ANSWERS TO EXERCISES (5th Edition)

Cost-Benefit Analysis: Concepts and Practice

By

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This document contains answers to all of the exercises in our book. If you find an error please contact: Anthony.Boardman@Sauder.ubc.ca.

For some exercises, the text indicates that an "instructor-provided spreadsheet" is available. These spreadsheets are in separate Excel files – one file for each exercise.

For many exercises the spreadsheet contains a complete solution. This pertains, for example, to Ex 9.6 (Chapter 9, exercise 6) and Ex 17.3. For such exercises, the instructor may wish to modify the spreadsheet before making it available to students, for example, by keeping the raw data but eliminating other material. Or the instructor may wish to ask a slightly different question. In Ex 17.3, for example, we provide the solution for Australia, Portugal and Brazil in the first sheet and ask students to obtain solutions for Norway, New Zealand and Croatia. The solutions for these countries are contained in the second sheet.

For some exercises, there are spreadsheets available that show the calculations behind the answers in this answer key. Students are not aware that these spreadsheets are available, but instructors may find them helpful.

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Chapter 1 Exercises
Introduction to Cost-Benefit Analysis

11. Imagine that you live in a city that currently does not require bicycle riders to wear helmets. Furthermore, imagine that you enjoy riding your bicycle without wearing a helmet.

a) **From your perspective, what are the major costs and benefits of a proposed city ordinance that would require all bicycle riders to wear helmets?**
b) **What are the categories of costs and benefits from society's perspective?**

1.a. The most significant categories of costs to you as an individual are probably: the purchase price of a helmet, the reduced pleasure of riding your bicycle while wearing a helmet, diminished appearance when you take the helmet off (bad hair), and the inconvenience of keeping the helmet available. The most significant categories of benefits are probably: reduced risk of serious head injury (morbidity) and reduced risk of death (mortality).

1.b. There are a number of categories of costs and benefits that do not affect you (directly or are insignificant), but which are important in aggregate. These are:

- program enforcement (a cost)
- reduced health care costs (a benefit), (although this may not be as high as one might expect if bicyclists ride more aggressively because they feel safer; this is called off-setting behaviour)
- increased pollution, due to cyclists switching to cars (a cost)

A social cost-benefit analysis would take account of these costs and benefits in addition to your costs.

2. 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 ($13 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 $19 million-the sum of the costs of increased domestic production and forgone domestic consumption ($6 million + $13 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 (-$19 million). Consequently, the CBA would recommend against adoption of the tariff.

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?**

2.a. If the agriculture department behaved as if it were a "spender," then the benefits would probably be:

- $5 million domestic grower profits ("constituents")
- $8 million tariff revenue (income from foreigners)

Total benefits: $13 million
Costs would be $13 million (reduced consumption)
Net benefits: $0 million.

A spender might treat the additional resources devoted to domestic kumquat production ($6 million) as a cost (if the resources go to non-constituents) or as a benefit (if the recipients are their constituents, such as labour). Either would be okay. However, the description of the question implies that the growers are the primary constituents, thus we would lean towards the view that a spender would not treat the $6 million as a benefit.

If the agriculture department behaved as if it were a "spender," then it might consider the increased prices paid by domestic consumers as a cost. However, again we would argue that the growers are the primary constituency and, therefore, a spender would probably ignore the increased prices paid by domestic consumers. For this reason, a "spender" might also ignore the $13 million loss in consumption benefits.

2.b. If the treasury department behaved as if it were a "guardian," then it would count only the costs and benefits accruing to the government. If so, benefits would equal $9 million ($8 million in tariff revenue and $1 million = 20% x $5 million in profits tax) and costs would be zero, so that net benefits would equal $9 million.

13. (Spreadsheet recommended) Your municipality is considering building a public swimming pool. Analysts have estimated the present values of the following effects over the expected useful life of the pool:

	PV (million dollars)
National Government grant:	**2.2**
Construction and maintenance costs:	**12.5**
Personnel costs:	**8.2**
Revenue from municipal residents:	**8.6**
Revenue from non-residents:	**2.2**
Use value benefit to municipal residents:	**16.6**
Use value benefit to non-residents:	**3.1**
Scrap value:	**0.8**

The national government grant is only available for this purpose. Also, the construction and maintenance will have to be done by a non-municipal firm.

a) Assuming national-level standing, what is the net social benefit of the project?
b) Assuming municipal-level standing, what is the net social benefit of the project?
c) How would a guardian in the municipal budget office calculate the net benefit?
d) How would a spender in the municipal recreation department calculate the net benefit?

3.a-d. The spreadsheet available from the instructor web page facilitates the following estimates of net benefits (millions of dollars):

Social CBA National Standing	Social CBA County Standing	County Guardians	County Spenders
-0.2	1.1	-6.9	8.9

We recommend that instructors delete the cell entries under these columns and distribute the spreadsheet to students. As this is a very simple use of a spreadsheet, it makes a good introduction for students who have not used them before.

As an alternative, instructors can distribute the spreadsheet as provided and give the students a different set of costs and benefits.