Microeconomics: Uncertainty and Information Exercises

Agribusiness Teaching Center
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Uncertain profit
Problem №15.2

Clare managers a piano store. Her utility function is given by

$$\text{Utility} = w - 100$$

where w is the total of all monetary payments to her and 100 represents the cost of the effort of running the store. Clare's next best alternative to managing the store provides her with zero utility. The store's gross profit depends on random factors. There is a 50% chance it earns £1000 and a 50% chance it earns only £400 (where by earnings we mean gross profits, not including payments to the managers).

Uncertain profit Problem №15.2

a. If the shareholders offered to share half of the store's gross profit, what would her expected utility be? Would she accept such a contract? What if she were only given a quarter share? What would be the lowest share she would accept to manage the firm?

b. What is the most Clare would pay to buy out the store if shareholders decided to sell it to her?

Uncertain profit
Problem №15.2

c. Suppose instead that shareholders decided to offer that shareholders decided to offer her a £100 bonus if the store earns £1000. What fixed salary would Clare need to be paid in addition to get her to accept the contract?

Uncertain profit
Problem №15.3

Now suppose that Clare can still choose to exert effort but that she can also choose not to exert effort. If she does not exerrt effort, she has no effort cost, so her utility is just the wage, w. The shop's return is £400 for certain.

Uncertain profit
Problem №15.3

a. If shareholders offered to share half of the store's gross profit, what effort would Clare choose? Would she accept such contract? What if she were only given a quarter share?

Uncertain profit
Problem №15.3

b. Suppose instead that shareholders decided to offer her a £100 bonus if the store earns £1000. Show that this would not get her to work hard. What is the minimum bonus that she would need to be paid? What fixed salary would she need to be paid in addition to get her to accept the contract?

Externalities
Problem №16.1

A firm in a perfectly competitive industry has patented a new process for making widgets. The new process lowers the firm's average costs, meaning this firm alone (although still a price-taker) can earn real economic profits in the long run.

Externalities
Problem №16.1

a. If the market price is €20 per widget and the firm's marginal cost curve is given by MC = 0.4q, where q is the daily widget production for the firm, how many widgets will the firm produce?

Externalities
Problem №16.1

b. Suppose a government study has found that the firm's new process is polluting the air and the study estimates the social marginal cost of widget production by this firm to be MCS = 0.5q. If the market price is still €20, what is the socially optimal level of production for the firm? What should the amount of a government-imposed excise tax be in order to bring about this optimal level of production?

Tragedy of commons
Problem №16.2

On the island of Pago-pago, there are two lakes and 20 fishers. Each fisher gets to fish on either lake and gets to keep the average catch on that lake. On lake 1, the total number of fish caught is given by

$$F_1 = 10L_1 - \tfrac{1}{2} L_1^2$$

where L_1 is the number of fishers on the lake. For lake 2, the relationship is $F_2 = 5L_2$.

Tragedy of commons
Problem №16.2

a. Under this organisation of society, what will the total number of fish caught be? Explain the nature of the externality in this equilibrium?

b. The chief of Pago-pago, having once read economics bok, believes that she can raise the total number of fish caught by restricting number of fishers allowed on lake 1. What is the correct number of fishers on lake 1 to allow in order to maximise the total catch of fish? What is the number of fish caught in this situation.

Public Good Provision
Problem №16.7

Suppose there are only two people in society. The demand curve for person A for mosquito control is given by
$$q_A = 100 - P$$
For person B, the demand curve for mosquito control is given by
$$q_B = 200 - P$$

a.   Suppose mosquito control is a nonexclusive good – that is, once it is produced everyone benefits from it. What would be the optimal level of this activity if it could be produced at a constant marginal cost $50 per unit?

Public Good Provision
Problem №16.7

b. If mosquito control were left to the private market, how much might be produced? Does your answer depend on what each person assumes the other will do?

c. If the government were to produce the optimal amount of mosquito control, how much would this cost? How should the tax bill for this amount be allocated between the individuals if they are to share it in proportion to benefits received from mosquito control?

Value of information
Problem 4.5

Suppose Lisa wishes to purchase an HD television. Her current income ¥20000, and she knows where she can buy the television she wants for ¥2000. She had heard the rumour that the same set can be bought at Crazy Eddie's for ¥1700 but is unsure if the rumour is true. Suppose Lisa's utility is given by

$$\text{Utility} = \ln (Y)$$

where Y is her income after buying the television.

a. What is Lisa's utility if she buys from the location she knows?

Value of information
Problem 4.5

b. What is Lisa's utility if Crazy Eddie's really does offer a lower price?

c. Suppose Lisa believes there is a 50-50 chance that Crazy Eddie does offer the lower priced TV, but it will cost her ¥100 to drive to the discount store to find out for sure. Is it worth it to her to invest the money in the trip?

(Hint: To calculate the utility asociated with part c, simply average Lisa's utility from the two states.)