

A New Format, a New Look

Beginning with this issue of our newsletter, we are going to a shorter format focusing on one main topic per issue. We are also beginning the transition to an all-electronic newsletter, delivered by e-mail, and designed for on-screen reading. Going electronic not only means a savings in postage, but also in paper, and delivery time. Never let it be said that a group of economists don't practice economy! For the time being, we will continue to send the newsletter by mail as well. But if you'd like to be added to our e-mail list, please send your e-mail address to: newsletter@norecon.com.

This issue's article is the first in a series on economic tools. At any party the standard ice-breaking question is "So what do you do?" Ask an economist that, and the follow up question is usually, "OK, so...what do you do?" For many of us, economists are like our appendixes: we're pretty sure they're there for a reason, but we couldn't really tell anybody what that reason might be! With this series of issues, we hope to answer that question for you, and to demystify some of the processes we use to help our clients make sound policy and investment decisions.

Economics Tools: Benefit Cost Analysis

Northern Economics' mission is to help decision-makers in public and private sectors make sound policy and investment decisions. As a means to that end, we employ a number of economic analysis methods and tools to help clients evaluate their options and make informed choices. One method we frequently employ to assist our clients is Benefit-Cost Analysis (BCA). BCA calculates the benefits and costs of a project or policy and provides useful measures of project value including Net Present Value, and a Benefit-Cost Ratio.

The Net Present Value of a project tells us the present-day value of the stream of net income (benefits less costs) associated with the project over time.

The Benefit-Cost ratio indicates whether or not a project will provide a net benefit by showing the relative value of benefits to costs. If the ratio is less than one, costs exceed benefits; if it is equal to one, benefits and costs are equal; and if it is greater than one, benefits exceed costs.

We use BCA frequently because it is versatile, can account for future project values, and is sensitive to differing

scenarios. We have used BCA to evaluate a proposal for a convention center, as well as alternative development strategies for the Ted Stevens Anchorage International Airport, proposed bridge access from Ketchikan to Gravina Island, road developments, tunnels, and even the impacts of alternative fisheries management measures.

Let us consider a simplified example of a company trying to decide whether to build a parking garage. An engineering plan calculates that the building will cost \$2 million and that it will cost \$200,000 per year to operate. Our analysis of operating revenue determines that the garage will start to

earn revenues of \$500,000 per year starting in the second year. The company is interested in knowing whether this project will be profitable over the next eight years. Net income in year one is estimated to be -\$2 million, and \$300,000 in years two through eight. Over eight years, total costs are \$3.4 million, benefits are \$3.5 million, and net income is \$100,000.

The net present value shows that the difference between the present value of revenues (benefits) and costs over the eight years is -\$360,000 at a 7% discount rate, -\$490,000 at a 10% discount rate, and -\$560,000 at a 12% discount rate. The discount rate chosen would depend on what the company can earn on its investment capital in an alternative investment. The ratio of

Net Present Value

$$NPV = \sum_{i=1}^n \frac{values_i}{(1+d)^i}$$

For a simple explanation of Net Present Value, consider this: Which would you rather have: a dollar today or one a year from now? How about two dollars next year? Or five? Net Present Value is a tool that defines the value of future returns or losses in terms of their values today.

Benefit-Cost Ratio

$$\frac{npv(benefit)}{npv(cost)} = \text{benefit-cost ratio}$$

The formula for a Benefit-Cost ratio is very simple. What requires effort is the identification and analysis of all factors making up the Benefit and the Cost portions of the ratio.

net present values of revenues to costs are all less than one, indicating that costs exceed revenues.

consider how the stream of benefits and costs will change and accrue over time. This is important because effective planning and decision making often requires that several alternative scenarios be evaluated and that they be evaluated for

that it includes items that may not have any market prices and so are valued using different techniques (i.e. value of clean air, value of a scenic view). In addition, defining the region or the scope of the analysis is critical in BCA because it determines if a benefit or a cost should be included.

Benefit-Cost Ratio and Net Present Value of Proposed Parking Garage

	Project Years								Benefit Cost - Measures			
	1	2	3	4	5	6	7	8	Total	Net Present Values		
										7%	10%	12%
Cost	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.4	\$2.88	\$2.70	\$2.60
Benefit	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	3.5	\$2.52	\$2.21	\$2.04
Net	-2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	-\$0.36	-\$0.49	-\$0.56
Benefit-Cost Ratio = NPV of Revenue/NPV of Costs										0.88	0.82	0.78

What this simplified example shows is that the revenues and costs are nearly equal but in net present values the project yields a negative return. Under these circumstances, the parking company might wish to compare this project with a larger garage that might earn greater revenue relative to the construction costs. Comparison of this project with another larger garage project can also be done with BCA.

BCA can also evaluate alternatives within projects and policies. The comparisons made in BCA can

their long term benefits and costs. BCA also allows us to vary estimates of benefits and costs to see how sensitive the decision will be to potential changes in benefits and costs over time. BCA can be applied to assess the financial feasibility of private business decisions or just as effectively can address public issues, such as whether a project or policy produces a net gain to society as a whole or to specific societal groups.

Finally, it should be noted that an ideal BCA goes beyond a standard financial analysis (or NPV analysis) in

Benefit Cost Analysis is just one of the tools Northern Economics uses to assist our clients. In future issues we'll examine other tools such as Input-Output Analysis. We'll also keep you abreast of ongoing projects, and how they are affecting the Alaskan Economy.

next issue:
Assessment of Economic Impacts of Measures to Protect Stellar Sea Lions in the Southwest Alaska Municipal Conference