

OLLCOIL NA hEIREANN, GAILLIMH  
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

AUTUMN EXAMINATIONS 2001/2002

## EC226 Cost Benefit Analysis

Second Year

Professor H. Dixon  
Professor M.P. Cuddy  
Professor V. Munley  
Mr. B. Kennelly

**Time allowed: TWO hours.**

### Instructions:

**There are four sections in this paper. Answer one question from Sections A, B and C. Section D consists of multiple-choice questions. There are separate instructions for Section D.**

### Section A (22 marks)

1. Consider a 2 good, 2 input production economy. What does the concept isoquant mean? Draw an Edgeworth box for such an economy labelling carefully all of the diagram. Indicate in the diagram equilibrium point(s). What condition is required for Pareto efficiency in production? Write a brief note explaining this condition.
2. Answer both (a) and (b)
  - (a) Consider a simple economy with two goods, food and clothing, and two consumers, A and B. For a given initial endowment, when the ratio of food to clothing prices in an economy is  $3/1$ , A wants to buy 6 units of clothing while B wants to sell 2 units of food. Is  $P_F/P_C = 3$  an equilibrium price ratio? If so, explain why. If not, state in which direction it will tend to change.
  - (b) Given the current allocation of productive inputs, the marginal rate of transformation of food for clothing in a simple two-good economy is equal to 2. At the current allocation of consumption goods, each consumer's marginal rate of substitution between food and clothing is 1.5. Is this economy efficient in terms of its product mix? If so, explain why. If not, describe a reallocation that will lead to a Pareto improvement.

## Section B (16 marks)

3. Answer both parts of this question.
  - (a) Once we understand the technical conditions for Pareto efficiency in an economy, why don't we simply allow free and competitive markets operate so that these conditions are satisfied?
  - (b) List three examples of market failure, the technical condition that gives rise to each, and the appropriate government response.
  
4. Answer both parts of this question.
  - (a) 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 can earn positive economic profits in the long run.
    - (i) If the market price is €30 per widget and the firm's marginal cost curve is given by  $MC=0.5q$  where  $q$  is the daily widget production for the firm, how many widgets will the firm produce?
    - (ii) Suppose a government study has found that the firm's new process is polluting the air and estimates the marginal social cost of widget production by this firm to be  $MSC = 0.75q$ . If the market price is still €30, 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?
  - (b) Suppose that there are three people in society who vote on whether the government should undertake specific projects. Let the net benefits of a particular project be €150, €140 and €50 for persons A, B and C respectively.
    - (i) If the project costs €300 and these costs are to be shared equally, would a majority vote to undertake the project? What would be the net benefits to each person under such a scheme? Would total net benefits be positive?
    - (ii) Suppose the project costs €400 and again costs were to be shared equally. Now would a majority vote for the project and total net benefits be positive?
    - (iii) Suppose (presumably contrary to fact) votes can be bought and sold in a free market. Describe what kinds of results you might expect in parts (i) and (ii).

### Section C (16 marks)

5. The government is currently considering a grant that would enable a new runway to be built at Galway Airport. This runway would enable direct flights to London and the Continent to be resumed. Present an analysis of the costs and benefits of such a grant.
6. Suppose Bank of Ireland and AIB asked the government for permission to merge. Consider a town where at present each bank has a branch. Under the proposed merger only one branch would remain open in this town. Present an analysis of the welfare effects in this town (ignore the effects of the merger in the rest of the economy) comparing the situation where only one branch serves the local population to the one where two branches compete for this service. What will be the most important judgments that you must make in determining which situation provides the greatest social welfare?

### Section D (16 marks)

**For each of the following questions, write which answer, if any, you have chosen in your answer book. Negative marking will be used for the multiple-choice questions. For each question, you will receive 2 marks for a correct answer, 0 marks if the question is not answered, and -0.5 marks for an incorrect answer.**

7. An efficient allocation of productive inputs requires that
  - (a) each output has the same marginal rate of technical substitution among inputs used
  - (b) each output has the same marginal rate of substitution for consumers
  - (c) each pair of outputs has the same marginal rate of product transformation
  - (d) each individual has the same marginal rate of substitution between outputs
8. The marginal rate of product transformation (MRT) refers to
  - (a) how a consumer can trade one good for another while still maximizing his or her utility
  - (b) how a firm can substitute one input for another and still maintain the same production level
  - (c) how production of one good can be substituted for another while still using a fixed supply of inputs efficiently
  - (d) how quickly a firm can produce a final good while starting with only natural resources

9. In order to assure allocative efficiency
  - (a) people's marginal rate of substitution must equal the economy's marginal rate of product transformation
  - (b) people's marginal rate of substitution must equal the firm's marginal rate of technical substitution among inputs
  - (c) a firm's marginal rate of technical substitution must equal the economy's marginal rate of product transformation
  - (d) all of the above
10. The reason externalities distort the allocation of resources is that
  - (a) too few goods are usually produced
  - (b) firms often go out of business because of the externality
  - (c) a firm's private costs do not reflect the social cost of production
  - (d) regulating externalities uses scarce resources
11. A perfectly competitive steel mill that produces large amounts of a pollution (a negative externality) will, from a social point of view,
  - (a) produce too little steel
  - (b) produce the socially optimal quantity of steel
  - (c) produce too much steel
  - (d) produce too much steel only if it installs pollution control equipment
12. Each of the following provides incentives to reduce a negative externality except:
  - (a) a merger with affected firms
  - (b) subsidizing consumption of the good being produced
  - (c) bargaining among firms
  - (d) taxation of the externality
13. Efficient production of a public good requires
  - (a) that individuals pay for such goods according to benefits received
  - (b) that each individual's marginal rate of substitution be equal to the marginal rate of product transformation of public goods for private goods
  - (c) that the sum of individual's marginal rate of substitution be equal to the marginal rate of product transformation of public goods for private goods
  - (d) that governments produce at the low point of the average cost curve for the public good
14. The "free-rider problem" of public goods refers to
  - (a) individual's refusal to pay taxes
  - (b) individual's attempts to hide their preferences for collective goods and to avoid paying for them
  - (c) individuals' over-use of collective goods
  - (d) the inelasticity of individuals' demands for public goods