ECOS3997

Tutorial 1

The week 6 lecture would be about behavioural economics. This problem set is designed to prepare you for that lecture. Some of the questions require calculation. Others only ask you to think. You are strongly encouraged to attempt all questions prior to the first tutorial in week 6 and the week 6 lecture itself. The tutorial is not graded, and will not affect your grade in the course.

1 Cake vs. apple

One of the prinicpal topics in behavioural economics is *temptation*—sometimes referred to as *present-biased preferences*. An example is when a person plans to skip the tempting but fattening dessert, but ends up eating it anyway. We can model this situation using the concept of flow utility—utility that is obtained in certain times. We will suppose that the fattening dessert yields a flow-utility of 2 when you eat it (it's tasty), and -3 later (when it makes you fat).

The standard model in economics for preferences over flow-utility is the *exponential discounting model* (behavioural economists use other models). Decision-makers have a discount factor δ (between 0 and 1), which they use to discount future utility as a function of its distance from the present. Suppose you eat the apple in period 1 and (potentially) get fat in period 2. In period 0 (before the time for dessert), you discount the flow-utilty from eating the apple by δ and the flow utility from getting fat by δ^2. Your total utility is

$$U_{t=0} = 2\delta - 3\delta^2$$

In period 1, you don't discount the flow-utility from eating the apple (because it's not in the future), but you discount the flow-utility from getting fat by δ (it's one period in the future). Your total utility is

$$U_{t=1} = 2 - 3\delta$$

a) Are there values of δ for which you would eat the dessert, even though you know it would make you fat later?

b) Are there values of δ for which: (i) in period 0, you prefer to skip dessert in period 1, but (ii) in period 1, you eat the dessert anyhow?

Answer: *The person would eat the dessert if and only if $\delta < 2/3$. However, the person would then prefer to eat the dessert even at $t = 0$. There is no value of δ for which (i) in period 0, you prefer to skip dessert in period 1, but (ii) in period 1, you eat the dessert anyhow. For that, it is necessary to use a behavioural economics model.*

2 Casino black lists

Casinos in Australia offer customers the option of self-excluding themselves from gambling.

Why would someone want to do that?

Answer: *A person may want to put themselves on a self-exclusion list if they (i) don't want to gamble in the future, and (ii) don't trust themselves to stick to this desire, and avoid gambling when they have an opportuntiy to gamble.*

3 Procrastination

Procrastination involves a series of choices. In each period, the decision maker can do the task now, or she can postpone it to some future time.

Consider a student who has 100 days to write a report. The utility from writing the report at time t is $100 - t$ (starting at 100 in period 0, and going down to 1 in period 99. The cost of writing the report is 3. This cost is discounted if the report is written at some later time.

Suppose the discount factor is 0.5, so that the cost of writing the report in a future period is 1.5 or less (as compared with 3 —the cost of writing the report in current period).

a) In period 0, what is the optimal time for writing the report? (what would the student prefer?)

b) In period 1, what is the optimal time for writing the report? (what would the student prefer?)

c) Why do you think procrastination happens?

Answer: *It always be optimal to write the report the following day.*

Procrastination happens because (i) you naively believe that, if you don't write the report today, you will do it tomorrow, but (ii) come tomorrow, you choose to postpone it to the day after tomorrow, etc. You thus have the combination of temptation and naivete (or wishful thinking—the triumph of hope over experience).

4 Risk aversion

This question is about risky prospects, such as a 50% chance of winning \$50,000. The *certainty equivalent* of such a prospect is the minimum amount of money the decision maker would prefer to the risky prospect. A person is *risk averse* if their certainty equivalent is below the expected value of the prospect (\$25,000 in this case). The standard assumption in economics is that people maximise the expected utility of their wealth using a concave utility function. Thus, the certainty equivalent of the above prospect for a person with wealth w is an amount c such that

$$u(w + c) = 0.5u(w + 50000) + 0.5u(w)$$

where u is some concave function such as $\sqrt{x}$ or $\ln x$.

a) Jack has a wealth of \$1,000,000 and a utility function over wealth of $u(x) = \sqrt{x}$. Compute (perhaps with the aid of a spreadsheet) the certainty equivalent of the following prospects:

a. A 50% chance of winning 500,000.
b. A 50% chance of winning 50,000
c. A 50% chance of winning 5,000
d. A 50% chance of winning 500
e. A 50% chance of winning 50

Research shows that most people are substantially risk averse over all these prospects. For example, many people (regardless of their wealth level) would prefer a certain \$20 to a 50% chance of \$50. How would you explain this?

Answer: *For the* $\sqrt{x}$ *utility function, the results are*

```
The certainty equivalent of 5000000 is 1974744.8714 (0.394949 * 5000000)
The certainty equivalent of  500000 is  237372.4357 (0.474745 *  500000)
The certainty equivalent of   50000 is   24847.5383 (0.496951 *   50000)
The certainty equivalent of    5000 is    2498.4414 (0.499688 *    5000)
The certainty equivalent of     500 is     249.9844 (0.499969 *     500)
The certainty equivalent of      50 is      24.9998 (0.499997 *      50)
```


For the $\log x$ *utility function, the results are*

```
The certainty equivalent of 5000000 is 1449489.7428 (0.289898 * 5000000)
The certainty equivalent of  500000 is  224744.8714 (0.449490 *  500000)
The certainty equivalent of   50000 is   24695.0766 (0.493902 *   50000)
The certainty equivalent of    5000 is    2496.8828 (0.499377 *    5000)
The certainty equivalent of     500 is     249.9688 (0.499938 *     500)
The certainty equivalent of      50 is      24.9997 (0.499994 *      50)
```


Risk aversion over small stakes is evidence against the expected utility model.