

Quiz 5

Q1. The Allais problem (15 marks)

(a) Let's say I give you a choice between two options A and B. In option A, you get Rs 10 lakhs for sure. In option B, you get Rs 10 lakhs with a probability of 89%, Rs 50 lakhs with a probability of 10% and nothing with a probability of 1%. Which option would you prefer? Which option would an expected utility maximizer prefer?

(b) Let's say I give you a choice between two options C and D. In option C, you get Rs 10 lakhs with a probability of 11% and nothing otherwise. In option D, you get Rs 50 lakhs with a probability of 10%, and nothing otherwise. Which option would you prefer? Which option would an expected utility maximizer prefer?

(c) Preferring A over B and D over C simultaneously is inconsistent with expected utility theory. Can you show why?

(d) How would you modify expected utility theory such that such preference ($A > B$, $D > C$) can be rationalized?

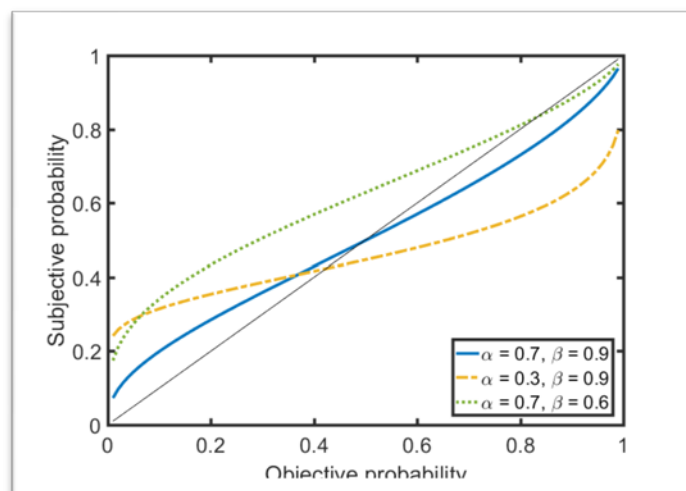
Q2. Probability distortion (16 marks)

Prospect theory is premised on the assumption that peoples' probability judgments are systematically distorted. One possible mathematical description of the distortion function, due to Drazen Prelec, takes the form

$$w(p) = e^{-\beta(-\ln p)^\alpha}$$

where both α and β are positive numbers, p is the objective probability and w is the subjectively judged probability.

(a) Can you draw the graph of w versus p for $\alpha = \beta = 1$?



(b) The graph above plots the Prelec distortion function for difference values of these parameters. Based on these values, can you say how both of them influence the behavior of the function?

(c) I have two friends, one of whom likes to buy lottery tickets and one doesn't. Who would be a better target for an insurance salesman according to prospect theory? Explain using the distortion function.

(d) A, B and C respectively solicit, are indifferent to and reject a bargain wherein they would win Rs 100 with a probability 95% and nothing otherwise in comparison to a safe option that would give them Rs 95 for sure. From the prism of prospect theory, what can we say about the parameter values of these individuals' distortion function parameter values?

Q3. Social utility (15 marks)

In the dictator game, one participant is randomly chosen from two to decide how to split up the shares of money that is jointly bestowed upon them. The second participant has no active influence on this decision. If participants are self-interested, they should keep all the money for themselves, yet it is empirically seen that participants generally offer close to even splits.

(a) Can you design a utility function that would generate this sort of outcome (close to fair splits) from a utility maximizing agent?

Let's say I generalize the dictator game, turning it into an N player game, where one person decides how to divide the endowment among all N participants. Two types of behavior are possible as N is increased. One, splits stay even, dwindling down to small values as N increases. Two, participants carve out a chunk of the endowment for themselves, and then evenly distribute the remainder among the other N-1 participants.

(b) Which sort of behavior falls out of your utility function? Can you change it to accommodate the other kind of behavior?

(c) How would a participant using your utility function behave in a prisoners' dilemma setting? What about in an ultimatum game?

Q4. Context effects (16 marks)

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(a) What's the point of offering just a print subscription if one could get both the print and the web subscription for the same price?

(b) In an experiment with MIT students, Dan Ariely showed that 84% of the students pick the third option when shown all three options. What do you think would happen when they were given a choice between just the first and the third option?

(c) Why do you think this sort of preference shift happens? How do sequential sampling models of the choice process explain it?

E-commerce retailers like Amazon use related concepts to guide people towards high margin sales.

(d) You are tasked with regulating these businesses so that they don't skim off profits by manipulating people in this particular way. What sort of strategy would you advise to minimize this specific type of context effect?

Q5. Sequential sampling models (18 marks)

(a) Can you describe the steps in the choice process of an agent that is using decision field theory to guide its decisions?

(b) The drift diffusion model is much simpler than DFT in its mechanistic description of the choice process. What assumptions have to be made about the nature of evidence and the nature of evidence accumulation that enable this simplicity?

(c) The EZ-DDM is a simplified version of the DDM that fits the most prominent parameters of the DDM. What are they? What are the choice data variables used to fit these parameters?

----- Programming assignment -----

Q6. DDM fit to 2AFC data. Data uploaded to course webpage. I've shown you how to fit an EZ-DDM, but you are welcome to use other approaches if you want. (20 marks)