

Lecture # 24 – Cost-Benefit Analysis

I. Steps to Cost-Benefit Analysis (continued)

6. Equity Considerations

- So far, we have said nothing about the distribution of benefits. Of course, these are important, especially in the political arena.
- Transfer payments are shifts of resources from one group to another that do not involve a net change in the value of resources available to society as a whole.
 - Since there is no net change in the value to society, no resources are used, and no new value is created.
 - However, all of the transfers that we have discussed have important equity considerations.
 - A project that passes whose benefits exceed the costs may nonetheless be rejected if the distribution of benefits and costs is seen as unfair.
 - Examples of transfer payments:
 - Taxes paid (such as the emissions fees we discussed with externalities).
 - Unemployment benefits
 - Benefits provided to specific groups (e.g. welfare payments)
- Two principles for identifying and measuring transfer payments:
 - At the level of particular groups, transfer payments resemble conventional benefits and costs.
 - That is, resources they are willing to pay to acquire, or resources expended by the group represent a loss of opportunity value to the group.
 - However, for society as a whole, the sum of transfer payments to particular groups must sum to zero.
 - Since no value is created or destroyed, one group's benefit is another group's cost.
 - Transfer payments merely represent shifts of resources.
 - For example, secondary benefits are often offset by secondary costs.
 - Higher land values near the expanded DestinyUSA would be offset by lower demand for land in other locations, such as shopping areas on Erie Blvd.

- How can we deal with distributional issues in cost-benefit analysis?
 - All of the transfers that we have discussed have important equity considerations.
 - A project that passes whose benefits exceed the costs may nonetheless be rejected if the distribution of benefits and costs is seen as unfair.
 - However, we cannot put a dollar value on the changes in distribution.
 - Rather, the goal is to assess the changes, and then ask whether these changes are acceptable, or if they alter our perception of the program.
 - If possible, the benefits and costs falling on each group can be quantified.
 - However, even if this is not possible, judgments can be made.
- Guidelines for defining groups
 - Groups should not overlap, and should add up to comprise the total society affected by the program.
 - Overlapping groups lead to double counting costs and benefits.
 - The sum of transfer payments across groups should be zero.

7. Sensitivity Analysis

- CBA analyses always include assumptions. Examples of assumptions include:
 - What are the benefits of the project?
 - What are the costs?
 - For example, are some costs, such as pollution, unmeasured?
 - What discount rate should be used?
- As a result, sensitivity analysis is important.
 - You should show how the results change if key assumptions are varied.
- How to analyze sensitivity to key assumptions:
 - Determine a range of plausible values for uncertain costs or benefits.
 - Re-estimate the project's value using the highest and lowest values in the range.
 - Do the conclusions change?
 - Is NPV positive for some values, but negative for others?
 - Presenting results for different discount rates is also a good idea.
 - Summarize the results and compare them with the original results using the most likely assumptions.
 - Where possible, indicate the likelihood that the cost or benefit will be different from the most likely value.
 - Identify which uncertain variables are most important.
 - In the example below, the results are sensitive to the true value of variable Y, but not to the true value of variable X

		Variable X		
		High	Medium	Low
Variable Y	High	+	+	+
	Medium	-	-	-
	Low	-	-	-

II. Which Discount Rate to Use?

- The discount rate reflects the relative value a person places on future consumption compared to current consumption.
 - Lower values show a greater preference for future consumption.
 - If your discount rate is greater than the interest rate, you will be willing to borrow money.
 - A high discount rate says that current consumption is important to you.
 - If your discount rate is lower than the interest rate, you will be willing to loan money.
 - A low discount rate says that future consumption is important to you.
 - Since the market interest rate reflects an equilibrium of lenders and borrowers, we can use the market interest rate as a measure of the discount rate.
- Why discount?
 - People are impatient
 - Prefer immediate well-being to future well-being
 - We expect to be wealthier in the future
 - Historically, both income and wealth have grown over time
 - The extra value of a dollar in the future is smaller than the extra value of a dollar today if we become richer over time.
 - Opportunity cost of not investing
- Why the discount rate matters
 - Discounting affects the value placed on future benefits and costs.
 - Higher discount rates place less importance on future returns.
 - In particular, discounting can affect the desirability of long-term projects
 - As a practical matter, this is not a big issue for short-term projects (e.g. 20-30 years). However, for projects with benefits over several generations, such as climate change, discounting will place very little weight on future benefits.
- How to choose the discount rate
 - Descriptive approach
 - Select rates that match observed market rates
 - These represent outcomes of market decisions on tradeoffs over time (e.g. do I save for retirement or spend money now?)
 - Prescriptive approach
 - Based on ethical and philosophical considerations for tradeoffs over well-being at different times.

- For a descriptive approach, there are several market interest rates. Which should we use?
 - Typically, economists use a risk-free rate.
 - Investors looking for a safe return invest in U.S. Treasury bills. Thus, the return on T-bills is a measure of the nominal risk-free rate.
 - After subtracting inflation, the real risk-free rate is typically around 3%.
 - To purchase assets that are riskier, investors need to be compensated with a higher rate of return.
 - This additional return is known as a risk premium.
 - Another alternative is to use a market rate of return.
 - If the funds come from firms, the before tax rate of return is the opportunity cost.
 - However, if the funds come from private investors, the after-tax rate of return is the opportunity cost.
 - In the U.S., this is typically around 7%. Note that this rate varies by country, and may be higher in countries with riskier investment climates.
 - Since government projects use both types of funds, an alternative is to use an average of both rates.
- A prescriptive approach leads to the concept of a social discount rate.
 - The above estimates use market data to determine the discount rate. Are their reasons to believe that the market rate is flawed?
 - Some economists argue that the opportunity cost of foregone future consumption might differ from the opportunity cost revealed in the markets.
 - For example, long term projects involve benefits or costs for future generations.
 - However, future generations are not represented in the market.
 - In this case, it might make sense to use a *social discount rate* which is lower than the rates observed in the marketplace.