Exam SØK2012 December 2021, 4 hours

Answer all 6 questions. All questions of equal value.

Question 1 Menu Dependence

A rational individual is initially offered a choice between X and Y, and chooses X (prefers X over Y). Explain why if instead they are now offered an additional choice, Z, they should never change their choice to Y.

The key point is to demonstrate how if Y is viewed as inferior to X, this remains true even as the menu is expanded.

Below sets out well behaved preferences from the class / textbook answer.

(A)	(B)	©
Hamburger	**Hamburger**	**Snails**
Ύ	**Ύ**	**Ύ**
Cheeseburger	**Snails**	**Hamburger**
Ύ	**Ύ**	**Ύ**
Snails	**Cheesburger**	**Cheeseburger**

A good answer should use a similar approach and demonstrate how switching preferences between X and Y as the menu expands represents non-rational preferences.

Question 2 Strategic Interaction

		Taxpayer	
		Pay Tax	Cheat
Tax Authority	Audit	3,0	5,-12
	Not Audit	5,0	0,5

The tax authority has to choose whether to audit the taxpayer or not (and check whether they have paid taxes). The taxpayer has to choose whether to pay taxes or not.

Demonstrate whether there is a Nash equilibrium in pure and / or mixed strategies.

First demonstrate that there is no Nash equilibrium in pure strategies, either the tax authority or the tax payer can increase their payoff by unilaterally changing their strategy

Next, find the Nash equilibrium in mixed strategies.

For instance solve for player 1.

Set U(A)=U(NA)

With probability q, player 2 pays taxes (T)

So payoffs are U(A)=3q+(1-q)5

U(NA)=5q+(1-q)0

3q+(1-q)5=5q+(1-q)0

3q+5-5q=5q

7q=5

q=5/7 (nice if this is interpreted – they should audit 5/7 of the time)

For player 2

Set U(T)=U(C)

With probability p, player 1 Audits (A)

So payoffs are U(T)=0

U(C)=-12p+(1-p)5

0=12p+(1-p)5

0=12p+5-5p

7p=5

p=5/7 (they should pay tax 5/7 of the time)

Question 3 Losses and Gains

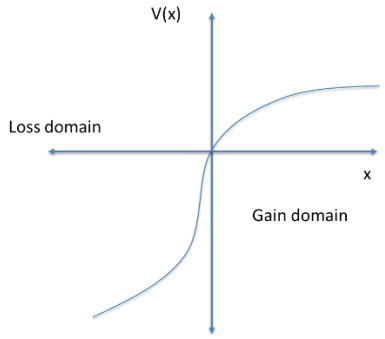
You are on a tv game show and you win 50000 NOK. 2 days later the tv company rings you and tells you that you have to pay 40% tax on your winnings.

(a) Demonstrate the effect of this on individuals if they view losses and gains differently (hint use a value function like we have used in the lectures / textbook).

The idea is to demonstrate that the winning is a gain and the tax of 20000 NOK is a loss. Then demonstrate how this fits with a (for instance) standard S shaped loss function. The standard function used in class was:

$$v(x) = \begin{cases} \sqrt{x/2} \textbf{for gains } (x \geq 0) \\ -2\sqrt{|x|} \textbf{ for losses } (x < 0) \end{cases}$$

Or diagrammatically:



The answer could numerically or diagrammatically (or both) demonstrate how the shifting reference point could lead to the individual feeling they are no better off, or even worse off, even though objectively they have more money than when they started.

(b) How does this change if you can mentally bundle winning and paying tax into one amount?

First, explain what mental bundling / accounting means. This is the ability to collect the gains and losses together (for instance winnings and tax). This leads the effect of the events described in 3(a) as being akin to a standard utility model. i.e. the answer should demonstrate that the individual views themselves as unambiguously better off if they can bundle the winnings and the taxation together.

Question 4 Retirement and Savings

Consider two people, Martina and John, who face a choice between how much to save during the working period. If they save (choice A) they consume less while working, but have a more comfortable retirement. Alternatively, they can choose (choice B) not to save in period 1 and are poor during retirement.

If they save in period 1 they receive 2 in period 1 (t=1) and 8 in period 2 (t=2). If they do not save they receive 5 in period 1 (t=1), but receive 0 in period 2 (t=2).

(a) Martina is an exponential discounter with delta (δ) = 0.6. At time t=0 what is her utility from choice (a) and choice (b). At time t=1 what is her utility of choice (A) and choice (B)

The problem is (from t=0) whether to take choice (a) or (b). Answer should calculate the discounted expected utility from both streams of utility. For the exponential discounter:

$U^0(A) = 0.6*2+0.6^2*8 = 4.08$

$U^0(B) = 0.6*5+0.6^2*0 = 3$

Hence Martina will choose to save

Once we get to period 1

$U^1(A) = 2+0.6*8 = 6.8$

$U^1(B) = 5$

Hence it is still preferable to save, Martina will not change her planned behaviour – exponential discounters are time consistent

(b) John is a naïve hyperbolic discounter with delta (δ) = 1 and beta (β) = 0.3. At time t=0 what is his utility from choice (A) and choice (B). At time t=1 what is his utility of choice (A) and choice (B)

For the hyperbolic discounter (using a beta-delta model)

U^0(A) = 0.3*2+0.3^2*8 = 2.22

U^0(B) = 0.3*5+0.3^2*0 = 1.5

Hence initially John will choose to save

Once we get to period 1

U^1(A) = 2+0.3*8 = 2.4

U^1(B) = 5

John will instead not save once he gets to period 1, he exhibits time inconsistency.

Question 5 Expected Utility and Risk

You face 3 potential gambles: (A) a ¼ chance of 50NOK; (B) a 1/5 chance of 100NOK; (C) a 1/8 chance of 150NOK.

(a) if you have a utility function of $u(x) = \sqrt{x}$ what is your expected utility from each of these gambles, and which one would you choose.

Calculate the expected utility of all three gambles

U(A) = $\sqrt{0.25 * 50}$**=3.54**

U(B) = $\sqrt{0.20 * 100}$**=4.47**

U(C) = $\sqrt{0.125 * 150}$**=4.33**

B is the preferred (expected utility maximizing) gamble

(b) what are the risk preferences of someone with the utility function (i) $u(x) = \sqrt{x}$ and (ii) $u(x) = x^2$. Explain why.

Demonstrate that (i) is risk averse and (ii) risk loving.

Can demonstrate this in a number of ways. Plot both utility functions, demonstrate certainty equivalence for both. Discuss where the expected utility of either function is relative the expected value for any given gamble / risky decision.

Question 6 Behavioural Game Theory

Consider an ultimatum game where the proposer is given 60NOK and has to choose how much to share with the responders (in 10's of NOK)

(a) What choice of the proposer does standard theory predict?

Helpful if the answer briefly explains structure of the ultimatum game (proposer and responder, what the proposers choices – strategies- are, and the same for the responder)

Use sub-game perfection to demonstrate (via backwards induction) that the responder's best response is always to accept, and as a result that the proposers utility maximizing offer should be zero.

(b) Discuss why the proposer might choose a different amount.

As discussed in class, experiments often find that proposers offer more than zero. One explanation is that they display altruism such that they do not seek to simply maximise their own financial returns. A good answer might show how adopting altruistic / quasi-altruistic utility functions can lead to non-zero offers. An answer could also mention / discuss that responders often reject small offers / zero offers and this changes the best strategy of the proposer.