

**Benefit-Cost Analysis for the
Environment:
Theory and Practice**

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I. Table 1. The Measurement of Benefits and Costs in Terms of Gains and Losses

- The Compensating Variation (CV Measure)
 - Benefits: Gains: WTP—the sum of WTP's for a positive change—is finite.
 - Costs: LOSS: WTA—the sum of WTA for a negative change—could be infinite.

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II. When To Use WTP & WTA

- The Airport Noise Problem
 - Residents have a right to quiet: WTA
 - Residents have no right to quiet: WTP
 - What difference does it make?

III. The Dams On The Elwha

- Does Restoring a River Have Value to Those that Never Heard of the River?
- Should Native American Claims be Valued According to WTP or WTA?

IV. The Importance of Standing for Environmental Valuation

- The Choice of WTP or WTA.
- Until recently, it was thought that the choice between WTP and WTA made little difference, aside from exceptional cases, and that the source of the difference was solely income effects. However, in important circumstances the WTP and WTA will differ greatly. They can differ because of income effects, substitution effects, and loss aversion

Differences Between WTP and WTA

- The differences in WTP and WTA can be especially large with respect to environmental goods.
- Thus, the Sierra Club might require a large amount to sell the Grand Canyon if it owned it because of its unique nature, but could pay only a much smaller amount to gain it if it did not own it.

Standing and the Law

- The law normally determines ones *standing* based on rights and ownership.
- (1) Standing determines whether or not the WTP or the WTA are to be used.
- (2) It determines whose values are to count.. In determining how they are to count we rely on ownership and rights.

. Standing Questions

- Not all values nor the values of all parties are typically included in a BCA. A municipal government will typically count only the values of its citizens or in some cases of its own finances. Benefits and costs to foreigners are often ignored even in Federal BCA's. The value of goods to the thief that stole them is usually ignored as are sentiments such as envy and so forth.

CONTROVERSIES

ONE

- What is role of legal rights?
 - In deciding whether to use WTP or WTA
 - In determining who has standing to have their values counted
 - In determining what and whose values count

IV. HOW TO DETERMINE VALUES EMPIRICALLY

- Questionnaires
- Revealed Preferences
 - For example travel costs to an environmental amenity

Location of a Municipal Incinerator:
Benefits and Costs

| | Locate in Poorer Area | Locate in Richer Area |
|---|---------------------------|--------------------------------------|
| Land Costs | \$10,000 | \$100,000 |
| WTP to Avoid Having Incinerator in Ones Area | \$120,000 | \$2,000,000 |
| WTA to Avoid Having Incinerator in One's Neighborhood | \$250,000 | \$5,000,000 |
| Benefit of Incinerator | \$1,000,000 | \$1,000,000 |
| Costs of Incinerator | \$130,000 or \$260,000 | \$2,100,000 or |
| NPV Benefits minus Costs | \$870,000 or \$740,000 | (\$1,100,000) or (\$4,100,000) |

Table 4:
 NPV When Compensation is According to
 WTA And Richer Group Provides and is
 Willing to Provide Full Compensation

| | Locate in Poorer Area | Locate in Richer Area |
|---|--------------------------|--------------------------|
| Land Costs | \$10,000 | \$100,000 |
| WTA to Have Incinerator Located in One's Neighborhood | (\$250,000) | \$5,000,000 |
| Gross Benefit of Incinerator (WTP) | \$1,000,000 | \$1,000,000 |
| Costs of Incinerator | \$10,000 | \$5,100,000 |
| NPV Benefits minus Costs | \$990,000 | (\$4,100,000) |

Controversies Two: moral sentiments

- Existence values
- Altruism

1.0 Introduction: The forms of Benefit-Cost Analysis

- **Benefit Cost Analysis**
- (BCA) is a subset of policy analysis. It involves an accounting framework in which benefits and costs associated with decisions are set out for purposes of information and discussion. The details of the framework are of course important and while there is significant agreement about them, there is room for improvement.

The Forms of Benefit-Cost Analysis

- BCA attempts to provide decision makers with preferred policy alternatives, including the alternative of doing nothing. The typical procedure is to measure gains by the WTP for them, losses by the WTA payment for them, and to recommend a project when the WTP for gains exceeds the WTA.

The Forms of BCA

- Life cycle cost analysis (LCCA), commonly used in engineering applications such as in seismic mitigation decisions. LCCA may be properly viewed as a sub-category of benefit cost analysis. It is simply another way of expressing the results of a benefit cost analysis, although this is not generally recognized. LCCA involves the determination of costs of all options. When these options are compared the result is similar to the result of a benefit cost analysis.

Costs-Effectiveness Analysis

- Cost-effectiveness analysis is another subcategory of BCA. Cost-effectiveness analysis presumes that a policy decision about the goal or objective to be reached has been made already, and that the only matter to resolve is the best way of meeting the specific policy chosen. For example, consider a policy discussion about whether a decision to construct a dam to produce electricity or whether a river should be left alone to provide recreation benefits. BCA would consider all of the alternatives.

Cost-Effectiveness Analysis

- However, if a decision already had been made to dam the river, then a cost-effectiveness analysis would determine the most economically efficient dam to build (i.e., the one providing the greatest net benefits). Another important example of cost-effectiveness analysis is air and water pollution standards. Normally, the question that arises with these standards is how to achieve them at the least cost. That is a cost-effectiveness question.