

Written Exam for the course

Behavioral Economics and Finance

(1) Prospect theory:

- (1a)** Explain the nature / character of the value function in prospect theory and explain the evidence that is underlying the particular shape of it.

Answer: for all the points that should be included see slides of lecture 7 and 8 as well as chapter 24 in Shefrin (2008), *A Behavioral Approach to Asset Pricing Theory*, Elsevier. Second edition. Over and above the evidence, this answer should explain that the value function in prospect theory is S-shaped around a reference point as it is assumed that people are risk averse in the gain as well as risk seeking in the loss domain. This is, the value function exhibits diminishing sensitivity to gains and losses. Furthermore, it should be explained that the value function exhibits loss aversion, i.e. a loss looms larger than a comparable gain.

- (1b)** Which type of decisions is prospect theory trying to model? In how far is prospect theory different from the standard expected utility framework?

Answer: Prospect theory tries to model decisions under risk and uncertainty. Different to expected utility theory it is not a normative theory, but a descriptive theory which tries to describe well how people behave with all the errors they make and biases they have. This is different to expected utility theory as expected utility theory tries to capture how rational and self interested agents should act.

(2) Disposition effect:

- (2a)** Explain the disposition effect and the evidence related to it.

Answer: In a nutshell the disposition effect says that people tend to sell their winners too quickly and hold their losers too long which is a costly mistake. There is experimental as well as real world evidence for the disposition effect. For example, in the article Odean (1998), *Are Investors Reluctant to Realize Their Losses?*, *Journal of Finance*, 53(5), 1775-1798 real world evidence is presented using trading data from 1987 to 1993 for 10.000 accounts at a large discount brokerage house. The evidence Odean presents reveals that investors realize their gains more readily than their losses. On the other hand, in the article Weber and Camerer (1998), *The disposition effect in securities trading: an experimental analysis*, *Journal of Economic Behavior & Organization*, Vol. 33, 167-184 the disposition effect is analyzed experimentally. Weber and Camerer's experiments were designed to see if subjects would exhibit disposition effects. Subjects bought and sold shares in six risky assets. Asset prices fluctuated in each period. Contrary to Bayesian optimization, subjects did tend to sell winners and keep losers.

Important: Over and above the above, a complete answer to this question contains a detailed description of Odean (1998)'s and Weber and Camerer (1998)'s analysis as well as a description of their results.

(2b) Furthermore explain which features of prospect theory can explain the disposition effect.

Answer: Disposition effects can be explained by the two features of prospect theory: the idea that people value gains and losses relative to a reference point, and the tendency to seek risk when faced with possible losses, and avoid risk when a certain gain is possible. Different to expected utility theory prospect theory assumes that people do not care about absolute values but only about losses and gains that are defined relative to a reference point (e.g. the initial purchase price of a stock). Furthermore, it is assumed that people are risk seeking when faced with losses and risk averse when faced with gains. Of course, talking about winners and losers implicitly presumes the existence of a reference point used to judge whether a stock is a loser or a winner. As people are assumed to be risk averse in the gain domain and risk seeking in the loss domain, they prefer realizing their gains, but hold on to their losses in hope of a gain in the future.

(2c) Consider a situation in which an investor has to decide which stocks to sell and which stocks to hold in his portfolio. Assume that the investor behaves according to prospect theory. Does the disposition effect arise for any possible reference point that the investor might have? If not, explain which ones might be relevant.

Answer: The disposition effect does not arise for any possible reference point. If, for example, the reference point is today's market price of a stock, no disposition effect should occur. It should not occur as the concept of losses or gains relative to today's market price would be meaningless. However, if the reference point is e.g. the price at which the stock was bought in the past or some other (e.g. historic) price, the disposition effect might occur, as today's price relative to the reference price might imply losses or gains. Further details and graphical explanations for this answer can be found on the slides of lecture 10 as well as on p 170 of the article: Weber & Camerer (1998), *The disposition effect in securities trading: an experimental analysis*, Journal of Economic Behavior & Organization, Vol. 33, 167-184

(3) Social Preferences: There is by now a large amount of evidence showing that people are not only motivated by their material self-interest. People also seem to care about others' outcomes as well as intentions. Against the background of this empirical finding models of "distributional concerns" and "reciprocity" have been developed. During the course we more specifically spoke about the model of "Inequality Aversion" of Fehr and Schmidt (QJE, 1999) and the model of "Sequential Reciprocity" of Dufwenberg and Kirchsteiger (GEB, 2004).

(3a) In the model of "Inequality Aversion" by Fehr and Schmidt (QJE, 1999) it is assumed that people maximize a utility function that differs from pure egoism. State the utility function that is proposed in Fehr and Schmidt (QJE, 1999) and describe its different parts intuitively. Furthermore, consider the dictator game and explain what a dictator

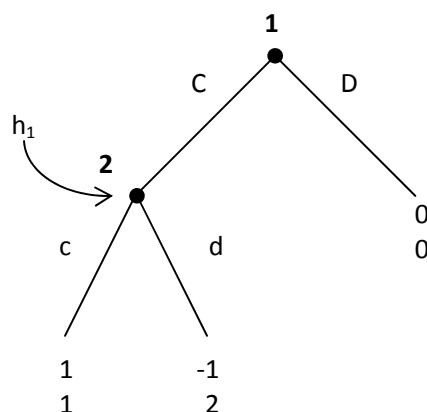
that is motivated by 'Fehr and Schmidt' - inequality aversion would optimally do in this situation.

Answer: In the article Fehr & Schmidt (1999), *A theory of fairness, competition, and cooperation*, Quarterly Journal of Economics 114(3), 817–868 Fehr and Schmidt present a model which is based on experimental evidence. The model they envision assumes that people do not only care about their own material payoff, but that they also receive a (dis)utility from being better or worse of than others – i.e. people are assumed to be inequality averse. Their exact utility model can be found on p. 822 of their article. On the pp. 822-825 they present a detailed description and discussion of their model as well as the assumptions they make. A complete answer should contain the points mentioned there. Furthermore, on pp. 847-848 (section VI) they discuss the dictator game and the extreme predictions their model gives in this strategic environment.

(3b) In the model of "Sequential Reciprocity" by Dufwenberg and Kirchsteiger (GEB, 2004) it is assumed that people have belief-dependent preferences. State the utility function that they propose and explain how kindness perceptions (i.e. the λ_{iji}) depend on players first- and second-order beliefs.

Answer: In the article Dufwenberg and Kirchsteiger (2004), *A theory of sequential reciprocity*, Games and Economic Behavior, 47(2), 268-298 Dufwenberg and Kirchsteiger present a model of reciprocity. Reciprocity means to respond kind to perceived kindness and unkind to perceived unkindness. That is, different to the model by Fehr and Schmidt people are not concerned about the distribution of material outcomes but about the intentions that others have. The detailed description of their model as well as an explanation for how the kindness perception λ_{iji} depends on player i 's beliefs can be found on pp 275-278 of their article.

(3c) Furthermore consider the following strategic situation:



How sensitive to reciprocity does player 2 have to be to choose cooperation (c) with certainty in history h_1 ? Also give some intuition.

Answer: First of all notice that it is for sure kind of player 1 to choose C as irrespective of his belief concerning player 2's behavior in h_1 C gives player 2 a higher payoff than D. This also implies that player 2's perception of player 1's kindness $\lambda_{212} > 0$. More specifically, player 2 believes in h_1 that player 1's kindness is

$$\lambda_{212} = b \cdot 1 + (1-b) \cdot 2 - \frac{1}{2} [b \cdot 1 + (1-b) \cdot 2 + 0] = \frac{1}{2} [b \cdot 1 + (1-b) \cdot 2]$$

where b is player 2's belief about player 1's belief concerning the likelihood that player 2 chooses c .

What is player 2's kindness to player 1 by choosing c and d ?

$$\kappa_{21}(c) = 1 - \frac{1}{2} [1 + (-1)] = 1 \text{ and}$$

$$\kappa_{21}(d) = -1 - \frac{1}{2} [1 + (-1)] = -1$$

Putting things together, player 2 chooses c in h_1 if

$$1 + Y \cdot [1] \cdot [\frac{1}{2} [b \cdot 1 + (1-b) \cdot 2]] > -1 + Y \cdot [-1] \cdot [\frac{1}{2} [b \cdot 1 + (1-b) \cdot 2]]$$

which reduces to

$$Y \cdot [b \cdot 1 + (1-b) \cdot 2] > 1$$

If the above inequality holds player 2 is better off from choosing c in history h_1 .

Taking this one step further, in equilibrium (higher-order) beliefs have to be correct. In our situation this means $b=1$ which implies

$Y > 1$, i.e. if $Y > 1$ there exists an equilibrium in which player 2 chooses c with certainty although it is not in his material self interest.