

Econ 370: Cost-Benefit Analysis and Project Evaluation

January 2013: Assignment 1

READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

- This assignment is due at the start of class on Tuesday, January 29th. No late assignments will be accepted.
- You can work on your own or in a group containing a maximum of 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 be 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 person's demand for gizmos is given by the following equation:

$$q = 6 - 0.5p + 0.0002I$$

where, q is the quantity demanded at price p when the person's income is I . Assume initially that the person's income is \$60,000.

- (a) At what price will demand fall to zero?
 - (b) If the market price for gizmos is \$10, how many will be demanded?
 - (c) At a price of \$10, what is the price elasticity of demand for gizmos?
 - (d) At a price of \$10, what is the consumer surplus?
 - (e) If price rises to \$12, how much consumer surplus is lost?
 - (f) If income were \$80,000, what would be the consumer surplus loss from a price rise from \$10 to \$12?
2. (10 marks) At the current market equilibrium, the price of a good equals \$40 and the quantity equals 10 units. At this equilibrium, the price elasticity of supply is 2.5. Assume that the supply schedule is linear.
 - (a) Use the price elasticity and market equilibrium to find the supply schedule. (HINT: the supply schedule has the following form: $q = a + (\Delta q/\Delta p)p$. First, find the value of $\Delta q/\Delta p$, and then, find the value of a .)

- (b) Calculate the producer surplus in the market.
 - (c) Imagine that a policy results in price falling from \$40 to \$30. By how much does producer surplus fall?
 - (d) What fraction of the lost producer surplus is due to the reduction in the quantity supplied and what fraction is due to the fall in price received per unit sold?
3. (10 marks) The effects of a tariff on imported kumquats can be divided into the following categories: tariff revenues received by the treasury (\$8 million); increased use of resources to produce more kumquats domestically (\$6 million); the value of reduced consumption by domestic consumers (\$4 million); and increased profits received by domestic kumquat growers (\$5 million). A CBA from the national perspective would find costs of the tariff equal to \$10 million—the sum of the costs of increased domestic production and forgone domestic consumption (\$6 million + \$4 million = \$10 million). The increased profits received by domestic kumquat growers and the tariff revenues received by the treasury simply reflect higher prices paid by domestic consumers on the kumquats that they continue to consume and, hence, count as neither benefits nor costs. Thus, the net benefits of the tariff are negative (−\$10 million). Consequently, the CBA would recommend against adoption of the tariff. (HINT: Read the paper “Costs and Benefits Through Bureaucratic Lenses” by Boardman et al. before attempting this question.)
- (a) Assuming the agriculture department views kumquat growers as its primary constituency, how would it calculate net benefits if it behaves as if it is a spender?
 - (b) Assuming the treasury department behaves as if it is a guardian, how would it calculate net benefits if it believes that domestic growers pay profit taxes at an average rate of 20 percent?
4. (10 marks) How closely do government expenditures measure opportunity cost for each of the following program inputs?
- (a) Time of jurors in a criminal justice program that requires more trials.
 - (b) Land to be used for a nuclear waste storage facility, which is owned by the government and located on a military base.
 - (c) Labor of current government employees who are required to administer a new program.
 - (d) Concrete that was previously poured as part of a bridge foundation.
5. (10 marks) This question has two parts:
- (a) Because of a recent wave of jewelry store robberies, a city increases police surveillance of jewelry stores. The increased surveillance costs the city an extra \$500,000 per year, but as a result, the amount of jewelry that is stolen falls. Specifically, without the increase in surveillance, jewelry with a retail value of \$1 million would have been stolen. This stolen jewelry would have been fenced by the jewelry thieves for \$600,000. What is the net social benefit resulting from the police surveillance program? (HINT: Read 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.)

- (b) 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 \$40 million, the time costs to doctors and health professionals to be \$220 million, and the convenience costs to patients to be \$180 million (all annually). The annual benefits of the program are estimated to be \$350 million in avoided resistance costs in the United States, \$70 million in health benefits in the United States from better compliance with prescriptions, and \$280 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?
6. (10 marks) A municipal government project will use 20 units of good X as an input. The municipal government will purchase the good on the open market. The market for good X is competitive. The supply demand curves for good X are given by $Q_d = 200 - 2P$ and $Q_s = 2P - 20$.
- (a) Calculate the resulting change in consumer surplus, producer surplus, government revenue, and net social benefits in the market for good X .
- (b) Now assume that production of good X generates a negative externality. Assume the marginal external cost (MEC) is a function of the quantity of good X produced. Specifically, assume $MEC = 0.2Q_X$, where Q_X is the quantity of good X produced. Now recalculate the resulting change in net social benefits in the market for good X resulting from the municipal project.