

Econ 370: Cost-Benefit Analysis and Project Evaluation

Summer 2013: Assignment 1

READ THE FOLLOWING REQUIREMENTS CAREFULLY:

- This assignment is due at the start of class on Friday, July 19th. No late assignments will be accepted.
- You can work on your own or in a group of up to 4 students.
- If you work in a group, your group should submit only one assignment, with the names and student numbers of all group members clearly indicated on the cover page.
- All assignments must be typed and professionally presented. Hand-written assignments will not be accepted. Hand-drawn diagrams are acceptable if neat and legible.
- All working must clearly explained and all results must be interpreted. Strive to be clear and concise.
- Each assignment will be graded out of a total of 30 marks. For each assignment, two questions will be randomly selected (after the assignment due date) and graded out of 10 marks each. The remaining 10 marks will be awarded for general performance on the rest of the assignment (ie, marks will be awarded for effort, accuracy, presentation).
- 40% of your grade will based on the quality of your writing, exposition, and presentation. The remaining 60% will be based on the technical accuracy of your work.

Please do the following exercises:

1. (10 marks) A BC government agency is considering building a new highway and has hired an economic consultant to estimate the project's various impacts. The consultant's findings are summarized in the table below. If the highway is built, the agency will operate it as a toll road.

Item	Million \$
Time and operating cost savings	45
Safety benefits (lives saved)	3
Alternative route benefits	15
Toll revenues from BC residents	20
Toll revenues from non-BC residents	10
Highway Construction Costs	200
Highway Maintenance costs	10
Toll collection operating costs	10
Toll booth construction costs	5

- (a) A senior bureaucrat in the agency reviews the consultant’s findings. Assuming the bureaucrat behaves as a “guardian”, explain how she would view each of the items identified in the table: as a cost, as a benefit, or as neither? Explain your reasoning and clearly state any assumptions you make. What would the bureaucrat estimate as the project’s expected net benefits?
- (b) Another bureaucrat in the agency reviews the consultant’s findings. Assuming this bureaucrat behaves as a “spender”, explain how he would view each of the items identified in the table: as a cost, as a benefit, or as neither? Explain your reasoning and clearly state any assumptions you make. What would the bureaucrat estimate as the project’s expected net benefits?
- (c) The economic consultant also summarizes the findings. Assuming she behaves as an “analyst”, explain how she would view each of the items identified in the table: as a cost, as a benefit, or as neither? Explain your reasoning and clearly state any assumptions you make. What would the economist estimate as the project’s expected net benefits?
2. (10 marks) How closely do government expenditures measure opportunity cost for each of the following project inputs?
- (a) The time of jurors in a criminal justice program that requires more trials.
- (b) Land to be used for a to expand a municipal sewage treatment plant, which is owned by the municipal government and currently used to store municipal vehicles when they are not being used.
- (c) Labor of current government employees who are required to administer a new program.
3. (10 marks) Because of a recent wave of jewellery store robberies, a city increases police surveillance of jewellery stores. The increased surveillance costs the city an extra \$700,000 per year, but as a result, the amount of jewellery that is stolen falls. Specifically, without the increase in surveillance, jewellery with a retail value of \$1.5 million would have been stolen. This stolen jewellery would have been fenced by the jewellery thieves for \$900,000. What is the net social benefit resulting from the police surveillance program? (Before attempting this question, carefully review the section entitled “Dependence of Net Benefits on Assumptions About Standing” that starts on page 37 of Boardman, including the subsections on pages 38–40.)
4. (10 marks) Excessive and improper use of antibiotics is contributing to the resistance of many diseases to existing antibiotics. Consider a regulatory program in the United States that would monitor antibiotic prescribing by physicians. Analysts estimate the direct costs of enforcement to be \$60 million, the time costs to doctors and health professionals to be \$210 million, and the convenience costs to patients to be \$190 million (all annually). The annual benefits of the program are estimated to be \$380 million in avoided resistance costs in the United States, \$50 million in health benefits

in the United States from better compliance with prescriptions, and \$320 million in avoided resistance costs in the rest of the world. Does the program have positive net benefits from the national perspective? If not, what fraction of benefits accruing in the rest of the world would have to be counted for the program to have positive net benefits?

5. (10 marks) Question 1 from Chapter 3 of Boardman.
6. (10 marks) Question 2 from Chapter 3 of Boardman.
7. (10 marks) The municipal government is going to upgrade a small bridge. To do so it needs to purchase 200 tons of steel. Before this project the demand curve for steel is described by $Q_d = 800 - 4P$ and the supply curve for steel is described by $Q_s = 4P - 200$.
 - (a) Assume there are no taxes or externalities in the steel market. Use a diagram to show the area that represents the social opportunity cost of using the 200 tons of steel to upgrade the bridge? Calculate the dollar value of the social opportunity cost of the steel used and compare it to what the government actually pays for the steel. What is the average shadow price for a ton of steel?
 - (b) Assume the federal government currently levies a tax of \$20 per ton on steel production. Use a diagram to show the area that represents the social opportunity cost of using the 200 tons of steel to upgrade the bridge? Calculate the dollar value of the social opportunity cost of the steel used and compare it to what the government actually pays for the steel. What is the shadow price for each ton of steel used by the project? (Note: the supply function $Q_s = 4P - 200$ does not reflect the effect of the pre-existing federal tax on the supply of steel. So you need to start by deriving the supply function that reflects both the costs of the inputs required to produce steel and the effect of the federal tax on steel production.)
 - (c) Same situation as described in part b. except that we know assume steel production generates an external cost of \$10 per ton. Calculate the total social opportunity costs of the steel used and compare it to what the government actually pays for the steel. What is the average shadow price for a ton of steel?
8. (10 marks) An immunization project will use a small quantity of a vaccine to immunize children in a remote region of a country against a disease common there, but not elsewhere. Explain what cost should be attached to each dose of the vaccine and how this would compare to the purchase price paid by the agency doing the vaccinations if:
 - (a) The vaccine is produced and sold by a domestic monopolist for a price of \$30/dose and the marginal cost of production is estimated to be \$18/dose. Production of the vaccine produces water pollution (an external cost) that does an average of \$2 worth of damage per dose of vaccine produced. The pollution only affects people that live close to the production plant.

- (b) The vaccine is imported from a competitive foreign market where it sells for \$10/dose. Production of the vaccine produces water pollution (an external cost) that does an average of \$2 worth of damage per dose of vaccine produced. The pollution only affects people that live close to the production plant. The cost of shipping the vaccine is \$1 per dose. The vaccine is imported by a domestic firm that has the sole rights to import the vaccine. This firm buys the vaccine at cost and sells it for \$15 per dose.
- (c) The vaccine is imported from a competitive foreign market where it sells for \$10/dose. Production of the vaccine produces water pollution (and external cost) that does an average of \$2 worth of damage per dose of vaccine produced. The pollution only affects people that live close to the production plant. The cost of shipping the vaccine is \$1 per dose. Each dose that is imported is subject to a \$5/dose import tariff levied by the federal government as part of a program to protect domestic pharmaceutical manufacturers.