ADS Mandatory Reference: N/A
ADS Supplementary Reference: 202

ECONOMIC ANALYSIS OF ASSISTANCE ACTIVITIES

A. Introduction

1. The purpose of economic analysis is to determine whether an activity is a worthwhile investment for the country, i.e., whether the results from an activity are sufficiently valuable as to warrant the expenditure of scare resources. (**NOTE: While the guidance on this and other types of analyses typically refers to an "activity" as the intervention being analyzed, analysts may prefer to conduct such analyses at a higher level of intervention when the component parts of such an intervention lend themselves to a common, combined analysis.**) Economic analysis also allows activity designers to select the least-cost design from among alternative options, as well as to choose among different activities in the same sector or in different sectors. Economic analysis is an indispensable tool in the Strategic Objective identification and design process. Where results are easily evaluated in monetary terms, the economic analysis provides one measure by which to evaluate and compare possible interventions. Where results are quantifiable but not easily reduced to monetary values, economic analysis allows the designer to determine the real resource cost per unit output which is indispensable in making judgements concerning an activity's value. Where outputs are non-quantifiable, economic analysis enables choice between competing designs on a least-cost basis.

2. While USAID does not have a rigid methodology for economic analysis, certain basic principles should be applied in all cases. In many instances the application of these principles will vary depending on the availability of data and the nature of the activity. There are many detailed manuals of economic analysis which go beyond the general principles to be outlined here, and which can be used as resources for the analysis of specific activities. A partial list of these sources is presented at the end of this Section.

B. General Features of Any Economic Analysis

1. The general principle of economic analysis is to compare the real benefits of any given activity with its real costs. The larger the discounted benefits for a given set of costs or the smaller the costs for any given set of benefits, the more worthwhile is the activity. The primary task of economic analysis is measuring the costs and benefits in terms of a

common yardstick - (**1**) measuring the real value of any result; and (**2**) comparing results across time. The first difficulty underlies the distinction between "**financial**" and "**economic**" analysis, while the second necessitates the need for a time discounting factor.

2. Financial analysis compares the stream of nominal benefits from any activity to the stream of nominal costs as determined by using (**normally**) local market prices. If the present value of benefits is substantially larger than the present value of the costs, then the activity is profitable. A minimum degree of profitability in terms of an internal rate of return or net return on investment will usually be required. Financial analysis is used to measure "**private profitability**," i.e., whether or not an activity is profitable from the point of view of the activity owners or actors - farmers, private firms, public sector entities, etc. These actors face market prices, pay taxes, receive subsidies, etc. If the financial analysis results in an adequate financial return (**i.e., exceeding what might be earned by an alternative use of resources**), then it is likely that the actors will behave in ways projected by the activity design (**adopt new technologies, for example**). If financial returns are small or negative, the results to be derived from the activity are not likely to be achieved. Thus financial analysis is a necessary component of the design of any activity in which financial viability is a consideration.

3. Economic analysis is similar to financial analysis except that in the place of (**nominal**) market prices one uses (**real**) "**shadow prices**" or "**opportunity costs**." In economic analysis the objective is to determine the social profitability of an activity, i.e., whether spending scarce resources in this particular way is sensible for the society as a whole. In a world of government involvement in the economy, labor unions, monopoly and restrained international movement of actors and products, (**nominal**) market prices often do not reflect real resource costs. In addition, private decision-makers do not take into account benefits received or costs incurred by others. Since the actual situation often does not reflect such an ideal, the prices of inputs and outputs have to be adjusted prices. Other modifications are necessary to financial data and are briefly noted below.

4. For example, the price of labor (**the market wage**) often overstates the real cost to the economy of using labor, since wages are artificially high. The existence of unemployment or underemployment is prima facia evidence that the opportunity cost of unskilled labor is lower than the market price. In other words, using local labor in this activity at the prevailing wage overstates the output foregone by society which this labor could produce in alternative uses. The "**shadow price**" is the wage rate that would reduce unemployment to that voluntary level necessary for labor mobility. Extreme care is required in deriving shadow wage rates

since seasonal, geographic and labor classification problems may be more relevant than national rates of unemployment.

5. The shadow price of foreign exchange is often higher than the market price given by the official exchange rate. Black markets in currency, exchange controls or high import tariffs, or restrictive quotas, are all indications of an overvalued exchange rate.

6. Real interest rates, especially in times of high inflation, are often lower than opportunity cost of capital because of government policy to encourage certain investment activities. Similarly, capital may be undervalued because capital goods are often imported at preferential exchange rates, without significant tariffs or other taxes. The problem is to estimate what discount rate represents the scarcity value of capital in the economy, or in other words, the opportunity costs of capital. Several of the references at the end of this section include methods of estimating the opportunity cost of capital.

7. All economic values have to be netted subsidies and taxes. These are financial costs or benefits, but not economic costs since they do not involve payments for the use of scarce resources. For example if the C.I.F. price of fertilizer bought from the U.S. is $150 a ton, but the fertilizer is sold to farmers for $100 a ton, the economy is still paying $150 for that fertilizer. The economic costs is $150. Tradable inputs should be valued at the F.O.B. price (**at the shadow exchange rate**).

8. Activity costs are made up of both capital and recurrent costs, denominated in both foreign exchange and local currency costs. In addition, all host government contributions and other donor participation as well as any private sector costs, should be included. Any activity analysis should include as costs all resources which could be used as productive inputs in another activity or sector, including building, machinery, labor costs, etc. These costs should be calculated for the projected life of the activity. Where capital (**e.g., vehicles**) are expected to wear out before the end of the activity, replacement costs must also be included.

Investments made prior to the design of a given activity should not be included as activity costs. The general principle is that some costs are forgotten, except for those elements for which alternative uses are possible. Similarly, finance charges, which are already accounted for by the discounting procedure, and depreciation are not counted as costs in an economic analysis. On the other hand, indirect costs of an activity need to be included. For example, a dam which causes the flooding of agricultural land has as a cost loss in the value of that land. If physical

capital has a salvage value after activity completion, that value is treated as a benefit in the last year of the activity.

9. Benefits are two kinds - measurable and immeasurable. In between are those items that cannot be measured with any confidence or precision. The primary dimension of benefits is the increase in income (**or output**) directly attributable to an activity. Some benefits are not easily measurable and cannot be reduced to a benefit-cost calculus. These benefits should be noted and their importance discussed. Substantial benefits of this type may make an otherwise unprofitable activity acceptable. It should be recognized that such a decision to accept an activity implicitly assigns a minimum value to such benefits. Care should be taken to assure that such implicit values are reasonable in the context of overall levels of per capita income, public sector spending, etc.

10. Both costs and benefits should be calculated on an incremental basis, that is, only those portions of costs and benefits that are due to the activity. This is particularly important in improvement, expansion, or rehabilitation activities. Calculations of incremental costs and benefits, therefore, requires a "**with activity/without activity**" procedure, where all costs and benefits associated with the activity are calculated net of costs and benefits that would exist without the activity.

11. Costs and benefits need not be adjusted for projected rates of inflation unless there is reason to believe the rates of inflation will differ significantly between costs and benefits.

12. An output or result five years from now is less valuable than an output or result today. Therefore, since activity costs and benefits occur across time, they have to be discounted in order to compare them. The general discounting procedure is explained in any of the activity analysis manuals. The critical question is the choice of a discounting factor - the social rate of return on capital. Theoretically this rate of return is the price of saving which is determined by supply factors (**the rate at which consumers are willing to put off consumption today for increased consumption tomorrow**) and demand factors (**the rate at which investors are able to transform capital today into increased output tomorrow**). Because of numerous interferences on the part of government in financial markets, it is not possible to rely on market rates as indicators of real social rates of return. Therefore estimates need to be made on the basis of information about private market rates, commercial rates for foreign exchange loans, etc.

13. Once economic costs and benefits have been calculated as flows over time, it is a relatively simple matter to compare them in order to determine whether a given activity is economically worthwhile. The

normal procedure is to calculate an internal rate of return (**IRR**). The net annual benefit flow is calculated by subtracting costs from benefits for each year of the activity. Most financial calculators have programs for converting this flow of net into an IRR which is defined as that discount rate that reduced the stream of net benefits to approximately zero. The higher the IRR the more profitable the activity. An activity could not be justified on economic grounds if the IRR is below what is believed to be the opportunity cost of capital.

14. Since all these calculations depend in part on some imprecise estimates of cost and benefit flows (**both due to the use of shadow prices and to the assumptions inherent in the activity**), it is useful to perform a sensitivity analysis on the IRR. This is done by varying the critical assumptions such as incremental yields in agricultural activities, estimates of the shadow price of foreign exchange, and activity delays, to determine what impact different assumptions would have on the IRR.

15. As noted previously, economic analysis can be used, where benefits are largely immeasurable, to compare the stream of costs of any set of alternative activity designs in order to determine which of those designs represent a least-cost solution, and is, therefore, preferable. Shadow prices should be used where appropriate in a least-cost analysis. A least-cost analysis should be accompanied by a demand analysis that demonstrates the need for the activity's intended output or result. The need for this kind of analysis obviously should be identified by the Strategic Objective Team early in the activity cycle so that alternative designs are undertaken.

16. The economic analysis should incorporate income distribution criteria to the extent possible. The methods of analysis described so far deal only with economic efficiency criteria, not equity criteria. Several of the sources listed at the end of this appendix describe how distributional weights can be incorporated in the traditional forms of cost-benefits analysis. In addition, if employment creation is a major result to be produced by the activity, criteria such as cost per job should be calculated in order to determine how efficiently the employment objective is to be achieved. Total incremental employment effects should also be presented as a activity benefit.

17. Finally, if the activity has as a major result a favorable impact on the country's balance of payments, the net foreign exchange impact of the activity should be analyzed. In the traditional methods of cost-benefit analysis, the net stream of costs and benefits do not distinguish between local currency and foreign exchange items.

C. The Use of Economic Analysis in Different Sectors

1. In general, the activity analysis procedure described above is most easily applied in activities clearly designed to have marketable economic results or outputs - increments in income or output. This is true of most agricultural and industrial activities, as well as most infrastructure activities. For example, analysis is applicable to transport activities such as roads where the results are reduction in transportation costs and time savings. An important indirect benefit of such an activity is the increase in the value of land when transport costs are reduced. While this is difficult to estimate in the absence of competitive land markets, such benefits are fully represented by the increase in the value of agricultural output due to the decrease in transport costs. Penetration roads analysis tends to be more complicated since causal factors may be more dispersed and activity timing (**of other required inputs**) more difficult to estimate.

2. Many USAID Strategic Objectives or results packages involve more than one type of activity. If these activities are integrated, such as integrated rural development interventions that includes credit, extension, seed, fertilizer, and research components, all the activities should be analyzed together in the cost-benefit analysis. In other words, their combined costs and benefits should be computed to yield a single IRR for the whole Strategic Objective. The test for whether two activities are integrated is whether the results or outputs of one are affected if the other does not occur.

3. While it is more difficult to estimate economic benefits in human resources activities - i.e., education, health and population - methodologies are available for converting quantifiable, but non-monetary, benefits into monetary ones. In education, for example, the general procedure is to estimate the lifetime increments in income due to increased education levels, and, in many countries, the data for doing these calculations are available.

4. Even when it is not possible to reduce quantifiable results (**e.g., number of births averted**) into monetary measures, economic analysis allows one to estimate the cost per unit output which can then be compared to alternatives. For example, an activity that costs $100 to avert a birth would be viewed less favorably, other things being equal, than one that costs $70.

5. Where results or outputs are not easily quantifiable ex ante (**e.g., agricultural research activities**), it still might be possible to determine whether such an activity is economically sound. One procedure is to estimate a desired rate of return and calculate the stream of net benefits necessary to achieve such a rate of return. In the agricultural research

example, a desired rate of return of 15% might imply an increase in yields of 50% and a spread of the research results to 10,000 farmers per year. It would than be necessary to make a judgement as to whether such outputs were feasible.

D. Recommendations for Further Information.

It is beyond the scope of this Appendix to give activity design personnel (**Strategic Objective Teams or subordinate teams**) even a rudimentary education on the economic analysis of activities. While the basic methodologies are standard, the exact application of such methodologies in different sectors and activities call for special and particular treatment. There are no hard and fast rules for determining shadow prices or social rates of return, and in many cases the task calls for reasonable judgements rather than exact measurement. Annex A to this Appendix is a series of documents which explain in much greater detail the methodology of activity analysis, and which should be referred to for a more complete handling of the topic. This list is not exhaustive, and in many cases designers may wish to consult other sources.

E. Sources for Treating Economic Analysis of Activities

1. General Sources Treating Project Economic Analysis

Adler, Hans A., Sector and Project Planning in Transportation, World Bank Staff Occasional Papers, No, 4, The Johns Hopkins University Press, 1967.

Austin, James E., Agroindustrial Project Analysis, The Johns Hopkins University Press, 1980.

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Schuster, Helmut, Agricultural Roads, 1973, World Bank.

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Squire, Lyn, I.M.D. Little, and Mete Durdag, Application of Shadow Pricing to Country Economic Analysis with an Illustration from Pakistan, June 1979, Working Paper #330, World Bank.

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2. World Bank Sector Papers

Agricultural Credit, May 1975, 85 pages (**including 14 annex tables**), (**A World Bank Paper**).

Agricultural Project Analysis: Case Studies and Exercises, World Bank.

Development Finance Companies, April 1976 (**Sector Policy Paper**), World Bank.

Housing, May 1975 (**Sector Policy Paper**), World Bank.

Rural Development, February 1975, Sector Policy Paper, World Bank.

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Sites and Services Projects, April 1974, (**A World Bank Paper**).

Village Water Supply, March 1976 (**A World Bank Paper**).