Written Exam at the Department of Economics summer 2017

Foundations of Behavioral Economics

Final Exam

June 02, 2017

(3-hour closed book exam)

This exam question consists of 5 pages in total

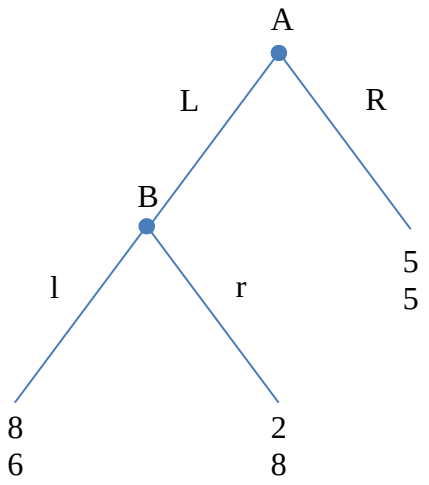
NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

The exam consists of 4 questions with several subquestions. In order to get the best possible grade, you must answer all questions. Please note that, because of differences in the workload needed to answer the questions, different (parts of the) questions may have different weights. When answering mathematical questions, you can use the calculator function on your computer. However, your responses must clearly and comprehensively reflect all steps your analysis. When answering non-technical questions, your answers can be short and concise (e.g., using bullet points), but your arguments must be explained sufficiently.

Good Luck!

Question 1

Consider the following strategic situation:



Note: upper payoffs are the payoffs of player A and lower payoffs are the payoffs of player B

(a) Traditional economic theory assumes that individuals are selfish and maximize their personal payoffs. Please derive formally the subgame perfect equilibrium for the above-described decision situation under the assumption that player A and B are selfish.

(b) Now assume that both players are inequality averse a la Fehr & Schmidt (1999). Under what condition will the players choose (L,l) in equilibrium?
Reference: *Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. Quarterly Journal of Economics, 817-868.*

(c) Using the model of sequential reciprocity by Dufwenberg and Kirchsteiger (2004), explain formally how player B perceives the kindness of player A following player A's choice L. Furthermore, explain under what conditions he will choose l instead of r in equilibrium**.** Given this, under what conditions will player A choose L in equilibrium?
Reference: *Dufwenberg, M., & Kirchsteiger, G. (2004). A theory of sequential reciprocity. Games and economic behavior, 47(2), 268-298.*

(d) Explain in your own words the difference between the outcome-based model of inequality aversion and the belief-dependent model of reciprocity.

Question 2

Consider a decision maker who is confronted with the following two choices between lotteries:

Choice 1:

Lottery 1A:	*vs.*	*Lottery 1B:*
110 kr. with prob. p=0.25 100 kr. with prob. p=0.74 0 kr with prob. p=0.01		100 kr. with prob. p=1

Choice 2:

Lottery 2A	*vs.*	*Lottery 2B*
100 kr.; p=0.26 0 kr.; p=0.74		110 kr.; p=0.25 0 kr.; p=0.75

The decision maker chooses Lottery 1B in Choice 1 and Lottery 2B in Choice 2.

a) Show formally that this choice pattern is inconsistent with Expected Utility Theory.

b) Which psychological phenomenon might explain the observed choice pattern according to Kahneman and Tversky's paper "Prospect Theory" (1979)?

Question 3

Imagine you are analyzing people's labor supply. You assume that the labor supply function—i.e., the (log) hours of work per day offered by workers, h^S, as a function of the (log) hourly wage, w—has the following form:

$$\ln h^S(w) = \beta \ln w.$$

β is a parameter and determines the wage elasticity of labor supply. Camerer, Babcock, Loewenstein, and Thaler (1997) estimate a labor supply function of exactly this type for New York City cab drivers. Their empirical specification is

$$\ln h_i = \beta \ln w_i + \varepsilon_i.$$

Here, i indexes the observations, $i = 1, \ldots, N$. ε_i is an error term with $\mathrm{E}[\varepsilon_i] = 0$. β is the parameter to be estimated.

a) Camerer et al. (1997) open their paper with the statement: *"Dynamic models of labor supply predict that work hours should respond positively to transitory positive wage changes, as workers intertemporally substitute labor and leisure, working more when wages are high and consuming more leisure when its price—the forgone wage—is low (e.g., Lucas and*

Rapping [1969]).”

In other words, standard dynamic models of labor supply—i.e., multiperiod models *without* reference-dependent preferences—predict that the labor supply function is upward-sloping (i.e., $\beta > 0$) for transitory wage changes.

By contrast, why does income targeting—i.e., a particular case of reference-dependent preferences—predict that $\beta < 0$ for transitory wage changes?
Hint: explain verbally; no formal derivation required.

b) What are the reasons why New York City cab drivers are a good sample for studying individual labor supply (as opposed to, say, high school teachers)?
   - State first what the ideal setup would consist of regarding (*i*) the flexibility of working hours and (*ii*) temporary vs. permanent wage shocks.
   - Then state why NYC cab drivers fulfil the required characteristics well.
   - Third, mention empirical correlations that Camerer et al. check to investigate that these criteria / their identification assumptions are actually met.

c) Briefly summarize the main findings of the paper. Focus on the following questions:
   - What is the sign of the estimated wage elasticity, β, according to the paper's main (OLS) specifications?
   - Are there systematic differences in the estimated β coefficients for different subgroups of taxi drivers?
   - What are possible sources of these differences?

d) Camerer et al. (1997) cannot observe the hourly wage w_i directly. Instead, they calculate it as the earnings of an entire day, divided by the number of hours worked on that day. In this case, what happens with the estimate of β in the presence of measurement error, i.e., if hours are not recorded perfectly but with noise and if one uses OLS regression?
   - What is this effect called, and what sign does it have? Explain.
   - How do Camerer et al. address this problem?

e) How can a model with belief-dependent reference points (e.g., Kőszegi and Rabin 2006) reconcile some of the seemingly contradictory findings in the literature on labor supply? In particular, how could the model help explain the observation that wage elasticities are positive on the "extensive" margin (working vs. not working on a given day), but negative on the "intensive" (within-day) margin?
   Hint: explain the key intuition verbally; no formal derivation required.

Question 4

Consider a decision maker whose preferences can be described by the linear per-period utility function, $u(c) = c$, in combination with *quasi-hyperbolic discounting*, also called (β, δ) discounting. Within the scope of this question, all we need is three periods, $t = 0, 1, 2$. Thus, in combination with the linear per-period utility function, we have the following lifetime utility functions U^t at the different time points t:

$$\begin{aligned} U^0(c_0, c_1, c_2) &= c_0 + \beta\delta c_1 + \beta\delta^2 c_2; \\ U^1(\quad c_1, c_2) &= \quad c_1 + \beta\delta\ c_2; \\ U^2(\qquad c_2) &= \qquad\quad c_2. \end{aligned}$$

Here, c_t denotes consumption in period t.

a) Assume that, in period 0, the decision maker is indifferent between consuming $c_0 = 121.5$ units in period 0 or $c_1 = 180$ units in period 1 or $c_2 = 200$ in period 2. What are the values of the discounting parameters β and δ that give rise to this indifference?

b) A naïve decision maker with $\beta = 0.9$ and $\delta = 0.95$ has the choice to distribute 100 units of consumption in t=0 over the three periods 0, 1, and 2. From period to period, saved consumption bears a real interest rate, $r = 15\ \% = 0.15$. How would this decision maker in period 0 plan consumption for the three periods 0, 1, and 2?
Hint: Note that due to the linearity of the per-period utility function, you only have to consider corner solutions where the decision maker consumes everything in the same period.

c) What will the decision maker from 0 do, once period 1 has arrived? Will she stick to her decision or revise her plan? Show formally.

d) Now assume that a commitment savings product is available in period 0. If used, this commitment device forces you to save for two periods (say, a government bond with a maturity of two periods). However, the commitment savings product pays lower interest: it only pays 14% per period, instead of 15%.

Would a naïve agent (with $\beta = 0.9$ and $\delta = 0.95$) use this commitment device? Would a fully sophisticated agent (with $\beta = 0.9$, $\delta = 0.95$ and $\hat{\beta} = \beta$) make use of this commitment device, instead of saving from period to period at 15%? Justify your answers formally!