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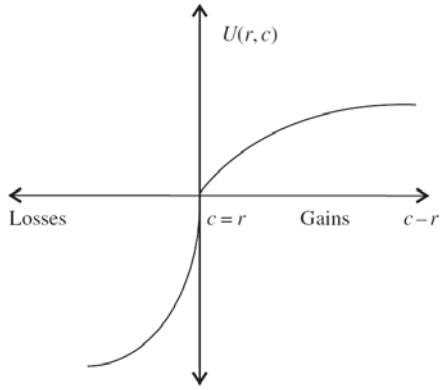
Suggested Answers in Final exam for MA course "Behavioral and Experimental Economics"

August 18, 9-11. 2015 (2 hours, closed book)

Question 1: Loss aversion

a) Kahneman and Tversky (ECMA 1979) propose a theory about how people evaluate risky prospects. Discuss the assumptions of this theory that relate to losses
(*Hint*: refer to a figure with four quadrants)
A: Risky prospects are not evaluated in terms of outcomes (final wealth, as in EU) but in terms of changes w.r.t. to reference point r (initial wealth). Losses weigh more heavily than gains of equal size (kink at the reference point): loss aversion. The function is concave in gains but convex in losses → risk aversion in gains but risk loving in losses.



b) Andersson, Holm, Tyran and Wengström (Management Science, forthcoming) investigate whether deciding for others reduces loss aversion in a large sample of the Danish population.

b1. An important measure in this paper is "the number of safe choices". Explain how this measure is constructed and interpreted
(*Hint*: refer to the "multiple price list" (MPL) and the notion of a "switch point")

A: In the MPL, subjects are given a series of choices (here: 10) between two gambles (Left vs. Right). Each gamble has two (here: equally likely) outcomes (Heads or Tails). One gamble is "safe" (with low variance), one is risky. The list has 10 lines and choices are ordered such that in the first few choices the safe gamble is relatively more attractive but further down the list the risky bet is more attractive. A rational subject with consistent preferences switches only once from safe to risky. Hence, the "number of safe choices" (or "switch point") is an indicator of risk aversion or of loss aversion (depending on whether the options include losses)

b2. What do the authors find with respect to the "the number of safe choices" when comparing treatments "Individual" and "Other"?
(*Hint:* compare conditions in which losses can occur vs. cannot occur)

A: When choices do not involve losses, subjects make the same choices for themselves as they do for others (i.e. in "Individual" and "Other"), but when choices involve losses, they make more risky choices for "other" (lower number of "safe" choices in other).

b3. How do the authors interpret their finding in b2? (*Hint*: refer to emotions)

A: The finding suggests that subjects tend to shy away from potentially profitable gambles because of loss aversion when their own money is at stake but do not shy away when the choice does not involve losing one's own money. This is consistent with the view that loss aversion is an emotional response to fear rather than a "deep preference".

c) Stephens and Tyran (WP 2012) discuss "nominal loss aversion" (NLA).

c1. Explain the expression NLA and how it is measured.
(*Hint*: the authors construct an index from a set of 8 questions)

A: NLA results from the interaction of loss aversion (that losses loom larger in people's minds than corresponding gains) and nominal thinking (that people tend to think of the value of economic transactions in terms of money). Thus, a given real loss that comes with nominal loss is more salient than if it comes with a nominal gain (or: real losses are less salient when they are obfuscated by inflation).

The authors present subjects (respondents are drawn from the general population in Denmark) with 8 hypothetical scenarios that come in 4 pairs. Subjects are asked to evaluate the "advantageousness" of housing transactions. In each pair, a given real loss is presented either with a nominal gain (at high inflation) or a nominal loss (at low inflation). The NLA index is the (averaged) difference between the evaluations in a pair. It is zero when subjects' evaluations are not influenced by the nominal framing. It is positive if subjects provide better evaluations when the real loss is obfuscated by inflation.

c2 Interpret the first three coefficients in the regression in table below (also explain how the variables are defined)

Nominal Loss Aversion	(1)	(5)
Time spent on all questions	−0.278***	−0.291***
	(0.055)	(0.056)
Cognitive reflection score (CRS)	−0.847***	−0.689***
	(0.129)	(0.135)
IST Matrix intelligence score (ISS)	−0.133***	−0.122**
	(0.045)	(0.048)
High school or vocational education		0.001
		(0.467)
Short or medium tertiary education		−0.413
		(0.470)
Long tertiary education		−0.429
		(0.520)
Age		0.136**
		(0.061)
Age²		−0.001**
		(0.001)
Female		0.743**
		(0.310)
Gross income		−1.448*
		(0.741)
Property owner		−0.237
		(0.304)
Personality (BFI)	No	Yes
Constant	6.801***	4.029
	(0.496)	(2.450)
F-test	31.969	8.783
Prob. > *F*	0.000***	0.000***
R^2 adjusted	0.104	0.131
N	732	732

A: Significantly lower NLA scores result for those who think longer about the scenarios (in seconds), those who "think twice" (have high scores in the cognitive reflection test measured as in Frederik JEP 2005), and those who have higher IQ scores in a standardized test for fluid intelligence (Raven's progressive matrices). The second column shows that these findings are robust to including lots of controls (including a standardized test for personality, say). The authors conclude that NLA is to a considerable degree a cognitive phenomenon.

d) Fehr and Tyran (AER 2001) provide evidence of money illusion as a cause of nominal inertia.
d1. Explain on what basis the authors make the claim after a negative shock
(*Hint*: refer to treatments NH vs. RH)

A: In both treatments, subjects choose prices from 1 to 30 and their payoffs depend on relative prices and a nominal shift variable M. The payoff functions are homogeneous of degree zero. Halfway into the experiment, subjects get new tables which are based on a new M, meaning that equilibrium prices adjust in proportion. In NH payoffs are presented to subjects in nominal terms (and they need to deflate them to know the corresponding real payoffs) while payoffs are shown in real terms in RH. Otherwise the tables are the same and they exhibit strategic complementarity. The main finding is that prices adjust much more slowly in NH than in RH after a negative shock, and this nominal inertia is associated with substantial losses in real income.

d2. Fehr and Tyran (AER 2001) also find evidence for asymmetric effects of monetary shocks. How does this result relate to "nominal loss aversion"?

A: The authors also compare the adjustment of nominal prices in NH vs. RH after a positive shock and find that the treatment difference is now much smaller, i.e. there is much less nominal inertia and money illusion therefore does not seem to cause upward nominal inertia. The suggested reason for the asymmetry between positive and negative shocks is that with a negative shock, agents have to move from high to low prices and nominal payoffs (and doing so may be perceived as loss) while with a positive shock they move from low to high payoffs (which may be perceived as a gain). Thus, nominal loss aversion may slow down price adjustment after the negative shock (but not after the positive shock).

Question 2: Biases in probability estimates

a) Consider the following scenario: For a woman at age 45 who participates in routine screening, the probability of breast cancer is 0.02. If a woman has breast cancer, the probability is 0.9 that she will have a positive mammogram. If a woman does not have breast cancer, the probability is 0.1 that she will still have a positive mammogram. Now imagine a randomly drawn woman from this age group with a positive mammogram. What is the probability that she actually has breast cancer?
(*Hint*: use Bayes' rule)
A: prob (cancer $\mid$ test positive) = (0.9 * 0.02) / (0.9 * 0.02 + 0.1 * 0.98) = about 16% (0.1552, to be exact)

b) What probability would a person prone to the Base-rate fallacy estimate for the woman in the example above? (explain why)

A: The "base rate" in the example above is 0.02, i.e. how often breast cancer occurs in the sample. The base-rate fallacy claims that people tend to ignore the base rate. Since it is low in the example above, such people would tend to overestimate the probability. Typically, they would think it is 90% (i.e. the reliability of the test, given that someone has cancer).

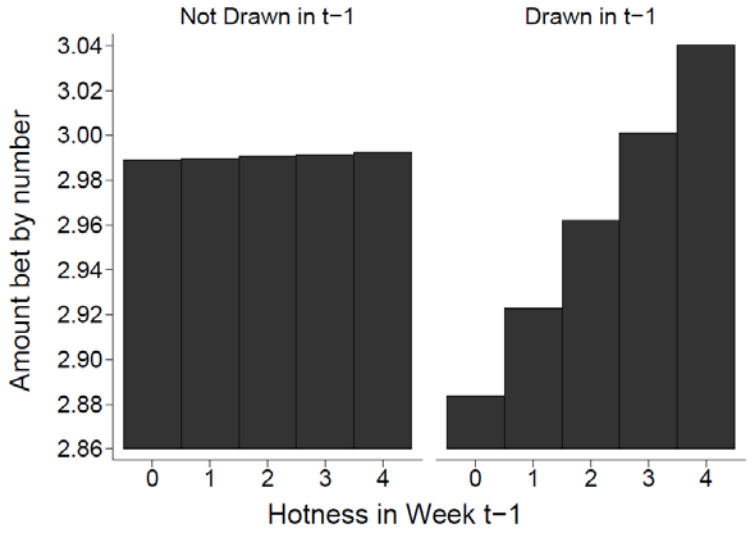
c) Kagel, Ganguly and Moser (JRU 2000) translate a similar scenario into an asset market context in which an "analyst" provides a report (signal) about success or failure of some company. The authors find that individual estimates are systematically biased, but prices in the market reflect the correct (Bayesian) probability of success in some cases and were far off in other cases. Explain under what conditions (and why) either outcome prevailed.

A: The treatments differ by the base-rate which is manipulated to create scenarios in which the prediction according to Bayes' rule has is higher or lower than the guess a person with Base-rate fallacy would make. In all treatments, subjects are endowed with assets and lots of cash (such that one trader can buy all units) and trade assets for cash in double auction format. Result: Market prices are better predicted by Bayes' Rule if Bayesian agents have higher values and *unlimited buying* power (i.e. were able to buy all assets). Thus, a single trader with correct (Bayesian) beliefs is sufficient to drive market price to the rational prediction. But BRF is better predictor of prices if Bayesian agents have lower values (and limited selling power). BRF now think the asset has high value, and they drive the prices up to irrationally high levels.

d) Suetens, Jørgensen and Tyran (JEEA forthcoming) study the Gambler's fallacy (GF) and the Hot-Hand fallacy (HHF) using Lotto data in Denmark. The figure below presents their estimates for how much "changers" bet.

d1. Explain how the Gambler's fallacy and the Hot-Hand fallacy can be read off the figure

A: the GF-effect is seen most clearly by comparing bars at "hotness" 0: the average lotto player ("changer") bets about 0.1 DKK (i.e. 3.5%) less on a number when it has been drawn than when not. The HHF-effect for numbers drawn (right panel): when the number has been drawn 4 times they bet 0.16 DKK (5.5%) more than when it has never been drawn.



d2. What do the authors find concerning the relation between the two fallacies (*Hint*: refer to Rabin and Vayanos, RES 2012)

A: Both GF and HH exist and co/exist in the sample (and many players choose the same numbers week after week), but players prone to both GF *and* HH are surprisingly common: Those who bet less on a number that has been drawn are significantly more likely to also bet more as the number gets hot → those prone to GF are also more likely to be prone to HHF, as predicted in Rabin and Vayanos (RES 2010)

Question 3: Direct and indirect effects of bounded rationality

Consider the standard guessing game with factor $p < 1$. Suppose a share $s < 1$ of the $n > 2$ players is irrational. These players choose a no matter what and a share $1\text{-}s$ is rational (i.e. have rational expectations) and choose a best reply r to what everybody else does.

a) Derive the choices of the rational players in equilibrium as a function of p, s and a.

(A: rational players all choose $r^* = psa/[1-p(1-s)]$)

b) Derive the equilibrium average number M^* and decompose the total effect into a direct and the indirect effect of a change in s.

A: $M^* = (1-s)r^* + sa = r^*/p = sa/[1-p(1-s)]$. $\partial M^*/\partial s = (1-s)\partial r^*/\partial s + (a - r^*)$,

where the first expression is the indirect effect (showing how the rational players change their behavior in response to the larger share of irrationals) and the second expression is the direct effect (showing the effect of having more irrationals choosing a and fewer rational players choosing r^*)

c) Derive the value of μ (the multiplier) in the expression $\partial M^*/\partial s = \mu (a - r)$

A: $\partial M^*/\partial s = 1/[1-p(1-s)] (a - r)$

d) How does μ depend on the degree of strategic complementarity and the share of irrationals?

A: μ is large if the degree of strategic complementarity p is high (i.e. $\partial\mu/\partial p > 0$) and if the share of irrationals is low (i.e. $\partial\mu/\partial s < 0$)

e) Characterize the equilibria in the guessing game when $s = 0$, $n > 2$ and $p = 1$

A: all symmetric choices are equilibria, i.e. there are infinitely many equilibria in which all subjects choose the same number. This is in principle a difficult coordination game but we discussed the idea of Schelling that "focality" might foster coordination in such a case (e.g. 50 is focal when numbers from 0 to 100 can be chosen).

f) Characterize the best reply structure of a rational player i (who is uncertain about the rationality of the other player) in the game above when $p < 1$ and $n = 2$

A: With only two players, choosing 0 is weakly dominant. If a player chooses a number > 0 it is likely to reflect his own ("direct") irrationality.

Question 4: Social Preferences

a) Describe the stylized findings in the dictator game
(*Hint*: refer to the metastudy by Engel ExEc 2011)

A: dictators give on avg. 28% of the pie. About a third (36%) of subjects give nothing, 17% half of the pie. Other findings: positive effects of age. If the dictator had to earn the pie, or if the recipient has his own endowment, giving drops by almost 20%.

b) What has been concluded from behavioral differences in the Ultimatum Game (Güth et al. JEBO 1982) and the dictator game concerning "generosity" as a motive for giving?

A: Much of the seemingly generous offers observed in the UG are not driven by generosity but by fear of rejection. Note: rejection is not possible in the DG.

c) Cappelen, Nielsen, Sørensen, Tungodden and Tyran (Ecs Letters 2013) replicate a study by List (JPE 2007) that challenges the view that giving in the dictator game is a good measure of preferences for altruism or generosity. Describe the design and the main finding of Cappelen et al.

A: Dictator (= player A) is «tentatively» allocated 200 kr., other 100 kr. In GIVE: Dictator can send from 0 to 100 kr. to other player. In TAKE: as in Give but can also take 0 to 100 kr. So, if A sends 50 kr., they both end up with 150 kr. which is "fair". But: self interest: take 100 kr. (i.e. A gets everything, B nothing). Main result: the share of positive giving falls about by half (from 74% to 34%), and the median transfer falls to 0 in TAKE (from 30 in GIVE). Interpretation: the drop in positive share of giving is not compatible with pure generosity as a motive for DG giving in the standard DG game but is consistent with «manners». What is appropriate to give is to some extent determined by contextual cues.

d) Prasnikar and Roth (QJE 1992) study the multi-proposer Ultimatum game. Describe the game and the main finding.

A: Design: 9 proposers simultaneously submit offers from 0$ to 10$ to a single responder. The responder may exclusively accept the best offer s_h. If he rejects, all 10 players get a payoff of 0. If he accepts, the responder gets s_h, the one proposer who submitted the best (accepted) offer gets 10 - s_h. All others get 0.
Results: Highly unequal outcomes prevail immediately and perfect equilibration prevails after a few periods, as predicted by standard game theory (proposers engage in intense competition and the entire rent goes to the responder).

Question 5: Trust games

a) Huck, Lünser and Tyran (GEB 2012) study a market for experience goods.

a1. What are the characteristics of such a market and how does it relate to trust problem?

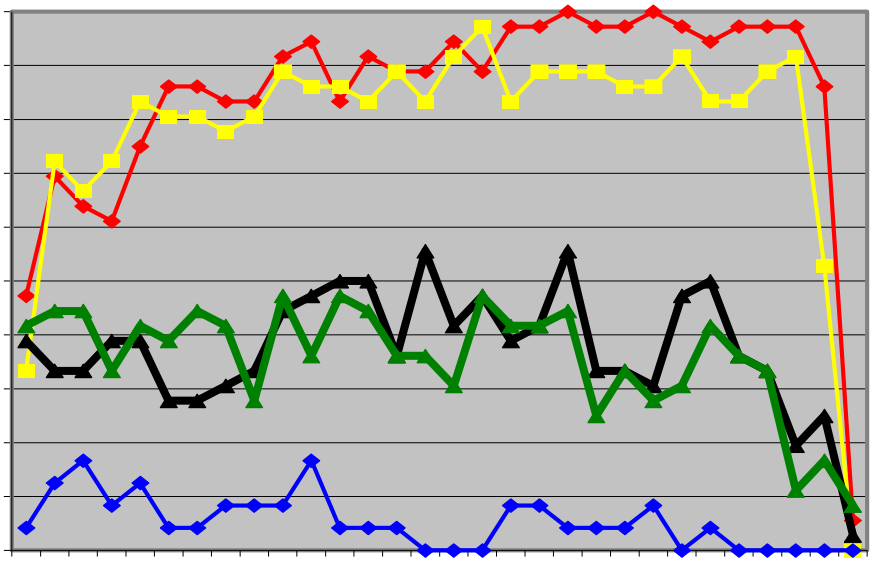
A: Experience goods have quality uncertainty ex ante but not ex post. Conflict of interest: Good quality is beneficial to the buyer, but expensive to produce. A buyer would have to trust the seller. Standard prediction in anonymous market: low quality (is cheaper) and no buy (no trust)

a2. The authors study the effects of reputation and competition on a market for credence goods. Describe the design.

A: In all treatments: markets with 4 sellers and 4 buyers, 30 periods. 2 by 2 design: Competition (yes or no), Information (full or partial because being informed about a seller's past action is a precondition for reputation formation). Competition: No: Random matching of buyers and seller (a seller is assigned 0 to 4 buyers), Yes: Buyers choose a seller; Information about the quality choices of the sellers (with colored hash marks): Full: All participants observe the history of all sellers. Partial: All participants observe

their own history (buyers identify sellers). In addition, there is a control (baseline) treatment in which there is no information and no competition.

a3. What are the main results of the study?
(*Hint*: figure below shows efficiency rates over time)



A: Control: performance is very low (21% trust rate, 5% efficient outcome). Reputation (partial vs. no info) improves performance; Strong effect of competition (partial and full); No effect of full transparency (full vs. partial); Competition as a discipline device: Reward (customer loyalty and attract new customers) and sanction (walk away) with competition; Overall: “Competition fosters trust” (title of the paper) in the sense of fostering trusting behavior, it does not mean that player become more trusting in the sense of “deep” preferences (see strong endgame effects in the figure).