

Sample Assignments of Economics

Question 1. (20 points) Let $U(c)$ denote the utility that Ursula derives from spending c dollars on consumption, where $c > 0$.

a. For each of the following utility functions, show Ursula's utility function in a graph (with c on the horizontal axis).

(i) $U(c) = \sqrt{c}$

(ii) $U(c) = c^2$

(iii) $U(c) = 2c$

b. Ursula can choose between the following two options:

(Option 1) getting \$100 for sure

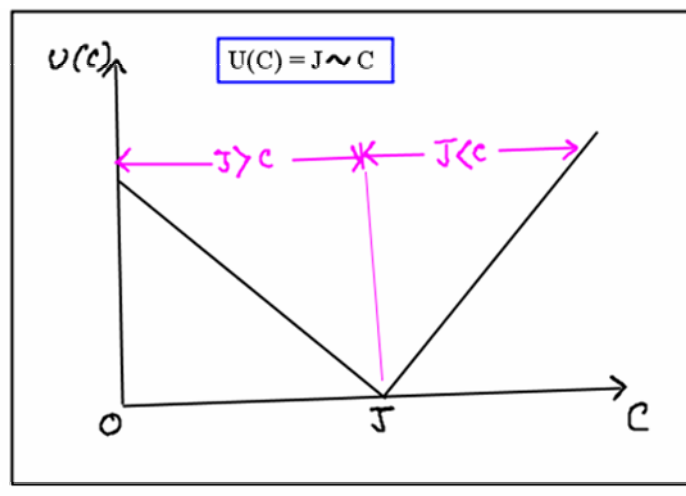
(Option 2) getting \$50 with probability 0.5 and \$150 with Probability 0.5.

For each of the three utility functions considered in a, determine whether Ursula would prefer option 1 or option 2, or whether she would be indifferent; in each also state whether Ursula is risk averse, risk neutral, or risk loving. Explain.

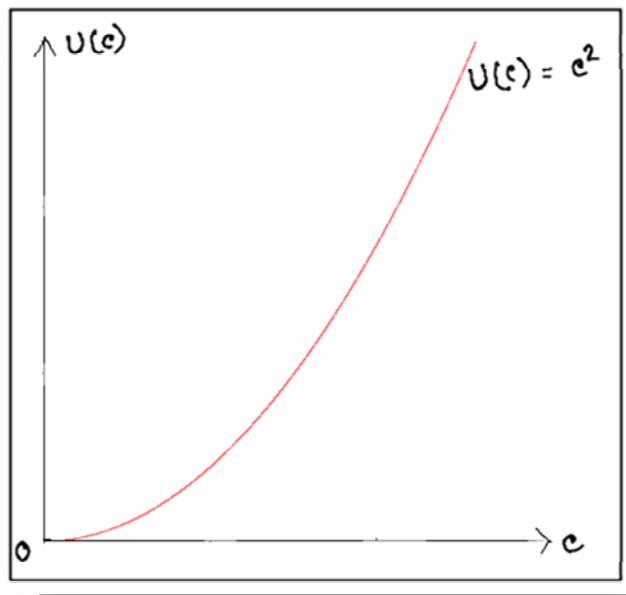
Answer:

(a) The graphs are given by:

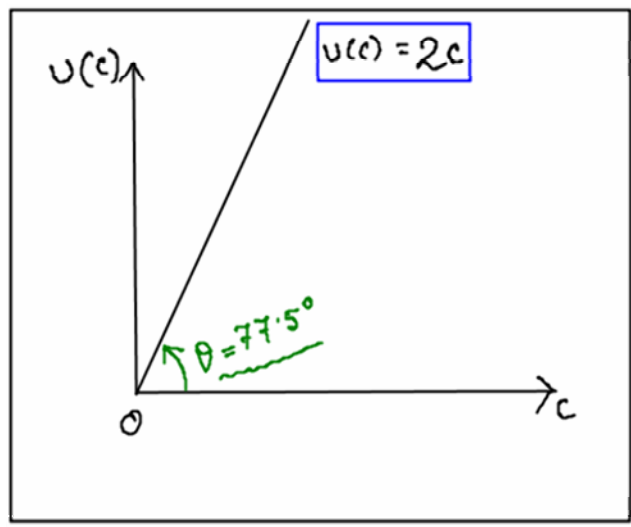
- $U(c) = \sqrt{c}$



- $U(c) = c^2$



- $U(c) = 2c$



(b)

- Option 1:: Total Utility worth= $U(C)$
- Option 2:: Total Expected Utility worth= $P_A(U(C_1)) + P_B(U(C_2)) = 0.5(U(C_1)) + 0.5(U(C_2))$

Where P_A = Probability Associated with event $C_1=0.5$ &
 P_B = Probability of event $C_2=0.5$.

(i)When $U(C)=J \sim C$

Cannot be found out unless the Specific value of 'J' is mentioned.

(i)When $U(C)=2C$

- Option 1:: Total Utility worth= $2(\$100) = \200

- Option 2:: Total Expected Utility worth= $P_A[2(\$50)] + P_B [2(\$150)]$
 $=0.5(\$100) +0.5(\$300) =\$200$

Conclusion: Indifferent between Option 1 and Option 2(Utility same).

Risk avert: Since she does not have an incentive to go and take undue risks when the secure return is same to non-secure risky way.

(i)When $U(C)= C^2$

- Option 1:: Total Utility worth= $(\$100)^2= \$10,000$
- Option 2:: Total Expected Utility worth= $P_A[(\$50)^2] + P_B [(\$150)^2]$
 $=0.5(\$2500) +0.5(\$22500) =\$12,500$

Conclusion: Option 2 is preferred than Option 1(Utility-wise).Option 2 chosen.

Risk lover: Since she can gain is she chooses the Option 2.

Question 2. (15 points) The CEO of Travel Adventures has to choose between upgrading the company's website, or keeping it as it is. The current stock price of Travel Adventures is \$30, and this price would not change if the website were not upgraded. By contrast, upgrading the website would be a risky proposition: the stock price would increase by \$7 with a 60 percent chance, and it would decrease by \$14 with a 40 percent chance. The executive owns no stock in the company, but he owns 200 stock options with an exercise price of \$25.

a. What is the expected change in the stock price from upgrading the website? Would shareholders like the CEO to upgrade the website?

b. Would the CEO gain from upgrading the website?

c. Are the interests of the shareholders and the executive aligned in this case? Explain. Would you say that the CEO's stock options make him/her more or less likely to choose risky projects than the shareholders? Explain. If you find that the interests are not aligned, suggest a change in the exercise price that would make the CEO's interests align with those of the shareholders. Explain.

Answer:

(a) The present stock price of Travel Adventures is given as \$30.

The expected Stock Price will be = $P_A(\$30+\$7) + P_B(\$30-\$14)$ Where $P_A =$ Prob. of \$7 rise in stock value after upgrade and $P_B =$ Prob. of \$14 fall in stock value after upgrade.

$$\begin{aligned}
&=0.6(\$30+\$7) + 0.4(\$30-\$14) \\
&=0.6(\$37) +0.4(\$16) \\
&=\$28.6
\end{aligned}$$

Hence the stock value is expected to fall after upgrade by \$1.4.

As a result, the shareholders will of course like the CEO to go ahead with the upgrade.

(b) The gain earlier for the CEO was $=\$30-\$25=\$5$.

After the proposed upgrade, the expected gain is $= \$30-\$28.6 = \$1.4$.

As a result, the CEO will gain either way, but the gain is less if he goes on with the plan, since he is expected to lose $(\$5-\$1.4)= \$3.6$. So, he will not upgrade the site as it will violate the 'more the better' postulate.

(c) In view of the above explanation, it appears that the view of both the shareholders and the CEO is aligned in the same way.

But there still exists a possibility that the CEO can go ahead with any plan regarding upgrades in future since he has nothing to lose as he owns 200 stock options with an exercise price of \$25 and he is always entitled to get that price whatever be the price in the stock at that time. So, to choose a risky proposition won't hurt the CEO at all, as opposite to the share holders.

The stock option of the CEO can be moulded in such a way that the stock portfolio of him is aligned exactly as of the share holders.

Question3. (25 points) *a. Two business partners decide to build a house together in order to sell it. The two partners choose simultaneously whether to undertake a high level of effort ($E = 2$) or a low level of effort ($E = 1$). The revenues generated from the sale of the house is determined by the lowest level of effort provided within the team. A partner's payoff is $60 + 20M - 1QE$, where M stands for the lowest effort in the team, and E is the own level of effort. This situation may be formally described as a two-player game, with the following payoff matrix:*

	<i>High effort ($E = 2$)</i>	<i>Low effort ($E = 1$)</i>
<i>High effort ($E = 2$)</i>	80,80	60,70
<i>Low effort ($E = 1$)</i>	70,60	70,70

(i) *This game has two Nash equilibria. Identify them. Explain.*

(ii) *Do you think that one of the two Nash equilibria is more likely than the other one to occur? Explain.*

Answer:

(a) i> The Nash Equilibriums are (80,80) and (70,70) in the given table is:

	High effort (E = 2)	Low effort (E = 1)
High effort (E = 2)	80,80	60,70
Low effort (E = 1)	70,60	70,70

The first is the response of the first individual as compared to the response of the second. The interesting point to note is that each of them knew the response of the other in each and every round.

As such the outcome of a game is characterized by the Nash Equilibrium. They are (80, 80), (70, 70). The reason being that anyone of them can easily shun his responsibility while other carry on working will give the former his return without giving any effort. Thus both of them has the tendency to flutter and put in less effort. As a result we will get result like the above.

ii> Among both the equilibriums, the likely outcome will be given by minimax. It is nothing but the 'minimum of the maximum', that is $\min [(80, 80) ; (70, 70)]$ and it will be (70, 70). The reason being that even among the equilibrium, there exists a possibility to shun their own responsibility and try to maximize their utility. As a result, both of them have an incentive to duck and get the better of the other. As a final outcome, therefore, we arrive at (70, 70).

Question 4. (20 points) Intuition would suggest that employers ought to link an employee's pay to his/her performance, in order to provide them with incentives to work hard. However, pay-for-performance is not as common as this simple intuition would suggest. This may be due to the costs (or problems) involved with pay-for-performance. Describe three such problems precisely and concisely (using at most three sentences per problem).

Answer:

- *Desire for leisure:* The employee may desire their leisure so much that the opportunity cost will increase by quite a bit and the company might find the cost of labour high enough. It will be determined by the utility function of the individual workers involving income and leisure.
- *Substitution effect and Income effect:* If the substitution effect is lesser than Income effect for a laborer then the company will be unable to make them work hard.
- *Lack of work motivation:* Las but not at all the least, if the employee lacks

motivation on his part to work more, even after his scheduled hours of work, they will never be interested to work hard. The motivation may not always be in the form of monetary incentive, but can be in the form of healthy environment in working area, foreign travel etc. that in fact, has the power to rejuvenate the employee to a great extent to put in that last mile of extra effort.

