Problems for the first seminar

ECON4260 Behavioral Economics – Fall 2017.

Solutions to the problems will be presented at the first seminars. Please direct any question to Kjell Arne Brekke (Room ES1032, Tel 228 41169, E-mail: k.a.brekke@econ.uio.no)

Problem 1

This problem was given in the first lecture. Each one of you should ask 4 students the question below. I want you to ask two sophisticated students (with some formal training in mathematical statistics) and two non-sophisticated students (with no courses in mathematical statistics). You may collaborate and attend lectures for first year students and students at intermediate/advanced courses in statistics at the math department.
Send the results to the seminar leader no later than the day before the first seminar.
The question:
"A dice has four Green (G) faces and two Red (R) faces. The dice will be rolled 20 times, and the result (R or G) will be written down. This will produce a sequence of 20 letters.
You can choose one of the three short sequences below:
RGRRR
GRGRRR
GRRRRR,
Suppose that if your chosen sequence appears in the sequence of 20 letters, you would win 500 kroner. Which one of the sequences 1.-3. would you prefer? "
a) Based on the theories presented in class and in the curriculum: What hypothesis would it be natural to formulate and test on this data?

Problem 2

Suppose a person chooses lottery (B) over lottery (A) where

$$\begin{aligned} \text{Lottery A} &: (4000, 0.3;\ 3500, 0.65;\ 0, 0.05) \\ \text{Lottery B} &: (3500, 1) \end{aligned}$$

Suppose further that the same person chooses lottery (C) over lottery (D), where

$$\begin{aligned} \text{Lottery C} &: (4000, 0.30;\ 0, 0.70) \\ \text{Lottery D} &: (3500, 0.35;\ 0, 0.65) \end{aligned}$$

(This ranking is commonly observed when we ask people to choose between lotteries.)
a) Does this person violate expected utility?
b) Consider now a version of Prospect theory without decision weights. That is suppose all decision weight equals the probabilities; $\pi_i = p_i$. Could such a version of Prospect theory explain the ranking?

c) Can Prospect theory explain the ranking?
Explain your answers

Problem 1
Consider the pair of lotteries (all values are in kroner).

$$\text{A: } (-50, 50\%; +70, 50\%) \text{ and B:}(0)$$

$$\text{C: } (-50, 50\%; +90, 50\%) \text{ and D:}(0)$$

Suppose that Ola is ranking lotteries according to prospect theory with $\pi(p) = p$ (outcomes are weighted by their probabilities) and

$$v(x) = \begin{cases} x & \text{if } x \geq 0 \\ \lambda x & \text{if } x \leq 0 \end{cases}$$

That is the reference point is $r = 0$ as mostly assumed in Kahneman and Tversky's original paper.
a) For what values of λ will Ola prefer A to B? And for what values of λ will he prefer C to D?
Now consider the choice where you are first given 100 kroner and then choose

$$\text{C': } (-50, 50\%; +90, 50\%) \text{ and D':}(0)$$

and the lotteries with no initial payout

$$\text{E: } (+50, 50\%; +190, 50\%) \text{ and F:}(100)$$

Kari is an expected utility maximizer and mentally adds gains and losses in the lotteries to her existing wealth.
b) Show that if Kari prefer E to F, she must also prefer C' to D'.
c) If we know Ola's ranking of the lotteries C' and D', can we infer his ranking for E and F?
Now, Ola and Kari are offered to choose between lottery C played twice and D twice.
d) Show that this yields the lotteries

$$\text{G: } (-100, 25\%; \ +40, 50\%; \ +180, 25\%) \text{ and H:}(0)$$

Now assume that $\lambda = 2$ for Ola.
e) Show that Ola will change the ranking of C and D when they are played twice.
Kari's ranking of lotteries is independent of wealth for small changes in wealth (within ± 1000 kroner).
f) Show that Kari in this cased will maintain her ranking when the lotteries are plaid twice.
The last point is a challenge. It is an exampel of well known result by Paul Samuelson.

Hint for the last point. Show the following:
1. (The hard part): When Kari compares the two sequences (C,D) to (C,C) she can do it in two ways. Choose before the first lottery, C, is played or play C first and then choose between D and C. Show that both must yield the same ranking.
2. Based on 1, show that if Kari prefer D to C, she will prefer the lottery sequence (C,D) to (C,C).
3. Show that Kari perfers (D,D) to (C,D) to (C,C)