how it works, so please read all instructions carefully. Not only will this allow us to collect more precise data, it will also help you to maximize your payment for participating.

In this survey you will complete two tasks: an **Encryption Task** followed by a **Choice Task**. There are a total of 50 rounds in this survey and it takes around 30 minutes to complete on average. There is no deception or "tricks" in this study; we are interested in your preferences and your payment will be maximized when you respond truthfully and accurately.

What is the task? Your task is to encrypt three-letter "words" into into numerical code. Simply enter the three-digit code for each letter in the boxes next to the word. A sample task is presented below:

M	P	G	R	J	S	Z	W
314	109	718	918	222	101	364	883

Please encrypt the following word into code:

MJZ : [ ] [ ] [ ]

In the **Choice Task**, two or three options will be displayed onscreen and your job is simply to choose the one you like the most. Each option is a gamble that will offer a chance to receive an

*Chen: Shandong University, Center of Economic Research, No. 27, South Shanda Road, Jinan, China (email: zhuochen@sdu.edu.cn). Golman: Carnegie Mellon University, Department of Social & Decision Sciences, Pittsburgh, PA 15217 (e-mail: rgolman@andrew.cmu.edu). Somerville: Federal Reserve Bank of New York, 33 Liberty Street, New York, NY 10045 (e-mail: jason.somerville@ny.frb.org). The views expressed in this paper are those of the authors alone and do not necessarily reflect the views of the Federal Reserve Bank of New York or the Federal Reserve System.

additional cash payment. In general, the larger the gamble's cash payment, the less likely it is to be paid out. The gambles will be represented visually by 100 balls, which can be **green** or **blue**. Below is an example of a typical lottery.



The lottery options will be different in every round, so please read the description of each one carefully before making a choice.

Do my responses matter? **Yes, they do!** At the end of the survey, we will randomly pick one round and implement it for real. Any choice that you make today might be implemented, so it is important that you treat each decision as if it were the only choice you make today. When we implement the randomly chosen round:

- We will randomly draw one of the 100 balls from the option that you chose.
- If the ball drawn is **green** you will receive the cash payment listed; if it is **blue**, you will not receive an additional payment.

Every decision that you make today is independent; your choice in one round will have no bearing on future options or outcomes. Everything "resets" when a new round begins, so try not to think about your previous decisions when faced with a new choice.

Page 2: Review

Please answer the following questions.

Which round will be implemented for real?

- ○ All rounds
- ○ The first round
- ○ One round of your choosing
- ○ One randomly selected round

What is the additional payment if a blue ball is drawn?

- ○ $3.50
- ○ $0
- ○ It depends on the chosen lottery

How many letters are in each word in the Encryption Task?

- ○ One
- ○ Three
- ○ Four
- ○ Six

True or False: Your responses in one round will matter for future rounds.

- ○ True
- ○ False

Word Encryption Screen

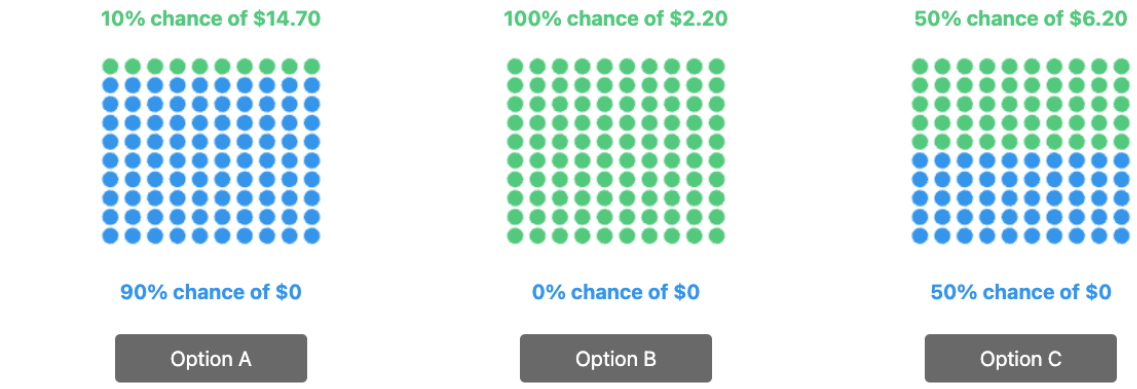
T	I	D	E	C	M	R	B	P	X	U	G	J
999	147	405	980	935	815	690	233	669	974	967	465	961
K	S	N	W	Z	H	V	A	Y	O	L	Q	F
881	695	901	833	924	819	412	875	382	258	179	490	721

Please encrypt the following three-letter word into code:

SPC:

Choice Task Screen

Please carefully review each of the options below.



Please choose the option you prefer the most

Remember: Your decision might be implemented for real, so treat it as if it were the only choice you make today.

A.1 Preregistration

AS PREDICTED

Wharton CREDIBILITY LAB
UNIVERSITY of PENNSYLVANIA

Menu-dependent risk preferences, December 2020 (#53943)

Created: 12/09/2020 06:51 PM (PT)
Public: 06/17/2021 09:20 AM (PT)

Author(s)
Jason Somerville (Federal Reserve Bank of New York) - js2946@cornell.edu
Russell Golman (Carnegie Mellon University) - rgolman@andrew.cmu.edu
Zhuo Chen (Shandong University) - zhuochen@sdu.edu.cn

1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
Our primary goal is to test a key prediction of a model of menu-dependent preferences in which people overweight the upside of a gamble when the potential gain is large. The model predicts that adding a gamble with a small probability of a large prize will cause people to overweight the potential upside of all lotteries in the choice set, leading to more risk seeking behavior. Holding fixed the expected value of this gamble, the higher the prize on offer, the more likely people are to choose a risky option over a safer alternative. Our experiment focuses on a situation in which people choose between three gambles:(a) win $z with probability p; (b) win $2βz with probability p/2, where β≥1; (c) Win $4z/(3α) with probability αp/2, where α∈(0,1/β). β indexes the relative expected value of (b) versus (a), while α inversely indexes the range of possible upside values. The model predicts that the threshold value of β* such individuals choose (a) whenever β ≤ β* and choose (b) whenever β > β* is increasing in α. Our main hypothesis follows from that result:
H1: The fraction of (a) choices is increasing in α and decreasing in β
H2: The fraction of (b) choices is decreasing in α and increasing in β
H3: The fraction of (c) choices is unaffected by α and β [With choice noise, the fraction of (c) choices is weakly increasing in α and weakly decreasing in β]
H4: The fraction of (b) choices relative to (a) choices is higher when option (c) is included in the choice set than when it is not included

3) Describe the key dependent variable(s) specifying how they will be measured.
The key dependent variables are the demand shares of (a), (b) and (c).

4) How many and which conditions will participants be assigned to?
The experimental manipulation is to vary α and β within subject. α will take six possible values: 0.3, 0.25, 0.2, 0.15, 0.1, and 0.05. β will also take six possible values: 1, 1.2, 1.4, 1.6, 1.8, and 2. This gives rise to 36 possible combinations of (α, β) and 36 possible choice sets in which participants choose between options (a), (b) and (c). As a control comparison, participants will also decide between (a) and (b) for the six possible values of β and between (a) and (c) for the six possible values of α.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
To test H1, H2 and H3, we will run regressions where the dependent variable equals one if a participant chooses (a), (b), or (c), respectively. The main explanatory variables are α and β, and the specification will include individual and round fixed effects. We will also test H1, H2, and H3 by presenting raw descriptive statistics comparing the fraction of participants choosing (b) relative to (a) across the 36 (α, β) combinations. Our analysis will also compare the results to the predictions of other prominent theories of risk preferences such as expected utility and probability weighting. These theories make distinguishing predictions in our experimental environment. In addition to testing H1, H2, and H3 using the aggregate data, we will conduct an analysis of individual heterogeneity in which we classify how consistent each participant's responses are with alternative decision rules such as menu dependence, probability weighting, expected utility, and random choice. To test H4, we will compare the relative demand shares of (b) vs. (a) in the full menu and the (a)-(b) binary choice menu. Finally, the analysis will also be supplemented by structural estimation. We will assume a type-1 extreme-value error distribution term and estimate the parameters of our model. This analysis will also explore individual heterogeneity in the parameter estimates.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will implement the following exclusion criteria: i) We will include two attention-check choice sets in which participants choose between a lottery or a strictly dominated alternative. If participants choose the strictly dominated option on either decision, they will be excluded from the analysis. ii) Participants will be asked four review questions after the initial instructions. If it takes them more than 10 attempts to correctly answer all four, they will be excluded from the analysis. iii) We will categorize participants' choices and flag those who almost always chose the same option. Specifically, participants who always choose the same option for all 36 possible (α, β) combinations will be excluded from the analysis of the aggregate data.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We will stop data collection once 600 participants have submitted the completed HIT on Amazon MTurk.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Version of AsPredicted Questions: 2.00

Available at https://aspredicted.org/4b36y.pdf
(Permanently archived at http://web.archive.org/web/*/https://aspredicted.org/4b36y.pdf)