Assessment guidelines SØK2012 V2021-70% (3hour) exam May 7.

The grade is based on overall assessment of the answers on the exam questions

Question 1.

Several years after the introduction of 7/34 Lotto in Norway in 1986 (with random draw of numbers every week), two of the largest Norwegian newspapers «VG» and «Dagbladet» regularly once a week had one or two pages where the «expected» probabilities for the different numbers to occur in the next draw were discussed based on tables about the frequency of numbers drawn in Lotto in the previous weeks (say, last two or three months). They could write something like: «The 2 has not been drawn in the last 10 weeks, now it should be due for a 2».

Explain the popularity of this kind of media information using insight from behavioral economics.

Suggested solution

Straight forward explanation is that the journalists, the players (or both) makes the gamblers fallacy. More precisely, they may **believe in the law of small numbers**. Belief in the law of small numbers implies that subjects believe in a systematic pattern in events, *even if no such patterns exist*. In Lotto each of the numbers has the same probability to be drawn in each draw, i.e. in the long run we expect the share of "2"s to be the same. In other words, the probability that a "2" will be drawn in the next round is *independent* of the history of draws. Suppose we have observed a pattern where the number 2 has been not been drawn in the last 10 draws (weeks). A rational agent would still judge the probability of number 2 to be the same and independent of the recent observed draws. A believer in the law of small numbers, in contrast, may falsely believe that the probability of the next observation to be above this since 10 draws without a "2"s has already been observed and base his decisions on this (false) judgement. See also p.100-101 in textbook.

Question 2.

Your friend who is a student in sociology argue that people care a lot about fairness. Explain to your friend an experiment (game) that could reveal the extent to which people care about fairness. Explain also to your friend what outcome will be predicted by the standard economic model.

Suggested solution

Ultimatum and dictator games or trust games explained in chapter 11 in textbook are relevant here.

Ultimatum game:

Consider two players: Proposer (player I) and responder (Player II). Before the game starts, player I is given an exogenous amount of money, X. Payoffs (utilities are measured in monetary terms, $, so we assume utility u(X)=X in the standard model (selfish) for simplicity.

Stage 1: Player I propose a division of the amount X between himself and the receiver, such that player II receives a share S of X

Stage 2: Receiver accepts or reject the proposed S. If responder rejects the offer S, both players get zero, if he accepts, player II gets amount S·X and player I gets X ·(1-S)

The subgame perfect Nash Equilibrium in this game is found by backward induction. Consider player II (responders) choice problem: If he rejects a positive offer, both he and player I gets 0. So he will accept all positive offers. Consider then player I's choice problem: He know that II will accept all positive offers, and he will propose an offer that gives him the largest payoff, i.e he will offer a minimal amount and Player II will accept it. Thus the subgame perfect Nash equilibrium when both players are rational and selfish is that the Proposer will propose a tiny fraction of the cake (S≈0) to the receiver and the receiver will accept it

Conclusion in experiments: Divisions appears much more even in experiments than standard theory and the concept of subgame perfect Nash equilibrium predicts (a strategy combination with X to player 1 and S≈0).

To test whether players care directly about fairness, researchers have experimented with a related game, the **Dictator game**. Player I chooses a division S of the cake, X, and the split is implemented without input from the responder (stage 2 above is eliminated). If player is a pure income maximizer, we should observe S=0.

Experimental evidence: A sizeable fraction of the dictators give away positive amounts of money. Deviations from the standard game theory and traditional economic models of behavior can be explained by incorporating other people's consumption or income in utility functions. Standard utility functions are U=U(x) where x is own income or own consumption. Extended utility function is U=U(x, y), where y is the income or consumption of another individual/group of individuals. Possible functional forms: $U = ax^{\alpha} + by^{\beta}$, $\alpha > 0$, $\beta > 0$, represents a generalisation of the functional forms on p. 243 in textbook. **Altruistic**: a >0, b >0, my utility increases if my «neighbor's» consumption or income increases. **Envious**: a>0, b<0, My utility decreases if my «neighbor's» consumption or income increases

Question 3.

Suppose that a factory owner considers two different bonus schemes. In scheme 1 the workers are given a bonus before the work month begins, but are notified that if the average per-hour production does not reach a threshold of 15000 items, it is retracted at the end of the pay period. In scheme 2, the workers are notified before the work month begins that if the months's average per-hour production reaches the threshold of 15000 items, a bonus is paid at the end of the pay period. Use your insights from behavioral economics to discuss the optimal choice of bonus system.

Suggested solution

The key is to argue in terms of value function and possibility of loss aversion. Scheme 2 provides bonus and worker incentives in the gain frame, while Scheme 1 provides bonus and worker incentives in the loss frame. Students could use value functions or graphs to argue that scheme 1 is likely to be most efficient one to incentivize workers. Loss aversion is the phenomenon that people dislike losses more than they like gains, i.e. losses loom larger than gains. This can be illustrated by value functions, $v=v(x)$ where v represents the subjective value for the individual where x can be gains ($x>0$) or losses ($x<0$). Suppose the value function have the simple form $v=hx$, where $h>0$ is a parameter. If h is larger if x is loss ($x<0$) than if it is a gain ($x>0$, then we have loss aversion. If h is **independent** of whether x is loss ($x<0$) or a gain ($x>0$), the value function does not exhibit loss aversion. Figures could be drawn to illustrate the cases.

Question 4.

People know that eating unhealthy food like chips may have negative consequences for their future health in terms of possible overweight and related illnesses. Formulate an economic model to discuss how a rational consumer with self-control would make the choice of chips consumption taking future health consequences into account. Compare this rational decision rule with the behavior if the consumer lacks self-control.

Suggested solution

A simple model to illustrate the situation with and without self-control is to start with an intertemporal utility function defined over three periods: Let the period before chips consumption starts be period 0, the consumption (eating) period be period 1 and the future be period 2. Let U denote the discounted utility in period 0.

$U = u_0 + \beta\delta u_1 + \beta\delta^2 u_2$ with u representing the utility in each period

δ represents the discount factor in the standard model of intertemporal choice, while β, where $0 < \beta \leq 1$ represents the degree of present biased preferences or lack of self control.

To simplify, we may set $\delta = 1$ without loss of general insight.

To further simplify the exposition: Let b represent the benefit associated with the chips eating during period 1, while c represents the cost in terms of health problems in period 2.

As viewed from period 0 (before eating takes place is) the discounted cost is βc and the discounted benefit is βb. Thus, if the consumer plan to not eat chips, it must be the case that the present value of eating exceeds the present value of the future health cost, $\beta c > \beta b$, i.e. $c > b$.

Consider then period 1, the period where eating is actually decided, i.e.when period 1 becomes the *present*. The benefit of eating is b, while the discounted future cost is βc

Thus, the decision to not eat chips is $\beta c > b$. Thus, the actual decision not to eat chips in period 1 differs from that in the planning period if $\beta < 1$, i.e to the extent that the consumer has self-control problems. Consider two consumers. Consumer A lacks self control, while consumer B has self control. In other words, consumer A has time-inconsistent preferences and lack self-control i.e. $\beta < 1$, while consumer B has time-consistent preferences, $\beta = 1$ and behaves according to his plan before the eating started. If they are equal in all respects except from the value of β, their eating behaviour will differ even if their planned behavior was the same.