Written Exam at the Department of Economics winter 2020-21

The Psychology of Choice

Final Exam

January 20, 2021

(3-hour open book exam)

Answers only in English.

This exam question consists of 5 pages in total

This exam has been changed from a written Peter Bangsvej exam to a take-home exam with helping aids. Please read the following text carefully in order to avoid exam cheating.

Be careful not to cheat at exams!
You cheat at an exam, if you during the exam:

Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text. This also applies to text from old grading instructions.
Make your exam answers available for other students to use during the exam
Communicate with or otherwise receive help from other people
Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
Use parts of a paper/exam answer that you have submitted before and received a passed grade for without making use of source referencing (self plagiarism)

You can read more about the rules on exam cheating on the study information pages in KUnet and in the common part of the curriculum section 4.12.

Exam cheating is always sanctioned with a warning and dispelling from the exam. In most cases, the student is also expelled from the university for one semester.

(1) Choice Theory

Often we have to make risky choices. Economic theory asserts that when we choose in these situations, we have well-defined preferences over prospects. A prospect is a list of outcomes with associated probabilities. Any prospect ***q*** can thus be represented by a probability distribution $(p_1,\ldots, p_n)$ over a fixed set of outcomes $(x_1,\ldots, x_n)$ where each p_i is the probability of a specific outcome x_i. In situations of risk, we know all outcomes and probabilities.

In *Starmer, C. (2000) "Developments in non-expected utility theory: The hunt for a descriptive theory of choice under risk", Journal of Economic Literature, 38(2), 332-382*, prospects are used as the foundation for a number of models defining risky choices. In the following, you will be asked to consider the violation of expected utility theory described by Allais' common consequence paradox, and use Loomes and Sugden's theory of disappointment aversion to explain what might be happening.

a. An economic agent has to consider the following prospect $\boldsymbol{q} = (p_1, x_1; p_2, x_2; p_3, x_3)$.

   - Write up the agent's Expected Utility $U(\boldsymbol{q})$ when his utility function is given by $u_i(x_i)$. Explain the axioms that define Expected Utility Theory.

b. A well-known violation of expected utility, known as Allais' common consequence paradox, comes in the form of the following pair of hypothetical choice problems. In the first, you have to imagine choosing between the two prospects:

$$\mathbf{s_1} = \{\ 1M \quad \text{with prob. } 1.$$

$$\mathbf{r_1} = \begin{cases} 5M & \text{with prob. } 0.1, \\ 1M & \text{with prob. } 0.89. \\ 0 & \text{with prob. } 0.01. \end{cases}$$

   In the second, you will have to choose between the two prospects:

$$\mathbf{s_2} = \begin{cases} 1M & \text{with prob. } 0.11, \\ 0 & \text{with prob. } 0.89. \end{cases}$$

$$\mathbf{r_2} = \begin{cases} 5M & \text{with prob. } 0.1, \\ 0 & \text{with prob. } 0.9. \end{cases}$$

   When asked to choose, most people prefer $\boldsymbol{s_1}$ to $\boldsymbol{r_1}$ and $\boldsymbol{r_2}$ to $\boldsymbol{s_2}$.

   - Write up the expected utility associated with each prospect $\boldsymbol{s_1}$, $\boldsymbol{s_2}$, $\boldsymbol{r_1}$ and $\boldsymbol{r_2}$.
   - Show (algebraically) why an expected utility maximizer views the two choice problems as the same.
   - Which axiom of expected utility theory does Allais' common consequence paradox violate? Why is the violation a problem for expected utility theory?

c. Loomes and Sudgen have proposed a psychologically grounded model that can explain Allais' common consequence paradox. In particular, they assert that people have "prior expectations" of the utility from the prospect, and if the outcome of a prospect is worse than expected a sense of disappointment will be generated. Formally, they assume that, preferences over prospects can be represented by the value function:

$$V(\mathbf{q}) = \sum_{\mathbf{i}} \mathbf{p_i}[\mathbf{u}(\mathbf{x_i}) + \mathbf{D}(\mathbf{u}(\mathbf{x_i}) - \underline{\mathbf{U}})]$$

   Where D(.) is the disappointment function and $\underline{U} = \sum_i p_i x_i$ is the prior expectations.

- Write up the value function associated with each prospect s_1, s_2, r_1 and r_2.
- Assume the decision maker is risk neutral, so u(x) = x, and that the disappointment function is given by D(h) = α + βh with β>0. Now find the range of β for which Loomes and Sudgen's model can explain Allais' common consequence paradox.
- Expected utility is a normative theory while the disappointment model's purpose descriptive. Describe the two modes and their differences.

(2) Anchoring and Heuristics

An implied assumption in economics is that people, when confronted with a choice, immediately know their valuation/utility associated with choices. Ariely *et al.* (2003) "Coherent Arbitrariness: Stable Demand Curves without Stable Preferences", Quarterly Journal of Economics, 118(1), 73-105, show that initial valuations of familiar products and simple hedonic experiences are strongly influenced by arbitrary "anchors". In the following, you will be asked to consider the definition of, and the evidence confirming, the anchoring effect.

a. Expected Utility Theory assumes that utilities are cardinal. Define cardinal utility. Describe how it differs from ordinal utility.

b. Ariely *et al.* (2003) coin the term "coherent arbitrariness". Define "coherent arbitrariness" and explain how it questions an assumption of Expected Utility Theory.

c. Experiment 1 in Ariely *et al*. (2003) considers peoples willingness-to-pay for ordinary products when imprinted with an arbitrary anchor. The findings of Experiment 1 were:

TABLE I
AVERAGE STATED WILLINGNESS-TO-PAY SORTED BY QUINTILE OF THE SAMPLE'S SOCIAL SECURITY NUMBER DISTRIBUTION

Quintile of SS# distribution	Cordless trackball	Cordless keyboard	Average wine	Rare wine	Design book	Belgian chocolates
1	$ 8.64	$16.09	$ 8.64	$11.73	$12.82	$ 9.55
2	$11.82	$26.82	$14.45	$22.45	$16.18	$10.64
3	$13.45	$29.27	$12.55	$18.09	$15.82	$12.45
4	$21.18	$34.55	$15.45	$24.55	$19.27	$13.27
5	$26.18	$55.64	$27.91	$37.55	$30.00	$20.64
Correlations	.415	.516	0.328	.328	0.319	.419
	$p = .0015$	$p < .0001$	$p = .014$	$p = .0153$	$p = .0172$	$p = .0013$

The last row indicates the correlations between Social Security numbers and WTP (and their significance levels).

- Describe the design of Experiment 1 and discuss its strengths and weaknesses.
- Explain and interpret the findings of Experiment 1.

d. Experiment 4 in Ariely *et al*. (2003) consider the possibility that the presence of market forces could reduce the degree of initial arbitrariness or facilitate learning over time. The findings of Experiment 4 were:

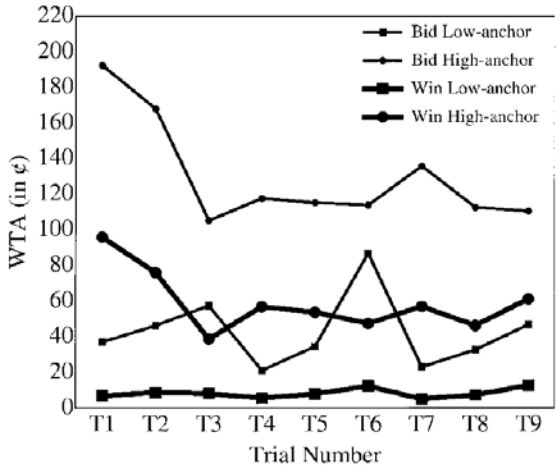

FIGURE V
Mean Bids (WTA) and Mean Payment as a Function of Trial and the Two Anchor Conditions

- Describe the design of Experiment 4. Discuss its strengths and weaknesses.
- Explain why Ariely et al. (2003) hypothesize that that the presence of market forces could reduce the degree of initial arbitrariness or facilitate learning over time.
- Interpret the findings of Experiment 4.

e. Explain how the maintenance of substantial interindustry wage differentials may be interpreted as a manifestation of "coherent arbitrariness".

(3) Ref. Dependence, Framing and Loss Aversion

Tversky and Kahneman (1981) "The Framing of Decisions and the Psychology of Choice", Science, 211(4481), 453-458, propose Prospect Theory as a descriptively more accurate then Expected Utility Theory. In the following, you will be asked to consider the value function as defined by Prospect Theory.

a. Consider Tversky and Kahneman (1981)'s Problem 3:

Problem 3 [N = 150]: Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer.

Decision (i). Choose between:
A. a sure gain of \$240 [84 percent]
B. 25% chance to gain \$1000, and 75% chance to gain nothing [16 percent]

Decision (ii). Choose between:
C. a sure loss of \$750 [13 percent]
D. 75% chance to lose \$1000, and 25% chance to lose nothing [87 percent]

- Explain what the majority of choices, made in Problem 3, implies for the functional form of the value function.

b. Consider Tversky and Kahneman (1981)'s Problem 4 :

Problem 4 [N = 86]. Choose between:

A & D. 25% chance to win \$240, and 75% chance to lose \$760. [0 percent]

B & C. 25% chance to win \$250, and 75% chance to lose \$750. [100 percent]

- Describe how Problem 3 and Problem 4 are related.
- Explain why the majority now choose “B & C” over “A & D”.

c. Describe what is meant by “minimal account” and how it is apparent in Problem 3 and Problem 4.

d. Explain what the “natural” reference outcome/point is in Problem 3 and Problem 4.