Economics Workshop

Topic 4: Consumer Demand and Uncertainty

1. Suppose that the insurance company with an initial wealth of $2 million is risk-averse and has a logarithmic utility function:

$$U(w) = \ln(w - 1{,}000{,}000)$$

Will the company be happy to accept a premium of $1,200 on a $100,000 house, given that the risk of total loss is 0.01?

With insurance (99% chance there is no claim, and 1% chance there is a claim):

$$0.99 \times \ln(2{,}001{,}200 - 1{,}000{,}000) + 0.01 \times \ln(1{,}901{,}200 - 1{,}000{,}000) = 13.8157$$

Without insurance (100% the company have the same amount of wealth):

$$\ln(2{,}000{,}000 - 1{,}000{,}000) = 13.8155$$

∴ the insurance company has a higher level of utility if it accepts the risk at a premium of $1,200.

2. (a) Distinguish between total utility and marginal utility. Use the following table to calculate the marginal utility obtained by consuming Good X and comment on your answer.

Consumption of Good X	Total Utility ($)	Marginal Utility ($)
1	28	28
2	53	25
3	74	21
4	90	16
5	100	10

(b) Suppose that the market price of Good X is $20. How many units of Good X will be consumed by a rational consumer and what is the resulting total consumer surplus (TCS)?
The consumption is maximised where MU = P. In this case, MU = 20. Therefore, the rational consumer would consume 3 units of Good X with TCS = 74 – 20(3) = $14.

3. A person who would gamble $10 if they had a 10% chance of winning $75 is termed:
   a. Risk free
   b. Risk loving
   c. Risk neutral
   d. Risk averse

4. The price of an ice cream is $2 and you buy three ice creams per week. If the price of an ice cream falls to $1.50 and you still buy three ice creams per week, which of the following is true?
    a. This violates the law of demand because as price falls the quantity demanded must rise.
    b. The marginal utility of the 4th ice cream per week must be less than $1.50.
    c. The marginal utility of the 4th ice cream per week is higher than $1.50.
    d. The total utility of the 4th ice cream per week must be less than $1.50.
    e. Both the total and marginal utility of the 4th ice cream per week must be less than $1.50.

5. A consumer will buy more of a good if the value of the good's:
    a. marginal utility is less than price.
    b. marginal utility is greater than price.
    c. total utility is less than price.
    d. marginal utility is less than or equal to price.
    e. total utility is greater than price

6. Rashid likes avocado dip. He goes to a party where this dip is on the table. After eating four crackers with the avocado dip, he switches to cheese and crackers. From this we conclude that:
    a. Rashid is no longer maximising his utility.
    b. the avocado dip now has a marginal utility of zero.
    c. the avocado dip cannot have been that good.
    d. at this point cheese and crackers have a higher marginal utility than avocado dip.

7. Define the following problems for insurance companies:
    (a) A person is diagnosed as suffering from lung cancer caused by excessive smoking and therefore tries to take out a life assurance contract without telling the life insurance company about the cancer. Explain whether this is an example of moral hazard or of adverse selection.
    Adverse selection when people who know they are bad risks are more inclined to take out insurance.
    (b) A person starts driving recklessly after taking a motor insurance. Explain whether this is an example of moral hazard or of adverse selection.
    Moral hazard when a policyholder may, because they have insurance, act in a way that makes the insured event more likely.
    (c) Explain what an insurance company can do to reduce the problems of adverse selection and moral hazard.

Adverse selection	**Moral hazard**
Insurance companies will try to: (i) obtain lots of info about potential policyholders, (ii) put them in homogeneous pools, and (iii) charge them appropriate premium.	Introducing penalties if the insured event occurs. For example, (i) setting limits of what and how much you can claim, (ii) making you pay an excess, and (iii) giving no claims discount

8. Having been granted debt forgiveness from the World Bank, the government of a developing country incurs new debt, expecting to be bailed out again if necessary. This is an example of:
    a. Adverse selection
    b. Moral hazard
    c. Diminishing marginal utility
    d. Risk spreading

9. (a) Calculate the maximum premium that an individual would be prepared to pay to insure himself against the total loss of his house worth $100,000 if his initial level of wealth was $140,000. Comment on your results. You may assume that the individual utility function can be described as

$$U(w) = w^{1/2}$$

and the probability of a loss of $100,000 is 0.01.

The maximum premium that an individual prepare to pay (P) can be determined from:

$$E[U(a - X)] = U(a - P)$$

where

- a denotes the initial wealth of 140,000 and
- X denotes the total loss of $100,000.

$$\begin{aligned} 0.01(140{,}000 - 100{,}000)^{1/2} + 0.99(140{,}000)^{1/2} &= (140{,}000 - P)^{1/2} \\ (140{,}000 - P)^{1/2} &= 372.4240813 \\ P &= 140{,}000 - 138699.6963 \\ &= 1300.30 \end{aligned}$$

(b) Suppose that insurance company has an initial wealth of $100 million and a utility function of the form

$$U(w) = w$$

Find the minimum premium insurance company would require in order to offer insurance to the insured and comment on whether insurance is feasible in this.

The minimum premium the insurance company will accept (Q) is given by the solution of:

$$E[U(a + Q - Y)] = U(a)$$

where

- a denotes the initial wealth of $100 million
- Y denotes the potential loss of $100,000 (the insured amount)

$$\begin{aligned} 0.01(100 \times 10^6 + Q - 100{,}000) + 0.99(100 \times 10^6 + Q) &= 100 \times 10^6 \\ 0.01Q + 999{,}000 + 0.99Q + 99 \times 10^6 &= 100 \times 10^6 \\ Q &= 100 \times 10^6 - 99{,}999{,}000 \\ &= \$1000 \end{aligned}$$