

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway
Semester II Examinations 2004 / 2005

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Exam(s)	2 nd Arts, 2 nd Arts (PSP), 2 nd Comm., 2 nd Comm. (Language), Erasmus, Occasional
Module Code(s)	EC226
Module(s)	Cost Benefit Analysis
Paper No.	1
Repeat Paper	
External Examiner(s)	Professor Vincent Munley
Internal Examiner(s)	Mr. Brendan Kennelly Professor Michael Keane

Instructions:

Please read the instructions for each section

Duration	2 hours
No. of Pages	5 (including Cover Page)
Department(s)	ECONOMICS
Course Co-ordinator(s)	Professor Michael Keane

Requirements:

MCQ
 Handout
 Statistical Tables
 Graph Paper
 Log Graph Paper
 Other Material

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EC 226 Summer Exam

Section A

Multiple Choice Questions. Answer all questions. Write your answers into the examination answer book. Questions 1-6 are each worth 2 points and question 7 is worth 3 points.

1. Which of the following best explains the source of consumer surplus for good A
 - a. many consumers pay prices that are greater than the equilibrium price of good A
 - b. many consumers would be willing to pay more than the market price for good A
 - c. many consumers think the market price of good A is greater than its cost
 - d. many consumers think that the price elasticity of demand for good A is one.

2. Which best describes the CBA decision rule of implementing a project
 - a. the benefits of the project should at least exceed its costs
 - b. net benefits of the project should at least exceed zero
 - c. the benefit-cost ratio of the project should at least exceed one
 - d. any of the above is a decision rule, as one implies the other

3. Which of the following is the correct statement?
 - a. benefit of the same magnitude coming farther in the future has a smaller present value
 - b. present value of a future benefit is smaller with a higher discount rate
 - c. both statements are true
 - d. both statements are false

4. In 2001, net income (sales revenue remaining after paying for costs) of an apple orchard was €100,000. The orchard's net income would have increased to €125,000 in 2002 if a new government regulation was not enforced that year. The regulation increased the cost of insecticide spraying and resulted in an actual net income of €115,000 in 2002. Assuming no divergence between private and social costs, what is the cost of the new regulation?
 - a. €10,000
 - b. €15,000
 - c. €20,000
 - d. €25,000

5. You have a project that produces a stream of benefits valued at €100 per year and lasting forever. What is the present value of this stream if the discount rate is 10 percent
 - a. €100
 - b. €1,000
 - c. €10,000
 - d. €2,000

6. Which of the following is a true statement?
 - a. there is an inverse relationship between price and marginal benefits
 - b. there is an inverse relationship between price and consumer surplus
 - c. there is a direct relationship between price and consumer surplus
 - d. there is a direct relationship between marginal benefits and total benefits when price falls.

7. A worker, who is typical in all respects, works for a wage of €40,000 per year in a perfectly safe occupation. Another typical worker does a job requiring exactly the same skills as the first worker, but in a risky occupation with a known death probability of 1 in 1,000 per year, and receives a wage of €44,000 per year. The value of a human life for workers with these characteristics that might be used in a cost benefit study would be
 - a. impossible to determine
 - b. €4 million
 - c. €40 million
 - d. €8.4 million

Section B

Answer two questions. Each question is worth 15 points

1. Consider a mineral water spring that has a flat supply schedule, $P = 4$. The demand for the mineral water is given by $Q^d = 10 - 2P$, where P is the price per bottle and Q^d is the quantity demanded. The government imposes a tax of €2 per bottle on the consumer.
 - (i) what is the price paid by the consumer before the tax is imposed, and in the post-tax equilibrium? What is the price received by the producers?
 - (ii) Do a cost benefit analysis of the tax decision.
 - (iii) Explain, both in words and graphically, the role of elasticity of supply and demand in determining the tax incidence of a tax imposed on consumers.

2. The town of Frostbite is trying to decide whether to build an outdoor skating rink which would cost €1million and last for only one season. Operating costs would be zero. Seasonal passes would be sold to anyone who wanted to use the rink. If P is the price of a pass, the number demanded will be determined by the relation $Q = 1200 - 6P$. The council has asked you to advise them on building the rink. You should give them one of the following answers:
 - a. revenues won't cover construction costs at any ticket price. There is no way to increase consumer surplus by building the rink.
 - b. if the rink is built and price is set to maximise profits, the town makes a profit and consumers will be better off.
 - c. if the rink is built and price is set to maximise profits, the town makes a profit but consumers are worse off than without the rink
 - d. there is no price at which ticket revenues will cover costs, but total consumer surplus from the rink exceeds costs and that is all that matters
 - e. none of the above

Explain your choice of answer.

3. You are an analyst who is advising Galway City on solid waste disposal. You face the following decisions:

Decision 1. You must decide whether or not to recommend building a new incinerator. The incinerator would cost €1 million to build and operate { this figure incorporates a sum for the capital and running costs of the project}. It is estimated that it would save €1.2 million annually in alternative waste disposal and landfill costs. However, a contingent valuation study shows that the citizens of Galway would be willing to pay €500,000 a year to avoid the air pollution that the incinerator would generate. Should the incinerator be constructed?

Decision 2. You must choose which of two types of incinerators to recommend for the city. Type A has virtually no pollution controls. It would cost €1 million a year to build and operate. It is estimated that it would save €2 million a year in alternative waste disposal and landfill costs, and would generate pollution that the citizens would pay €500,000 a year to avoid. Type B is equipped with an advanced scrubber. It would cost €1.4 million a year, would save €2 million a year in alternative waste disposal and landfill costs, and would eliminate all perceptible air pollution. Which incinerator should be built?

Section C

Answer one question. Each question is worth 25 points

1. The Red Chemical Company employs 50 workers. The company has a poor safety record and accidents can happen in the company's plant. The company has the option of installing safety equipment which lessens the probability of an accident occurring, see Table 1.

Table 1.

Probability of an accident	Annual cost of safety equipment
	(prevention costs)
.0	€800,000
.1	€400,000
.2	€200,000
.3	€100,000
.4	€40,000

- a. Plot the relationship between prevention costs and accident risk
- b. Identify the type of costs associated with accidents, to the firm and to society at large
- c. The accident costs identified in b. could be avoided if the Red Chemical Company installs safety equipment. These costs, which we can call consequences costs, represent the benefits to the company from safety spending. Sketch the likely magnitude of these costs and their relationship to risk levels.
- d. Based on your characterisation of prevention and consequences costs what is the optimum level of accident risk for the Red Chemical Company?
- e. Suggest why this may not be the right level of risk from society's standpoint?
- f. If it is impossible to enumerate and quantify all of the costs and benefits involved then cost-benefit analysis is a limited guide to regulatory activities. What is the economist's response to this criticism? Why is it nonsense to talk about eliminating all accident risk?

2. The city council in Dublin are considering building a LUAS type line to the airport that will lower the cost of the trip to €2.5. At present buses cover the same route and charge a fare of €5 of which €4 is the marginal cost and €1 is profit. Transportation planners feel that they know two points on the demand function. At the current bus fare of €5 there are 1 million users a year and it is estimated that, if the fare was €4, there would be 1.4 million. The planners also know that the capital cost of the project will be €2 million and that the annual operating costs will be €100,000. They take a 20 year time horizon for the project and use a discount rate of 5% in the analysis. Assume further that the planners know that if they build the line they should maximise net benefits by charging a fare where the marginal benefits of the last LUAS ride equal the marginal cost, i.e. €2.5. Is it sensible from a cost-benefit perspective to build the line?

3. A bridge could be built across a river. The cost per week (in terms of interest charges on a permanent loan that financed the construction) is €800. The bridge has a capacity of 2,500 crossings per week and is uncongested up to that point. The demand curve for crossings per week is $Q = 2000 - 2000P$ where P is measured in euro
 - a. What is the optimal price?
 - b. Should the bridge be built?
 - c. What price would maximise revenue?
 - d. Would a private entrepreneur be willing to build the bridge?
 - e. If the revenue-maximising price were charged, should the bridge be built?
 - f. Suppose capacity were only 1,500 crossings per week. What would be the optimal price?