Written Exam at the Department of Economics summer 2017

Foundations of Behavioral Economics

Final Exam

August 22, 2017

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

This exam question consists of 4 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 questions 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: (weight: 31%)

a) During the course we discussed the model of belief-dependent sequential reciprocity by Dufwenberg and Kirchsteiger. Please define and explain their notion of kindness and perceived kindness. How do they formalize the emotion of 'reciprocity' using these two concepts?

Points to include in the answer: See slides 16-22 of lecture 3 and pages 276 to 278 of the paper "Dufwenberg, M., & Kirchsteiger, G. (2004). A theory of sequential reciprocity. Games and economic behavior, 47(2), 268-298"

b) Consider the following sequential prisoner's dilemma

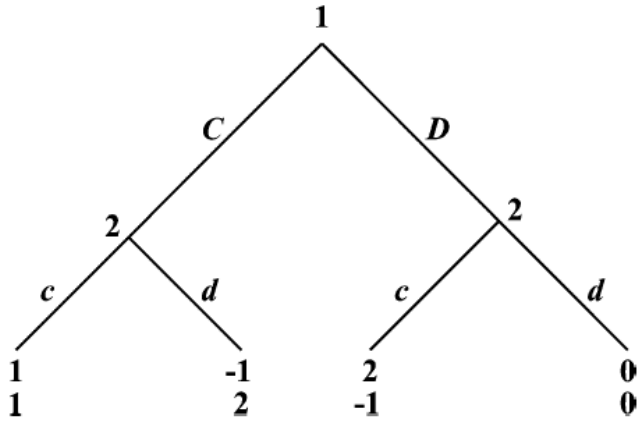

Fig. 2. Game Γ_2—the sequential prisoners' dilemma.

Under what circumstances is (C,cd) are sequential reciprocity equilibrium. I.e. under what circumstances is player 1 choosing strategy C and player 2 choosing strategy cd a sequential reciprocity equilibrium?

Points to include in the answer: See section 4.1 and pages 293 to 295 of the paper for a derivation proof that answers this question "Dufwenberg, M., & Kirchsteiger, G. (2004). A theory of sequential reciprocity. Games and economic behavior, 47(2), 268-298"

c) We also talked about the belief-dependent emotion 'guilt aversion'. Please formally and intuitively define it. Using this model, give an example for how guilt aversion might affect real world behavior.

Points to include in the answer: A formal and intuitive definition of guilt aversion can be found on slides 6 to 16 of lecture 5 as well as in the paper:

Dufwenberg and Charness (2006), Promises & Partnership, Econometrica, 74, 1579 - 1601

Question 2: (weight: 35%)

Consider a consumer who is characterized by a Koszegi-Rabin utility function with the following properties

- $U(c|r) = m(c) + \mu(c|r)$
- with material utility $m(c)=c$
- and two-piece linear gain-loss utility $\mu(\cdot) = \begin{cases} (c_i - r_i) & \text{if} \quad c_i \geq r_i \\ \lambda(c_i - r_i) & \text{if} \quad c_i < r_i \end{cases}$

  where $\lambda > 1$

The consumer faces a situation in which he risks losing \$1000. This damage occurs with probability 20% ($p=0.2$).

Alternatively, the consumer can buy an insurance police that fully insures him against the potential loss (choice *"I"*). The cost of the insurance police is \$280.

a) What is the reference point of the agent if he expects *not to buy* the insurance police? Provide a formal response and explain Koszegi/Rabin's underlying assumption of what determines the reference point.

Koszegi / Rabin assume that an individual's reference point is determined by her (recently held) rational expectations. *If the individual expects not to buy the insurance policy, her reference point is therefore determined by the risky gamble of facing the probabilistic loss. That is, her reference point R is the lottery*

{0.2, -1000\$; 0.8, 0\$}

Note that, according to KR, the reference point is the "entire lottery", rather than just the expected value of the lottery.

b) What is the consumer's expected utility if he does not buy the insurance (choice *"NI"*) and does not expect to do so? I.e., what is *EU(NI|NI)*?

EU(NI|NI)
*= 0.2(-1000) + 0.8*0 + 0.2[0.2(-1000+1000) + 0.8 λ(-1000-0)] + 0.8[0.2(0 + 1000) + 0.8(0-0)]*
*= -200 - 0.16λ1000 + 0.16*1000*
= -40 -160λ

c) Is "not buying" the insurance (and expecting not to buy) a personal equilibrium?
   - *Hint: build on your result from part b) and check under which conditions* EU(NI|NI)> EU(I|NI)

EU(I|NI)
= -280 + 0.2[0.2(-280+1000) + 0.8 λ (-280+0)] + 0.8[0.2(-280+1000) + 0.8λ (-280+0)]
= -136-224λ

EU(NI|NI) > EU(I|NI) if

-40 -160λ > -136-224λ
⇔ λ > -1.5
Since, by assumption, λ >1, this is always fulfilled. Hence, "not buying" is a personal equilibrium.

d) Under which conditions is "buying the insurance" (and expecting to buy) a personal equilibrium?

EU(I|I) = -280 + 0.2[-280+280] + 0.8[-280+280] = -280

EU(NI|I) = -200 + 0.2λ [-1000+280] + 0.8[0+280]
= 24 -144λ

EU(I|I) > EU(NI|I) if
-280 >24 -144λ
⇔ λ > 304/144 ≈ 2.11
Hence, if λ >2.11, buying the insurance is a personal equilibrium.

e) What is the preferred personal equilibrium?

To determine which P.E. is the P.P.E., compare EU(NI|NI) and EU(I|I):

EU(I|I) > EU(NI|NI) if
-280>-40 -160λ
⇔ λ > 240/160 = 1.5

Hence, whenever the "buying insurance" equilibrium from part d) exists, it is also the preferred personal equilibrium.

Question 3: (weight: 17%)

a) Discuss three different strategies for empirically identifying the relevance of limited attention in decision-making. Use the simple theoretical framework (i.e., the valuation function) discussed in class to illustrate your response.
   - *Hint: in the framework, the (perceived) valuation of a good was denoted as* $\hat{V} = v + (1 - \theta)o$

The framework assumes that the objective value of a good, V, is the sum of a visible component, v, and an opaque component, o.
$\hat{V}$ *denotes the* perceived *valuation of the good, and depends on v, o, and* θ*, which measures the consumer's degree of inattention (e.g., for* $\theta = 0$*, the consumer is fully attentive and*

$\hat{V} = V$; when $\theta = 0$, the consumer is inattentive and disregards the opaque component completely).

θ is itself a function that depends on two variables, $\theta(s, N)$:
- *the "saliency" of the opaque component, s*
- *and the number of competing stimuli, N*

This yields the following three strategies for identifying limited attention empirically:
1) vary the opaque component (i.e., change the level of o) and measure the impact on $\hat{V}$
2) change the saliency of the opaque component, s, and measure the impact on $\hat{V}$
3) change the number of competing stimuli, N, and measure the impact on $\hat{V}$

b) For one of the strategies mentioned in part a), discuss an empirical study in which the respective strategy was used.
- Describe the basic economic environment, the key hypotheses, and the identification strategy of the study.
- Briefly summarize the study's main empirical findings.

Examples for applications of the three identification strategies are
1) Hossain and Morgan (2006), Chetty et al. (2009), Lacetera et al. (2012)
2) Chetty et al. (2009),
3) "paradox of choice", Shiv and Fedorikhin (1999), Levav et al. (2010)

(see lecture notes and corresponding references for further details on the studies' setup, hypotheses, and main findings)

Question 4: (weight: 17%)

Based on empirical findings in economics and psychology, some people have argued that policy-makers should rely more heavily on a "libertarian paternalistic" policy approach.

a) What is the idea behind libertarian paternalism?
- Explain, in particular, the basic rationale for this approach from a behavioral welfare perspective.
- Critically discuss potential advantages and problems of the approach.

Key idea of libertarian paternalism: take limitations of rationality, self-control, and attention
into account. Design policies such that "biased" decision makers avoid making costly mistakes, while freedom of choice is preserved for everybody else (e.g., perfectly rational people) → welfare improvement.

Potential advantages and problems:
- Precise understanding of the underlying psychological biases and their welfare implications is needed to design libertarian paternalistic policies that are truly welfare-improving. This can be very difficult (e.g., difficulty to distinguish between inattention/present bias/reference dependence as a source of empirically observed default effects)

- *Do policy makers have (i) enough knowledge and (ii) the right incentives to help biased individuals?*
- *In many situations it is inevitable to specify certain rules (e.g., default regulations). Why not try the picking the best?*
- *People might become used to being "nudged", then policies lose their effectiveness or can't be taken away anymore*
- *Are libertarian paternalistic policies a slippery slope or rather a substitute for more heavy-handed regulations?*
- *…*

b) Provide an example of a libertarian paternalistic policy intervention. Discuss briefly what bias it tries to address, to what extent the intervention fulfills the idea of being both "libertarian" and "paternalistic", and use the example to illustrate your arguments from part a).

Examples discussed in class:
- *Default rules (e.g., 401(k) saving plans, organ donation)*
- *Reminders*
- *Simplified information provision (e.g., traffic-light framing of food labels)*
- *…*

See lecture notes + discussion above for further details on characteristics, advantages, and problems of the different instruments.