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COST-BENEFIT ANALYSIS:

A METHODOLOGICAL EXPOSITION \*

by

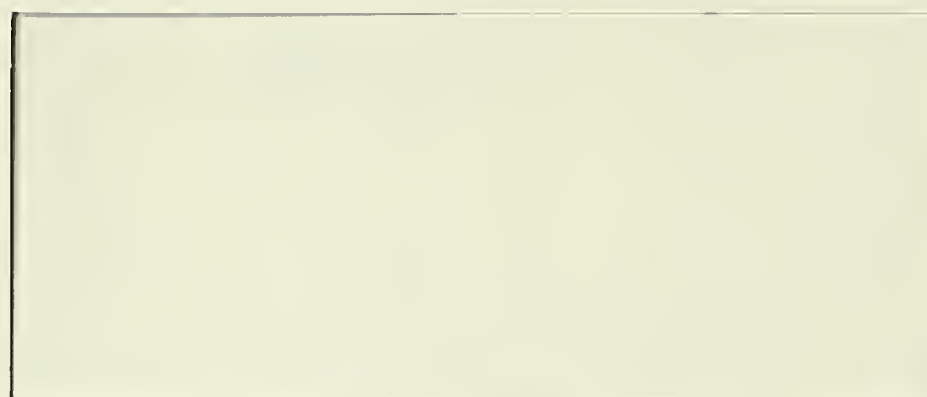
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1. The Structure of Social Evaluation

1.1 Introduction

Cost-benefit analysis is a technique employed mostly by economists for evaluating changes in social situations and the relative desirability of different collective policies. Typical applications would be to ask whether the government should enact a certain piece of legislation, or which of a number of different expenditure projects should a particular agency of the government adopt. As a technique it is not a specific set of procedures but a broad general approach. Studies claiming to be cost-benefit analyses have differed in so many small and large ways that an observer might have been led to conclude that they had in common only the claim. Cost benefit is a distinctive way of regarding social choice problems, but its concrete applications have considerable variety, some of it the justifiable projection of the differences among the problems and some the result of controversiality in the handling of important components. It is neither unitary nor definitive.

These differences and controversial aspects do not obscure the main emphasis, especially in the wide context of social evaluation in the behavioral sciences. In the present essay I shall attempt to clarify this central emphasis, spending the major part on its general distinguishing features rather than on technical details. I am addressing the essay to social scientists broadly, not solely to economists, and so shall linger over methodological considerations that economists typically take for granted or bear only with impatience. At the end I shall present applications of cost-benefit designed to indicate something of the variety of issues that are encountered.

## 1.2 The Paradigm of Social Choice

Benefit-cost concerns social evaluation, not individual evaluation, but the presumed relationship between the two is one of the two major pillars of the approach. It must therefore be placed within the perspective of social evaluation. To facilitate this, we briefly examine a paradigm of social evaluation.

First, social evaluation refers to evaluation of social situations from the point of view of the society. It can signify a process carried out "by the society", or by an "agent" or "representative" of the society. The sense in which it is most usual to refer to evaluation by the society itself is in choices made by the decision-making institutions of the society. Social choice and social evaluation are here being used nearly interchangeably. A society's relative evaluations of different situations are revealed in its choices among them. Of course, evaluation between some two situations need not be relevant to an actual choice between them, as for example is the situations refer to the past. Evaluations are often carried out without the practical question of selection through public policy being involved. But cost-benefit is intimately **connected** with public policy, hence with choice; the sense in which it delivers evaluation is in the immediate context of social choice. We shall therefore be willing to neglect the distinction between evaluation and choice and use them interchangeably.

The distinction between choices made by the society and by an "agent" on behalf of the society is a deeper one. Here too the context of cost-benefit defines our stance. Integral to cost-benefit is the situation of having to formulate public policy, or to undertake public action in accordance

with public policy. Social action is not simply to be observed and understood: it is to be informed, directed. Cost-benefit is an apparatus to be wielded by an agent of the society for the purpose of informing it about desirable directions of action, and perhaps undertaking such action on behalf of the society. The proper context is therefore one of setting out a procedure for judging the relative desirability of different social actions, a procedure that can be used either by agents of the society in preparing its own actions, or by observers who seek to advise or criticize the society on its policies.

Second, the social decision maker is assumed to wish to make rational choices. Rationality here means something quite simple in concept (although not nearly so simple in practice): to choose, under the circumstances, most in accordance with the real aims of the chooser. It does not prejudge the nature of the aims, nor prescribe the actual procedures by which this most fulfilling choice is to be made. It says nothing, for example, about the degree of calculatingness or detachment of the chooser.

Rational choice is assumed to be logically characterized by a distinctive structure of definable elements. Each choosing situation involves alternatives, consequences, values and criteria. Basic to the existence of a problem of choice is the existence of a set of mutually exclusive alternatives. The problem would be trivial in the absence of more than one alternative. In the present context these alternatives are different public policies or actions. These are to be compared in terms of their relative desirability. But the desirability of the alternatives is derived from the desirability of their consequences. The second element in the situation is

the delineation of the consequences of the policy alternatives. These consequences are social states, specified in dimensions relevant to the nature of the policy alternatives. The third element is the comparison of consequences. This can be accomplished only if there is available a criterion in terms of which the relative desirability of different social states can be ordered. The ordering criterion is an essential ingredient of the process. It is not a "natural" construct, implicit in the choosing situation, but an artifact, representing the values or ends or aims of the decision-maker. Thus, the overall situation is that of a decision-maker with given ends, confronted by a set of mutually exclusive possibilities. He must scrutinize the possibilities with respect to his system of ends, selecting that one which achieves his ends most completely.

This paradigm is broad enough to be consistent with both sides of a fundamental contemporary debate on social choice: totalism vs. incrementalism. The first argues that relevant social evaluation concerns judgments about social states that represent options for radical institutional change. The second argues that social change is highly circumscribed by initial conditions, and that the truly relevant choosing situations involve only marginal changes from the status quo as feasible. The logical structure of the choice situation is unaffected by this opposition. Each position is tantamount to a specializing of the alternatives of choice and the evaluational criterion. The general nature and function of the situational elements, however specialized for these cases, remain unaffected.

Current controversy about the nature of the evaluational criterion may similarly be subsumable within the framework presented, although one

form of it does touch on the basic relevance of rational choice. The debate is between a syncretic and a bargaining notion of social ends: between the belief that individual and group divergences in goals are reconcilable into a unitary conception of the public interest, and one that argues that these divergences are not dissoluble, that at best they are compromised through bargaining. In most versions the argument can be interpreted simply as a difference about the formulation of the evaluational criterion. Whatever the criterion, so long as it is operationally defined, it can be applied in principle to obtain a judgmental ordering of the alternatives of choice.

The version that does raise the question of relevance is that in which the bargaining polarity insists that the criterion is not the ordering of compromises revealed through bargaining, but the process of bargaining itself. The decision-making process itself, and only that, is what is socially valued as an end: the process is the end, the outcomes are simply derivative. Thus, there is no overview evaluation of social alternatives; there is only a process in which individuals and groups follow individual and group advantage with respect to piecemeal public actions. A social policy is simply a resultant of these piecemeal effects, in no part of the system examined or chosen as totalities.

This position does violence to our paradigm and to the cost-benefit approach which depends on it. It significantly narrows the context of social valuation. social valuation refers only to broad decision-making mechanisms; only individual valuations exist to fill the outcomes of these mechanisms. In this extreme form the position comes close to rejecting relevant social valuation. Within the context of cost-benefit analysis, we must

reject it as a valid position within the range of permissible valuational formulations. We do, however, consider a milder variant of it below.

Where does cost-benefit analysis fit into the paradigm of social choice? Its chief issues focus largely, but not exclusively, on the evaluational criterion. Most cost-benefit studies assume that in each choosing situation the relevant set of alternatives is not problematic and is known. Similarly, with the given set of alternatives it is assumed that the consequences are in principle knowable, and can be derived from positive economic analysis. Any practical difficulty in deriving them is not considered a deficiency of the cost-benefit approach but of positive economic analysis. Thus, for each problem the policy alternatives and their consequences are known. The difficulties proper to cost-benefit relate to the specification of the relevant social goals, and to the evaluational criterion which these goals make appropriate.

This delimitation begs a number of important questions. Even conceptually, alternatives and consequences are not so easily disposed of. For some incrementalist and bargaining orientations the alternatives are critical to social choice situations. Resolution of social conflict is deemed often to depend on the social innovation of devising new alternatives which possess the salutary features of old alternatives while in addition containing some critical compromise component to dissipate a prior impasse. So the significant fewness, the incompleteness, of alternatives, the sequence in which they are formulated, and the non-trivial creativity necessary to supplement any such set selectively, are central characteristics in the process of social choice.

Similarly, specification of consequences is of great moment to the choosing situation. In the concrete circumstance, not all or even most of the consequences of the various alternatives are known. Existing theory does not suffice to furnish definitive and exhaustive answers. What is more, the degree of detail and even of accuracy obtained depends on the amount of resources deliberately chosen by the decision-maker for the purpose. The accuracy obtainable is therefore a policy decision of the same choice situation as that in which the information about consequences is due to be used. At any rate, with information incomplete and inaccurate, it is of the essence of cost-benefit to have to decide which additional pieces of information should be sought and admitted into the analysis.

It is therefore not true that the conceptual problems of cost-benefit are overwhelmingly bound up with goals and evaluative criteria. Nonetheless, these do predominate and are the most distinctive. Hence, we shall be largely concerned with them.

## 2. The Structure and Scope of Cost-Benefit Analysis: Ends, Means and Scarcity

The focus of the cost-benefit approach is the means-ends relationship. This is also the central focus of the discipline of economics. Its centrality stems from the existence of scarcity as the basis of the discipline (as well as of the approach). Under scarcity the productive resources - human and non-human - available to the society do not suffice to enable everyone's total wants (needs) to be satisfied. Every possible configuration of use of these resources makes possible a configuration of partial fulfillments. The target of the economic system is to bring about the best configuration of fulfillments, or at least a configuration not inferior to any other.

A significant characteristic of the means-ends relationship between resource use and want fulfillment is substitutability. This takes a number of forms. On the consumption side, for any one individual, his behavior indicates that when faced with scarcity he is willing to substitute fulfillment of one set of wants for that of a different set. Moreover, for any of these sets of wants fulfillment is attainable by means of more than one set of resource-outcomes: commodities. Thus, wants are substitutable for overall satisfaction; commodities are substitutable for specific satisfactions.

On the production side, a given commodity can be produced alternatively by more than one set of resource inputs. Moreover, for any set of resource inputs the same commodity can be produced by a variety of different techniques: resources and techniques are substitutes in producing any combination of commodities. Finally, with respect to interpersonal distribution, resources can be used alternatively to produce fulfillments of the same and different kinds for different individuals.

With all these forms of substitutability in the presence of scarcity, the target of overall best use of resources involves non-trivial choice: which resources shall be used to produce which commodities, by which techniques, and who shall receive them? An efficient pattern of resource use and commodity distribution represents a compromise between the differential production opportunities which existing resources and the state of technology make possible, and the relative preferences concerning the configuration of commodity production and distribution which the existing population expresses.

Suppose that at the beginning of a period being studied all productive resources are being used in some way or other. Then a change in policy by



either a public or private agent means that some resources will be used differently than before (or than otherwise). Then the original resulting configuration of output-distribution will give way to a new configuration. We evaluate the change by comparing the new output-distribution configuration (with its resulting pattern of want-fulfillments) with the old. It has been found convenient to partition the comparison into two categories: benefits and costs. We say that the change is worthwhile if the benefits achieved, exceed the costs incurred, by making the change. Both benefits and costs are want-fulfillments: benefits are the want-fulfillment patterns made possible by the change; costs are the want-fulfillment patterns which were possible with the prior (or the alternative) resource-use configuration but no longer possible with the new one. Benefits are present opportunities, costs are opportunities presently foregone. This is the fundamental meaning. All definitions in terms of commodities or dollars are derivative and ultimately refer back to these notions of real fulfillment opportunities.

Since scarcity and substitutability hold for each economic decision-making unit as well as for the totality of them, each unit is faced with a basic problem of choice: how to use its limited want-satisfying stock of resources so as to achieve the greatest overall fulfillment in the circumstances facing it. The economist distinguished two types of tasks for the economic discipline in this context, a positive and a normative: 1) the understanding, explanation and prediction of how each unit will make this decision, and how these individual choices will interact to produce behavior in the system as a whole; 2) the recommending or prescribing of how each unit should (ought to) make its decision so as best to fulfill its wants

(ends), and/or how the system as a whole should perform to render the best pattern of fulfillments of the constituent wants.

For both of these tasks the economist relies on the notion of rationality as the chief framework. He assumes that the problem consists of a specification of alternatives, cause-effect relationships, and a structure of ends which can order situations in terms of relative degrees of want-satisfaction. Choice, whether being predicted or recommended, involves simply selecting consistently with respect to this preference ordering. Choice is not, and should not be, random, inconsistent or systematically directed to less want-satisfying alternatives when more want-satisfying alternatives are available.

It must now be clear why every choice by a single economic agent or by "the economic system as a whole" involves a set of alternatives, and therefore the whole logical structure by which we characterized our paradigm of social choice. Every decision about the use of scarce resources precludes all mutually-exclusive ways in which these same resources could have been used. Thus, it gives rise to benefits, but to costs as well. It is part of a comparison among options, whether explicit or only implicit. Thus it is either explained or prescribed as an exercise in rationality.

But rationality is interpreted broadly enough to fit the framework of scarcity. Rationality does not mean cold-blooded, infinitely scrupulous calculatingness. Decision making is itself an activity that uses up scarce resources (at the very least, time and thought, but usually more). So the costs of an additional gathering of alternatives, elaborating and perfecting of causal relationships and even ordering of alternative outcomes in terms

of want-fulfillments, must be considered as an offset to its advantages. A balance must be struck: the decision-maker will be rational not to be perfectly informed about alternatives and their outcomes or even about his own feelings toward different outcomes, nor to be infinitely painstaking about the weighing of his several options. Spontaneity, proximateness, variety and uncertainty are consistent with rationality.

The same holds for measurability. Rationality does not imply that all outcomes are, or should be, fragmented into a set of profoundly measurable dimensions, which are then reassembled into a single measurable indicator. Measurement is an adjunct to part of the calculation process, useful where possible, but not a necessary condition to rational choice. It is not always the case that a rational decision-maker will be able either to create or to require an explicit comparability among the several dimensions of the set of outcomes. On the other hand, if he makes decisions among multi-dimensional outcomes - or outcomes which can be treated multi-dimensional outcomes - or outcomes which can be treated multi-dimensionally by an observer - it is sometimes possible for the observer to use the pattern of these decisions to infer a set of dependable, consistent, implicit comparisons across dimensions. The mensurability and commensurability are observer artifacts attributed to the rational decision-making.

When the observer is operating prescriptively he is likely to make explicit use of such a system of measurable calculation. This is not a falsification of the decision-making process of the agent being advised - or criticized - if the measures on each dimension and the inter-dimensional comparability adopted are congruent to the implied pattern of the agent's own

choices. Moreover, since some advisers are hired because they are better informed than the agent, and the agent seeks thereby to become better informed himself, the adviser's explicit mensuration can be an appropriate objectification even in the absence of such congruence if the agent subsequently agrees that the distinctions and measurements made represent an improvement over his prior decision-making.

In cost-benefit analysis the analyst attempts to quantify everything and to establish dimensional comparability. This is because he is an adviser, and must make his analysis replicable by other potential advisers (or critics) and by the decision-maker whom he is advising. He does not possess the same perceptual capacity or internal evaluational predispositions as his advisee. He must render his study public-interpersonally communicable-and justifiable in terms of his mandate: to accord with the goals of the decision-maker he is advising. Thus, our characterization of rationality as having no specific content in terms of the degree or kind of calculatingness attributable to ultimate decision-makers is not inconsistent with a cost-benefit technique that claims to be relevant to rational decision-making and yet emphasizes extreme, explicit, quantitative calculatingness.

### 3. Individual, Group and Social Evaluation

Cost-benefit analysis is an exercise in social evaluation. This social dimension creates very significant problems, and the approach taken toward this dimension is what is most distinctive about this form of analysis. There are issues involving alternatives and criteria.

In the context of individual evaluation or choice the question of alternatives is not trivial. We have already suggested that the degree of

informedness about alternatives is an outcome of the choice process as well as an input into it. Social choice is faced with this complexity as well. But in addition the nature of social alternatives possesses ambiguities absent from the individual context. In both contexts there is uncertainty between the initiation of the "action" and its consequences, arising from inability to control "outside" factors completely. In the social context, however, there is further uncertainty stemming from the fact that under the social action the behavior of the members of the society themselves are not committed but must be predicted. The decision maker is in serious question of what "his" own behavior will be under his "social action". Thus, there is an inability to control critical "inside" factors as well as "outside" factors. Social choice and social behavior are distinct, although they may be linked.

There are at least two upshots. One is that social behavior may occur - and therefore social consequences result - without social choice having taken place. Social choices set frameworks of rewards and punishments for individual behavior. Within a given framework the pattern of individual actions may change substantially, with large consequent changes in social outcomes. Another upshot is that the social choice may be made with respect to the desirability of the framework - i.e. desirability of the social processes within which individual actions are to be channeled - as well as to that of the most probable consequences of any such framework. Given substantial uncertainty between the manner in which individual decisions will be influenced by collective action and the individual consequences following upon such influence, collective choices may be decided significantly on the former grounds.

Cost-benefit takes a position on both these problems. While changes in social outcomes need not stem from changes in social choices, cost-benefit analysis is concerned only with situations in which a change in social choice is in question. Moreover it is interested only in one form of social choice: the choice informing collective action. The focus is on government policy - so-called public policy. Moreover, the alternatives - mutually exclusive public policies - are evaluated in terms of their most probable consequences (although interval estimates are sometimes resorted to rather than point estimates in making evaluations, to allow for uncertainty of predictions).

The first delimitation represents a perfectly proper specialization of scope carrying no liability. The second does involve a genuine exclusion of possible relevance. Some choices among public policies may well be dominated by valuations placed on the relevant means as well as on the outcomes. Concepts of social fairness or justice, for example, are likely to influence social choice, and these frequently do depend more on the existence of opportunities or types of channels open to individuals than on what the individuals do with their opportunities. It is not in principle impossible to deal with valuation of means, but it would notably be difficult in practice, since most of the technical advance in the field is oriented toward the valuation of consequences.\*

The issues surrounding criteria for social choice are considerably more formidable, and the devices adopted more seriously deficient and

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\*We already have dealt above with the extreme version of this emphasis on means: namely, where "social valuation" relates only to valuation of very broad alternative decision-making processes in the society. We argued that this probably falls outside the concept of social valuation as a guide to public policy.

debatable. The fundamental question is: what are the social ends or goals on the basis of which one can derive criteria for making social evaluations? To answer this one must resolve an anterior question: what is the meaning of a social goal? Individuals have goals, certain organizations can be spoken of as having goals, but what is the meaning of the goals of society?

To clarify, let us consider four types of decision-maker: the individual, the firm, the coalition, and the society. The situation of ends for the individual is, although not simple, simplest of the four. The individual is assumed to possess a complete, consistent system of values permitting him to give a complete transitive preference ordering of alternatives. The alternatives can be thought of as single period social states (social outcomes), or many-period sequences of social states; and prospects as well as outcomes can be included, to allow for valuation of means as well as end-states.

The team is somewhat more complicated, and some violence may have to be done to fit concrete real-world organizations into this ideal category. The team is assumed to be a set of individuals who have coordinated their respective roles in such a way that they place the same preference ordering on all of the outcomes that are relevant to the functioning of the team. Within this range of outcomes the team members have truly common interests. Outside this range they need not agree on anything. It is as though the members merge their identities with respect to all matters pertaining to the team's legitimate scope of interaction with the rest of the world. Within this scope we can identify the goals of the team, and these are completely reflective of the goals of the individuals comprising the team.

The same formal properties will be met by any group of individuals who have identical orderings over a specified set of alternatives, whether or not this identity stems from formal organization of roles or not. The "team" is defined over this set of alternatives and its "goals" are those implied by the common evaluations. It should be noted that it is not similarity of personal objectives that constitutes a team, but similarity of attitudes toward the outcomes defined in their full dimensionality - as for example expressing "payoffs" to others as well as to oneself. The first, taken by itself, can lead to the most divergent rather than similar overall evaluations. Thus, while each of 20 dogs chasing the same rabbit may have exactly the same attitude about catching the rabbit, each wants it for himself as opposed to the others. The evaluations in the pack are totally diverse. The pack is not a team.

A coalition is considerably more complicated. The several participants modify, or compromise, some of their partly similar, partly divergent outlooks for the purpose of increasing their overall impact on the outer environment. Thus the alliance reflects a partial but not total commonality of goals, even for outcomes that fall within the scope of the group's legitimate interaction with the rest of the world. Alternately, the range of outcomes on which there is perfect agreement is considerably narrower than the range that is relevant to the group's function. The degree of consensus will vary from complete agreement to nearly as much divergence as in the population as a whole, for different subsets of outcomes within the set relevant to the group's function. Moreover, different coalitions will differ with respect to these distributions of consensus. Thus, the degree of



commonness involved in different choice situations depends on the particular situation: alternatives and coalition. Thus, the concept of a group criterion must be flexible enough to portray this variable degree or structure of consensuality.

Society can be considered an extremely complicated form of coalition. Surely a consensus of basic values for carrying on relatively orderly group processes is a necessary condition for a going society. The consensus will typically extend to legitimized group decision-making processes: agreements about the means by which individual incentives are to be followed. But this degree of agreement is by itself insufficient to generate a social criterion for rating more detailed types of public policy - policies granting different reward structures to individual actions within the same broad framework of mutual interaction. Additional consensus depends partly on the degree of homogeneity in the society and partly on the basic shared norms about the proper scope of cooperative and competitive behavior.

Cost-benefit analysis formulates a social criterion for evaluating detailed public policies by implicitly abstracting what is taken to be the consensual pattern of authoritative decision-making, and the distinctive norm about competitive and cooperative behavior, in a mixed market society like that of the U.S. Such a criterion is neither correct nor incorrect. It has never been, nor is it ever likely to be, subjected to consensual social evaluation. Rather, to propose it is to propose a value judgment, which will be persuasive to different observers in differing degrees. To this we now turn.

#### 4. The Value Context of Cost-Benefit Analysis

The market system is taken as the exemplar of authoritative interpersonal relations. The key characteristic of this system is that it is a congeries of individual exchange transactions. There is no central coordination, no supra-personal direction, of transactions. Decisions are decentralized down to the individual decision-maker (which may, however, be a giant composite like General Motors), and "his" exchange decisions are made solely with regard to his own advantage. The system as a whole makes decisions not as a collectivity which supervenes these individualistic transactions but solely as an aggregation of them. Overall well-being in the system is implicitly held to increase as individuals improve their situations competitively, to decrease similarly as they experience worsened situations. Since the unit of interpersonal interaction, the exchange transaction, is voluntary, each such transaction is deemed to reveal an improvement for both partners to the transaction (else one or both would not have entered upon it). Moreover, in the typical case the transaction is assumed not to impinge directly - i.e. other than through affecting prices in the market - on other decision-makers, so that all mutual adjustments to market conditions are incorporated within the market transactions themselves.

This view leads to two major value emphases: (1) the market valuations which individuals implicitly place on commodities by being willing to trade them on those terms are taken to reflect a common unit of value both as regards the fulfillment of different types of goals for each individual and the fulfillment of goals between one individual and another. (2) Overall

well-being is a matter of adding together the gains obtained by the totality of market participants. The "general welfare" is a matter of aggregating individual welfares, not of revealing a "collective or corporate will."

Because individual market transactions are the measure of well-being for the group as a whole the role of government is seen as something very special and circumscribed. The public sector is an instrumentality to enable the people to do for themselves collectively what they cannot do for themselves privately. It must step in where there is a systematic imperfection in a market or markets; or it must act to change an income distribution which is consensually considered undesirable. Market imperfections are structural characteristics such that individual behavior, unexceptionable in itself may, in their presence, bring about a less desirable overall performance of the system than could have been attained in their absence.

Situations like this calling for public sector aid or direct participation involve market prices which do not reflect the true social opportunities foregone, or involve transactions that do significantly affect third-parties directly and so have a welfare impact that is not wholly accounted for by the gains to the transaction's direct participants. Either prices are wrong or the basis for calculating relative advantage is too narrow.

Thus, despite the fact that the approach so far described makes market value a measure of social value, and private calculations of gain and loss the determinants of market values, when public policy is called for - or is at least potentially relevant - the evaluation of each policy option must differ in some respects from a purely private calculation of

advantage. The importance and limitations of market prices form the cornerstone of the cost-benefit delineation of an evaluative criterion. Consider the market system as composed of the  $n$  private decision-makers plus the public sector as the  $n+1$  decision-maker. Each of the first  $n$  chooses among the alternatives facing him (essentially, the different ways that he may use his productive resources, or ownership claims to productive resources) on the basis of what benefits to him each will bring, and what opportunities will be lost to him in return. The alternative chosen is that for which the net advantage - the benefits minus costs - is greatest. The criterion of cost-benefit evaluation is that the addition of the public sector as  $n+1$  decision-maker to this system, with powers of regulation, control and direct use of productive resources, should increase the total of private net advantages to the greatest extent possible. The public sector decision-maker should also choose on the basis of which of its alternatives gives the greatest spread of its benefits over its costs. But "its" benefits and costs are the changes its actions bring about to the situations of all the other  $n$  decision-makers. The public sector has no valuational existence in itself. It operates solely as collective agent for all the others.

We see therefore that this basic value criterion is individualistic, aggregative, interpersonally comparable. Moreover, it derives from a market value analogue and, as we shall see below, uses money values - which thereby creates comparability and tradeoffs with market values - in measuring public policy benefits and costs.

This close linkage with markets and market values must not, however, be misunderstood. One hears often a distinction made between market values and human values as though the two are, at best, different and more likely, antipathetic. Such an association, if true, would severely flaw cost-benefit analysis.

The association is not, in fact, true. Market values are human values as these values are transmitted through a complicated multi-person decision-making process in which agents with scarce resources are attempting to maximize the power of these resources to fulfill their human wants (not "economic wants": there are no such things). As is typical in the relationship between individual and large group, the norms (prices) he must adjust to, are a compromise of his and many others' attitudes. But this is typical of the relationship between individual and large group in any society. It does not mean that he is necessarily any more alienated from market values, that they more significantly distort his real priorities and preferences and needs, than other resultants of the individual's interchanges with large heterogeneous social groups.

On the other hand, not all human values are in fact or can be expressed in market values. For our purposes, it is important to make a distinction between the two predicates. Because of the absence of markets in some types of interactions, because of the imperfections in some of the markets that do exist, because of the third-party spillovers resulting from some transactions (what we shall refer to as "externalities") market values may falsify or omit reference to human values that are relevant. It is the express task of cost-benefit analysis to correct these misrepresentations,

to rectify these omissions: i.e. to bring human values more accurately and completely to our attention.

## 5. The Meaning of Benefits and Costs

### 5.1 Real Output Change

The benefits and costs accounted for in cost-benefit analysis refer to the changes in well-being of the private agents in the market system. (This restriction of scope means in effect that we are considering the use of cost-benefit analysis in the evaluation only of so-called "economic policies" - policies involving the use of the scarce productive\* resources of the society.) Delineation and measurement of these must take into account various complex forms of reverberatory and other interactive impacts in the market system as a whole. Economic theory has developed a framework, general equilibrium analysis, for dealing with problems of this sort. The keynote of the approach is that each change, regardless of where it has its first direct impact, will typically lead to a variety of ramifying indirect impacts whose overall significance may far exceed that of the direct one.

The fundamental criterion is that the benefits of any alternative are the want-gratifications it makes possible anywhere in the system, the costs are the want-gratifications opportunities it removes from anywhere in the system. Upon this basis we distinguish among three types of transactions. The first involves a simple transfer of title to existing assets (wealth objects) between the parties to the transaction. Gifts, gambling gains and losses, sales of old art objects and second-hand articles among

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\*"Productive" is not meant to carry any pejorative connotation with respect to what is "non-economic". Use of a different conventional attribution, "tangible," is at least as misleading.

non-dealers, are examples. Such transactions do not affect the composition or size of output in the system as a whole. They are called transfers. Unilateral transfers are called transfer payments.

A second type of transaction involves not only a change in the distribution of assets but a change in their composition as well. Through production and trade a new collection of commodities (in terms of numbers and types) becomes available, but neither the quantities alone nor their aggregate want-gratifying power make it possible to speak of the size of output being changed. In effect, composition and distribution of real national income or output is changed but its size is not. We shall call these redistributions.

Finally a third type of transaction is one that involves a change in the size of real national income. Such a change logically need not involve a change in either composition or distribution. Actual changes in size, however, do generally involve both. We call these real output changes. Cost-benefit analysis has historically concentrated on this last category. More recent emphasis on relative income distribution effects for certain types of public policy has brought redistributions to attention as well, although its more important impact has been to draw attention to the redistributive aspects of real output changes.

The chief concern of cost-benefit analysis has been the delineation of real output changes. These have been traced through, and measured by, market values. But market values have a factitious side for this purpose. The issue is contained in the distinction between nominal vs. real values. Market values contain two types of information: the terms on which commodities

can be traded for money; through this, the terms on which commodities can be traded for one another. Only the second is decisive for the measure of real output changes. The former is not only inessential, it is misleading. For the unit of money can be varied substantially without any change in the want-satisfying power of output. In inflationary periods, nominal market values change appreciably, while the size and composition of output may remain relatively - or actually - constant. An important task of cost-benefit analysis is to attempt to use only the inter-commodity trade-off content of market values. This is accomplished by deflating nominal prices into so-called "real prices": i.e. to select the set of relative commodity tradeoffs prevailing in a particular period, called the "base period," and then to adjust nominal, observed prices in every other period to this single, unchanged basis by manipulating the index of change from the base prices to the observed prices.

## 5.2 Opportunities Foregone

Real social costs refer to want-gratifying opportunities which are lost to the system as a whole as a result of decisions to use resources in any particular way. The qualification "to the system as a whole" is very important. If agent A loses certain options as a result of a transaction he has experienced a personal or private cost. It is a social cost if no one else in the system has gained the same options. In a transfer, for example, this would not be so. What A loses B gains. There is no social cost, only private costs. The same can be true of more complicated transactions as well. Suppose specific productive resources are hired to help produce other commodities. If these resources would in fact have been



employed to produce those other commodities then the social cost of this production is such other commodities whose production is now precluded. But if these resources would in fact have been unemployed, no such loss results by employing them here. The social cost is zero.

If all resources are employed at the outset, then any new pattern of use results in original production activities being shut off. Every new pattern of resource use entails social costs - the output lost from curtailed initial uses. But if some resources are unemployed at the outset then putting those resources to use entails no social costs because no otherwise productive activity is hampered. Of course, even when substantial resources are unemployed, some patterns of new use pull out resources that were or would have been used elsewhere and so entail social costs. This discussion points up the importance of the degree of unemployment of resources to cost-benefit analysis: it is directly relevant to the question of what real production opportunities are lost under any specified pattern of resource use.

### 5.3 Market and Non-Market Values

To measure the size, composition and distribution of output we generally count actual market flows (transactions) for the different economic agents. Specific gains and losses, as well as total productive effort, are typically enumerated this way. But not all policy impacts on want-gratification opportunities occur in the form of direct actual transactions. Public policy may make some individuals better or worse off by affecting the terms on which they can carry out a variety of potential transactions. This results either from influencing the market prices facing them, or by changing

their overall situation so that they have a new set of relations to the environment including the market. The former effects can be measured in principle by examining the whole complex of transactions entered into by the population, so that transactions far removed from the initial site of impact must be consulted to obtain an accurate picture. But flows of market values do suffice.

The latter effects cannot be completely captured even by the totality of market flows. If the danger of flood is removed from a certain building, or the danger of enemy bombing is added, or a family is required to give up its home because of highway construction, or an individual finds his water flouridated or himself drafted - then well-beings are affected. That some of these effects will have repercussions in market transactions means only that the consequences of the changes in well-being induce changed relations with the market. But these changes will not even in principle correctly measure the initial welfare changes, unlike the first type of effect, since they do not tell us what happened to the "starting positions" from which the participants confront the market as well as the rest of their environment.

Most public policies have both effects: they affect market prices and starting positions. So market transactions will not suffice to measure the total impact. cost-benefit analysis must supplement such information. It is this supplementation that is often misunderstood. The analyst seeks to accomplish two goals. First, he attempts to find a single-dimensional measure of changes in "starting position" for any decision-maker, such that a correspondence can be established between the well-being of the subject under the naturally observable variety of multi-dimensional starting situations

and situations where all starting dimensions but one are held constant. The single variable dimension is the dimension of welfare measurement. The dimension conventionally selected to perform this measurement function is market purchasing power. Having established a single dimensional representation of starting positions, the second task is to establish a well-being correspondence between changes in market opportunities (i.e. changes in market prices) and starting positions. By these two procedures, all changes in situation, whether related directly to market transactions or not, are expressed in terms of hypothetical market transactions. In effect, "human", "non-market" values are translated into market value terms. It is this that is often decried as irrelevancy or dehumanization of values.

In fact, it is neither necessarily irrelevant nor dehumanizing. It is an empirical hypothesis that individuals are willing to substitute different types of gratification for one another in their overall balance of drive and fulfillment. In particular, individuals can feel as well off with greater command over marketable commodities but less of certain non-marketable gratifications as in the reverse situation. Vulgarly, individuals can be bought off with money.

There are moral issues here: one for each individual and one for the observer. Each of the former must decide whether or not additional market power does compensate him for loss of non-market commodities like friendship, security, prestige and power. The observer must decide whether social well-being will permit such substitutions - i.e. whether there are social value judgments that deny the commensurability.

The cost-benefit analyst takes a distinctive position on both types of issue. He holds that there are no consensual social judgments of the

latter sort. In their absence he refuses to impose his own. He therefore accepts whatever judgment each individual makes about his own well-being. Each such judgment will be reflected implicitly in terms of which substitutions the individual reveals himself empirically being willing to make to keep his welfare unchanged. Private value judgments enter cost-benefit analysis therefore with respect to the accuracy of the empirical hypothesis about individual substitutability and the operational ability to elicit such implicit tradeoffs from observation.

The procedure just described is possible only under ideal circumstances. In ordinary circumstances non-market impacts cannot be brought into dependable correspondence with market values. Either the data on implicit tradeoffs are inadequate, or the tradeoffs observable in fact show undependable, inconsistent correspondences (i.e. the empirical hypothesis about substitutability is suspect). An especially likely situation is that different individuals possess and/or reveal different tradeoffs, so the requirements for a correct measurement of the aggregate of tradeoffs become practically unfeasible. By preventing expression in common units this state of affairs seriously hampers cost-benefit analysis. The most that can be done is to express the non-market impacts in their natural dimensions, as for example morbidity or mortality rates, or number of felonies per 1000 population. Sometimes even the natural dimension cannot be quantified with any fineness, so that differences in impact along this dimension must be largely ignored and only the number of individuals or decision-making units affected can be listed, as for example the number of households displaced from neighborhoods where they have lived for more than, say, two years.

Having expressed outcomes in a variety of natural dimensions as well as, where appropriate, in dollar values, the very difficult task of evaluating what are then multi-dimensional consequences (vectors) must be faced. Most cost-benefit analyses have avoided going this vector outcome route because of a lack of insight as to how to render an evaluative ordering. They typically list only the outcomes that are susceptible to monetary expression, aggregate these, and call the reader's attention to the existence of so-called unmeasurable types of impacts that have had to be perforce omitted from the analysis. The more proper procedure is to enumerate and aggregate as many of the non-monetary dimensions as possible along with the monetary, so that the relevant decision-maker can make whatever evaluative tradeoffs he feels proper to his value system.

#### 5.4 Internalities and Externalities

The prototype of cost-benefit analysis is the decision-making of the individual economic unit, whether household or business firm. Each in effect considers every hypothetical action and asks whether it will gain more than it loses by undertaking the action. Since cost-benefit measures the benefits and costs generated by any action in terms of the effects on each decision-making unit, it would seem that the effect of each action taken by a unit could be measured simply by taking the gains and losses experienced by that unit. This would be so if the only impacts the action had on others operated through changes in the market prices they faced. Whenever the impacts were more direct, in effect, changing their "starting positions" - e.g. through factory smoke, polluted downstream water, greater knowledge - the primary benefits and costs to the participant would not be the only ones

to consider. The spillover or third-party effects would have to be counted separately to ensure completeness. These spillovers are called "externalities," as noted above, and are especially likely to be important in areas where public policies are considered. Indeed, often it is the large-scale presence of externalities that makes collective action justifiable. Hence in measuring costs and benefits, the analyst must not be satisfied to enumerate solely the outcomes for direct participants. Victims or beneficiaries of externalities must have their net spillover impacts added up as well.

Where externalities are negligible the social consequences of any prospective action are internalized to the balance of direct participant effects. As a result the private calculations which serve to decide the private desirability of the action are a good reflection of the calculations necessary to establish the social desirability as well. Besides, except for the imperfection of markets, this identification of private and social calculation means that private actions are likely to be appropriate ones. Public correction will be uncalled for in these areas. Where externalities are important, however, the private calculations that serve to determine desirability omit significant outsider effects. Private desirability can diverge substantially from social desirability. So private actions can be seriously improper, and public action becomes a relevant social corrective.

Thus valid social action is intimately connected with situations where private calculations need supplementation from a wider vantage. The need for cost-benefit analysis to go beyond private calculations of advantage, despite the fact that it couches its measurements in market value terms, is therefore integral to the approach. It is of its essence.

This argument can be rephrased. We indicated earlier that cost-benefit analysis defines social costs and benefits as simply a collection of individual costs and benefits. This section establishes a sense in which the individual and social magnitudes can differ. More precisely, the distinction is between individual and social evaluation. Individual evaluation of an action consists in weighing the prospective gains and losses to the initiator of the action. Social evaluation of the same action consists in weighing the prospective gains and losses to everyone affected by the repercussions of the system as a whole. Because of market imputations of these repercussions the two evaluations are often similar. When they are not, it is not because of any distinctive motivation or character of the private action, or the nature of the private calculations, but because of the structure of the market or of the market by-pass nature of the interaction with others' situation. Inappropriate individual actions are not typically meaner or more selfish than appropriate ones.

## 6. Income Level and Income Distribution

### 6.1 The Level and Distribution of Income

The concepts of the level of income and the distribution of income are the most central of the entire approach. This formulation accounts for what is most distinctive about the actual procedures of cost-benefit. But as it is the core of actual practice it is also its most controversial aspect.

The level of national income (or real national income, or real output) is a measure of the total want-gratifying power of the current flow of goods and services. The distribution of income is a measure of the level of real income of the different members of society, at each specified level of national

income. The level of national income is assumed to be capable of change without a change in distribution and vice versa. The level of income is at its peak, in each set of circumstances, when it is impossible, for given technology and available resources and consumption preferences of the population, to rearrange the overall pattern of resource use so as to increase the total want-gratifying power of output. We say of such a situation that resources are efficiently (or optimally) allocated. If it is possible so to rearrange resource use that the new total exceeds the old, then we say the rearrangement can increase the level of income and hence that the original resource allocation was inefficient (suboptimal).

The use of the cost-benefit criterion has predominantly - although not exclusively, especially in recent work - represented an application of level of income analysis. The conclusion that benefits exceed costs for a given project, or the reverse, has signified that the total level of national income could be, or could not be, respectively, increased by implementing the project. The key to the linkage of cost-benefit with level of income analysis lies in the assumption about interpersonal comparability of welfare changes.

As we indicated above, benefits and costs for any individual are measured, wherever possible, as that amount of purchasing power which, when added to (benefits) or subtracted from (costs) his initial situation, would make him as well off as in the actual situation consequent on whatever project is being evaluated. Since benefits and costs are both expressed in dollars, their difference can signify the net impact on that individual. The net effect for other individuals can be similarly expressed. Then - and this



represents the critical assumption - a dollar of net impact for one individual has exactly the same social significance as a dollar of net impact for any other. A \$50 loss by ten individuals each is exactly offset in aggregate social well-being by a \$500 gain by one. Consequently, the aggregate social impact of any given project can be computed simply by taking the algebraic sum of net impacts over the whole population. Any positive sum implies that the level of national income can be increased by the project: that the project will improve the efficiency of resource allocation.

This formulation has an important operational significance. Since the amounts of money which are added together individually represent sums which it would be necessary to add or take away to return each individual to his pre-project situation, a positive algebraic sum means that if the project were enacted the resultant distribution of gains and losses would enable those who benefitted on balance to pay enough money to those who lost on balance so that no one was worse off and at least one person better off. Indeed, with enough divisibility in the monetary unit the pattern of compensating could make everyone better off. Outcomes which have either of these one-way advantages (vector dominance) over another are called "Pareto superior", and a move from an inferior to superior position is called a "Pareto improvement." It constitutes what is probably a highly consensual social value judgment to assume that Pareto improvements increase social welfare.

Thus, the criterion of the algebraic sum of net welfare impacts (also known as "the sum of consumers' and producers' surpluses") establishes whether or not a Pareto improvement could be attained. But its actual

attainment almost always requires a set of positive and negative compensatory payments between losers and gainers. Some legislation attempts to compensate some losers for some of their losses, especially when glaring damage is done. However, there probably never has been an explicit attempt in real-world public policy to guarantee that no one will end up losing. This means that adopting a certain policy because it will give rise to an outcome which could be made Pareto-superior to the initial situation is in fact to bring about an outcome which is not itself demonstrably better than that initial situation.

If Pareto-improvement were the true value criterion then the logical structure of the evaluation would require that the policy under consideration be the policy as originally formulated plus a set of compensatory payments between gainers and losers necessary to convert the unmediated outcome into a Pareto-superior position (relative to the starting point). The absence of the compensation adjunct in cost-benefit applications can be interpreted in at least two ways:

1. The true value criterion is not actual welfare improvement but potential welfare improvement. Public decision-making is too complex to require that each agency bear responsibility for overall social welfare. The task can be specialized into two parts - a) the efficiency with which resources are used, b) the distribution of the fruits of resource utilization. Specialized responsibility for the former means focusing attention on the maximization of opportunities for want-gratification; responsibility for the latter means being concerned with what is actually done with those opportunities. Potential welfare improvement is a statement about opportunities.

Compensatory schemes relate to distribution; but the specialization on distribution need not be bound by the social value judgment about distribution implied in Pareto-improvement. Other values may be adopted; so the distribution policies adopted need not be the compensatory schemes related to Pareto-improvements. In this context, the use of level of income in cost-benefit analysis reflects a specialization on potential improvement and is therefore only a partial indicator. In studies where distributional impacts are estimated as well, the two are coordinate, partial dimensions of social welfare, intended for an integrated use by a more ultimate decision-maker (the stage at which the specialized parts are brought together).

2. The true value criterion is actual welfare improvement, and potential improvements are identified with actual improvements. Under this interpretation the interpersonal comparability of net welfare impacts has a deeper meaning than simply bearing upon the possibility of compensation. Dollar impacts across individuals are implicitly deemed to have fully equivalent social welfare significance. Loss of \$1000 each by 1000 individuals is assumed to be exactly offset in social value by a gain of \$1 million by one individual.

This is a highly suspect procedure. In conventional economic analysis it is assumed that a dollar loss to a poor man involves more welfare loss than a dollar loss by a rich man. Dollars are comparable, but the welfare significances of changed possession of dollars are not obviously comparable and, at the very least, are not well approximated by the assumption of strict equality.

Under this interpretation aggregation alone suffices to produce a complete welfare criterion: actual welfare improvement. Additional information about distribution can, however, be relevant. It can be introduced in the following ways. First, it may be simply added as a separate evaluative dimension. To be relevant, the decision-maker must be willing to expand the dimensionality of evaluation. The second method is to separate the net welfare impacts for all of the groups relevant to evaluation and then, on the basis of value judgments concerning the relative social importance of changes for the different groups, to apply relative weights to the several group net impacts. The evaluative criterion becomes a weighted sum of group welfare impacts. Here level and distribution considerations are joined in a single dimensional test.

The tradition of economic analysis has made the level of national income the dominant concern of cost-benefit applications. Unlike questions of distribution it appears to be scientifically clean, impartial, tangible. Its single dimensionality makes interpretation of results apparently straightforward. The recent concerns with distribution have not produced attractive, "objective" techniques to counterpart the secure, yet intricate techniques developed to measure level.

Yet some of the strengths of the latter are illusory. In fact, the very appearance of unquestionableness is counter-productive. It discourages closer examination of weaknesses and an appropriate modesty about conclusions. We have already mentioned the incompleteness of the potential welfare criterion and the highly dubious assumption about interpersonal comparisons of welfare change in the version that equates changes in income level with that of actual

welfare. A final caution is in order. Deeper welfare analysis discloses that at base income level and distribution cannot really be distinguished. The relative prices that help to define income level are a function of the distribution of purchasing power. Moreover, since the distribution of income that matters is that of gratification levels, this cannot be defined abstracted from concrete commodity distributions (income level) without additional extreme assumptions about interpersonal measurement of gratification. The practical use of the distinction is therefore a very rough and ready matter. It is suggestive and helpful, but not one of the great truths of nature. It must be employed with self-conscious care.

## 62. The Individual and the Group: Situational Relevance of the Distinction

The persuasive impact of the distinction is not self-evident, even to those who are unaware of the subtle vulnerabilities of the approach. Indeed, ironically, it is sometimes appreciated more by those who understand its ambiguous character closely than by those whose knowledge of it is trivial. We recall that a project A can conceivably be declared to raise the level of income higher than project B even if A entails moderate losses relative to B to an absolute majority of the population while concentrating very high gains to a very few. Losers are not likely to favor A even if told that in some sense the community as a whole is better off. The requirements for political action - namely, passage and administration of legislation - are not closely linked to the persuasive thrust of the income level criterion. Information about distribution, on the other hand, furnishes grounds for close predictions about the political patterns of support and opposition to particular programs. Thus, insofar as cost-benefit emphasizes

level of income as chief criterion its relevance as a guide to officials who represent specific constituent groups may be extremely ambiguous. The opposition of losers on particularistic grounds despite the optimistic assurances of the criterion on a very special brand of universalistic ground should not be surprising. More explicit attention to distribution may well improve predictability and lead to selection of programs which elicit more widespread approval.

## 7. Perspectives

### 7.1 The Relevant Population

An important set of issues concerns specification of the appropriate choosing situation: the right population, the right set of alternatives, and the right form of the criterion. We begin with population.

#### 7a. The Relevant Population

The cost-benefit criterion always refers to a particular population: the population for whom changes in well-being is deemed relevant by the appropriate policy-maker. The identity of this population is an issue because there are more than one governmental jurisdiction who can make policy, and each of these has a different population for whose welfare it has designated responsibility. For each governmental decision-maker the welfare of anyone outside his jurisdiction need not be considered in his planning. This represents a form of partial view evaluation analogous to that of private sector units relative to the public sector, but is justified by the genuine demarcation of political responsibility into separate units and the prime obligation of each unit to represent its constituencies.

The basic principle here for cost-benefit is that the only population whose well-being must be considered is that for which the policy-maker has responsibility. But the whole of this population must be considered, as well as all kinds of effects on this population which might stem directly or indirectly from the policies being considered.

Complexity enters because different governmental units are not independent of one another. In particular, federalism imposes a hierarchy of responsibilities, so that a more local unit carries out its delegated functions in effect on behalf of a more encompassing unit. This not only means that there is a dependency relationship between the included and the including units, but also that any two subunits of the same inclusive unit are deemed to be cooperative agencies catering to the same overall population. Their mutual exclusiveness is significantly circumscribed.

The problem is further complicated by the fact that the nature of the interdependencies may differ from time to time, not solely as a result of specific legislative stipulations, but because the exercise of hierarchical coordination is more active at some times than at others. Exercise of jurisdiction is not cut and dried: it has an important discretionary component to it.

Thus the definition of the relevant population is a matter of perception of the appropriate pattern of political responsibility. As such it is not an invariant of a situation, since it depends on the perceptiveness of the particular individuals who are evaluating policy. In this very human process the role of the cost-benefit analyst is potentially ambiguous. Often he is an outside consultant, asked to perform evaluation for a specific agency of

a specific governmental jurisdiction. This agency sees its responsibilities in ways which often differ from the consultant's perception. The latter is likely to see the agency's mission as subsumed within a larger one, larger both with respect to that jurisdiction and to more encompassing jurisdictions. His definition of the relevant population will generally differ from that of his client, with important policy implications. Yet if he acts upon it he is likely to render his advice unacceptable to the client. If he deliberately adopts the vantage of his client he may do real violence to his conception of the evaluative problem.\* This last is further complicated by the fact that the analyst often has an audience wider than that of his agency employer, for his work appears in a professional literature. This is, especially so where there is no formal employment relationship between analyst and most relevant public agency. The problem of incompatible audiences may then be especially important. This difficulty has no easy resolution. It probably resides in reinvigorating coordinative links among political bodies. Until that occurs, the position of cost-benefit analysis will be essentially ambiguous.

#### 7b. The Relevant Alternatives

Everything we have said above about relevant populations applies to relevant alternatives, since what an agency sees as its relevant alternatives stems from its way of regarding its freedom and range of action. This permissible scope depends on the attitudes, the perceptions and the actions

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\*Much the same quandry is present with regard to the question of the relevant alternatives, where the client agency is likely to feel that its options are considerably more circumscribed than does its consultant analyst.



of the electorate and of other government bodies, as well as on the agency's own self-perception. This applies both to a given political jurisdiction as a whole, and to any single agency within that jurisdiction. There is ample ground for expecting divergences in specifying the range of options that may - or must - be considered. Here again the cost-benefit analyst has no invariant rule as to how to adjudicate the divergences.

In addition to this problem there are other issues raised by the question of relevant alternatives. There are very important because they intimately affect the very logical structure of the evaluative procedure.

We can distinguish two types of evaluational situation. In one an explicit menu of different, mutually exclusive policies (e.g. projects) is laid before the policy-maker, of which he must select one. In the other the policy-maker asks whether or not a specific policy (project) should be enacted. The first type is straightforward, primarily because by definition the difficult problems have all been assumed to be resolved. Rarely is an agency faced with, or given, the whole of its relevant menu. The menu must be constructed out of the separate elements that do come to the agency from outside: a set of mission directives, budget allocations, and other constraints bearing on the definition of the policy area and the agency's scope of jurisdiction and freedom of action. Nonetheless, all we need say about this first type is that almost always one of the alternatives in the menu will be the status quo, with status quo defined as no action taken at this time by the agency.

The second situation is more interesting, because it appears to be evaluating a single alternative in a vacuum. This is not so. There is always

at least one other alternative implicit in the evaluation. It is a form of status quo position. There are a number of types of status quo, depending on the specifics of the situation. For example, suppose a certain budgetary allocation has been made to an agency. The agency is to decide whether that allocation should go for some project A. One alternative to project A is to return the money to the general fund of the government. Another is to return the money to the private sector. Another is to use it within the same agency but on some as yet unspecified other project. These options represent three different sets of alternatives. The most appropriate one depends on exactly what are the institutional processes that determine the decision-making process in that governmental jurisdiction. If the allocation, once tentatively made, belongs to the agency, the third pattern is most relevant. If it does not, and the allocation represents actual revenues or expected proceeds from a tax system which cannot quickly be changed, then rejection of project A sends the money back to the General Fund but within the public sector. Finally, if the tax system is quickly adaptable, and project A was the only project being currently considered for public sector expansion, then rejection of A results in cutting the total of tax revenues in the current period, thereby making more resources available in the private sector.

The varieties increase if the initial supposition is changed so that no actual allocation has been made because the resources are not yet under the control of the public sector. That is, sufficient additional tax revenues will be levied if project A seems worthwhile, but not otherwise. Here the alternative to project A is the current pattern of resource use

in the private sector. It should be noted that this pattern - resulting from not taxing additional revenues - is not necessarily the same as that which would result from refunding revenues already collected. The tax instruments involved may differ; but even with variations in the same tax, the private sector behavioral responses differ at different overall revenue levels.

The list of conceivable types of alternatives can be expanded. But the principle is clear: it is of critical importance in a cost-benefit study to specify precisely what are the true alternative options facing the system. This sometimes requires a profound understanding of the decision-making context within which the problem is posed - an extremely difficult task.

Suppose such a specification has been made. What has been specified is either a single alternative or a set of possible alternatives. In both cases the analyst will typically not bring the alternatives explicitly into the evaluation. Rather they will treat these implicitly, as the opportunities foregone by undertaking project A. The net attractiveness of these alternatives is cited as the opportunity costs of project A. This is the gist of our earlier characterization of the real costs of any action as the attractive opportunities foregone. Where the alternative is a single action real costs is in principle easy to calculate. Where it is a set of possible actions a further decision has to be made: which member of this set is to be treated as the opportunity foregone? The answer in principle looks easy (it is not in fact so): select that member which would have been chosen in the absence of A. For private sector alternatives this involves predicting the behavioral

result of a public policy change: lower taxes, less public borrowing, less public investment, etc. For public sector alternatives this in effect requires performing an evaluation of all other relevant public projects (the analytic circularity gives way finally to private sector alternatives). In practice this is anything but easy. Actual procedures differ as to whether the released resources are assumed to find their way to the best of the available uses or to the average of those available, or whether an empirical attempt is made to predict exactly where the resources would go - which may differ from both of the first. Even under the easier first two approaches - specifying hypothetical as opposed to behaviorally predicted uses - furnishing an estimate is highly demanding.

In the special case where project A involves the use of capital resources whose alternative is private sector use, the conventional way to express the cost of A is either as the rate of return of those resources in their relevant private use (the so-called "cost of capital" or "marginal productivity of capital"), or as the present discounted (capital) value of the net returns in that private use. Under the first, project A benefits are expressed similarly as a rate of return; under the second, as generating a present discounted value of net returns from its public use. In this way benefits and costs are expressed in comparable magnitudes.

#### 7c. Relevant Evaluation

We have just noted that to facilitate evaluation, benefits and costs are expressed in the same magnitudes - usually dollar values, but in certain special cases dealing with investment, as rates of return. We have already indicated how benefits and costs are meshed together in the cost-benefit

criterion, but it is helpful to draw explicit attention to this criterion again. The reason for doing so is to make a distinction and dispel a popular notion. The distinction is between benefits minus costs as criterion and benefits - costs (the benefit-cost ratio) as the criterion. Popularly - especially among government agencies - the appropriate criterion is believed to be the benefit-cost ratio. In fact, the correct criterion is the benefit-cost difference - i.e. net benefits. We have argued above that this latter always indicates either a potential or actual increase in real income. The benefit-cost ratio does also. The difference is that if all policy alternatives involve the use of the same total amount of resources, adoption of the goal of maximizing either measure will result in the same policy choices being made; but if some of the alternatives involve the use of different total amounts of resources maximization of one will result in a different policy choice than maximization of the other. In the latter case, maximization of net benefits will increase the income level higher than maximization of the benefit-cost ratio.

One last item concerning the structure of comparisons should be sketched here. The comparison situations we have discussed involved alternatives that differed from one another with regard to both benefits and costs. Sometimes, however, there are either natural situations or more frequently situations expressly constructed for the purpose, where an important simplification can be achieved. The several alternatives differ from one another either in the benefit or the cost dimension, but not both. The latter of these has been popular especially in the defense establishment and is known as "cost effectiveness" evaluation. Of the two simplifications

it is the more important. One of the truly serious difficulties in conducting cost-benefit studies is the lack of bases on which to value the flow of public services: the benefits from public projects. Markets typically do not exist in which these services are sold, certainly not sold to maximize profits. As a partial by-pass of the problem of valuing benefits, analysts structure their comparisons by assuming that all the alternatives are fashioned so as to achieve the same output goals. This means that they render the same benefits. They are evaluated in terms of the size of the resource costs necessary to achieve the standardized level of benefits. The least expensive project renders the greatest net benefits and is chosen.

Aside from its more limited reach, the procedure has pitfalls. The choice of alternative may well depend on the level of output selected to standardize the comparison. An alternative that wins at one output level need not win at a different one. The danger is that the cost-effectiveness test will be performed at a level other than what is actually intended in the project, and the results simply projected to the desired level. The choice may then be erroneous. Another difficulty is that in most public functions there are a number of "output dimensions." It is hard to believe that significantly different policy techniques will have the same pattern of consequences in all of the output dimensions. Therefore, fixing a given common level of output for all the alternatives is not likely really to achieve equality in all the output dimensions. Benefits are not really equal for all the alternatives. Hence the cost-effectiveness choice may be misleading. Nonetheless, where valuation of benefits is effectively impossible it can render important service in helping to abstract a part of the problem that is tractable.

## 8. Issues in the Measurement of Benefits and Costs

We now touch briefly a few issues involved in the concrete measurement of benefits and costs.

### 8.1 Transaction Gains and Costs

Wherever benefits or costs are reflected in concrete transactions we take the market values in those transactions as a first approximation of the appropriate measures. There are a number of circumstances under which we wish to modify these, however, for a closer approximation.

a. Our real target is usually to measure the change in consumers' and/or producers' surpluses, not the mere value of transactions: i.e., we wish to measure the value of the new trading opportunity, of which the transaction value measures only a portion. Correction typically involves estimating a demand or supply function and measuring areas within them.

b. Actual market prices may incorrectly reflect the real opportunities foregone. If the relevant market is monopolistic, price systematically distorts the real alternative supply options for the society. Our adjustment must be made that estimates the direction and magnitude of these market distortions. With monopolistic and oligopolistic markets widespread the whole configuration of distortion is exceedingly complex, and resolution a highly conjectural procedure.

c. If excise taxes or subsidies appear in the relevant markets, the prices at which transactions occur will reflect these and thus contain a form of static which hides the real production tradeoffs that are possible in the system. Transactions should therefore be valued at factor prices to express production foregone; to express value of benefits, however, market prices are appropriate.

d. Where transactions give rise to important externalities, these must be explicitly considered. This is not so much a question of modifying the values at which actual transactions occur as separately itemizing the effects. Since they are likely to be non-transactional effects, we speak about them in the next item.

e. Where output of the public sector is sold to the public, these prices are likely not to bear close relation to opportunity costs, but reflect desired income distribution goals. Adjustment must be made to approximate true social opportunity costs. On the benefit side it is especially important here to try to estimate demand functions so as to express consumer surpluses, since transaction values will typically fall far short of such surpluses.

f. If the project under consideration would result in a substantial change in either market demand or supply (so-called "lumpiness"), the true impact prices would be different from those currently prevailing. These impact prices should be predicted by estimating supply or demand functions.

## 8.2 Non-Transactions Gains and Costs

Most services produced in the public are not sold. There are no market transactions to turn to to measure the value of the benefits generated. (The social opportunity costs are tolerably measured by program costs - where properly accounted for.) This is an exceedingly difficult problem. Some outputs are approximated by finding a type of commodity in the private sector which is a close substitute and inferring a value to the public commodity based on the market prices of the private good. This is subject to the errors of imperfect substitutability and a phenomenon akin to the lumpiness



problem mentioned above. The assumption is implicitly made that the public and private goods are competing in the same market. The non-sale of the former, however, belies this. If they were in market competition the substantially different market supply situation prevailing would cause prices to be different from those observed.

Where no close private substitutes can be found, hypothetical valuations are pieced together from a variety of indirect sources. For example, investigators may attempt to put a social value on human life (e.g., in the context of traffic accidents or health care programs) by observing jury awards for death in court damage suits, or perhaps the cost per decreased accident of constructing a highway improvement designed to increase traffic safety. Such measures are of course conjectural and some may fail to gain any real consensus among analysts.

As indicated above, to by-pass the problem some comparisons are expressly structured as cost effectiveness studies. The problem of benefit measurement is resolved by equating as many outcome dimensions as possible across alternatives.

Another by-pass is essentially to give up the attempt to achieve measurement in terms comparable to transaction impacts. Outcomes are rendered in their own natural dimensions, as, for example, number of felonies, patient days of specified illness, deaths. The intent is to present some more ultimate decision-maker with a multi-dimensional vector outcome and hope that he will be able to establish the implicit tradeoffs across outcome dimensions necessary to make choices among the several alternative "market baskets" placed before him.

Clearly, the problem of measuring non-transaction impacts - a major part of the domain of cost-benefit - is far from solved.

### 8.3 Opportunity Sets

In view of the difficulties involved in direct measurement of all types of outcomes, certain short-cuts may be used that do not attempt a quantitative, but only a qualitative, evaluation. One such relates to the presumption that the well-being of an individual is enhanced if he experiences an increase in the opportunities open to him - i.e., the addition of some alternatives without the subtraction of any. This can be made more sophisticated by distinguishing between alternatives that might conceivably be chosen in some circumstances and those which would not, being dominated by other alternatives. Then the evaluation would proceed by seeking to discover whether any policy would create a choice-relevant expansion of opportunities relative to any other. If so, such a choice-augmenting policy would be considered superior, regardless of the actual choices made under the different policies. Failure of the test would simply fail to establish any preferences. The procedure clearly can generate only a partial preference ordering among the relevant set of alternatives.

### 8.4 Market Efficiency and Inefficiency

When the kinds of outcome that are generated by alternatives are numerous, as for example where repercussions in various markets must be considered, the cumbersomeness of direct enumeration of all impacts is very great, and its accumulated errors great enough to hide systematic influences, a short-cut procedure can establish whether or not there are likely to be systematic tendencies, and can greatly facilitate measurement by suggesting

where one might find already-aggregated, consolidated, netted out consequences.

The method is to undertake an explicit general equilibrium welfare analysis of the system as a whole under the various alternatives - in other words, to carry out systems analysis before any measurement takes place and even before the nature of appropriate measurement has been decided on. Such an analysis can often suggest what net influences - in both direction and kind - on overall allocational efficiency will occur after all repercussions work themselves out. As such, it helps to identify what types of magnitudes will best capture the flavor of these net influences. Such magnitudes may be far removed from what would suggest itself for direct measurement of enumerated primitive impact. Given the grave difficulties involved in direct measurement of so many types of outcome, the short-cut indirect measurement derived from the general equilibrium analysis certainly seems a promising avenue to explore.

#### 9. Time and Interest Rates

The treatment of time has probably been the most controversial aspect of cost-benefit analysis. It is inherently complex, and no definitive resolution of the issues involved yet exists. We have space only to sketch the overall problem.

Time appears in the analysis in at least three connections, and interest rates are bound up with each of them. We shall mention each: (1) time sequence tradeoffs; (2) time flow comparability; (3) opportunity cost for durable investments.

(1) Time sequence tradeoffs. Suppose there are two project alternatives with consequences extending over two years. One has net benefit payoffs of 0,100; the other 100,0. Are there grounds for preferring one over the other? For any consumer faced with these as consumption options the choice would be decided by his preferences about payoffs sequences. These preferences are referred to as time preferences. It is believed that empirically individuals are present-oriented: because of mortality, impatience, they would prefer the second sequence to the first. This means that at the moment of choosing they rate \$1 of consumption in year 2 as worth less than the same \$1 consumed in year 1. If asked to give up \$1 of this year's consumption in exchange for more of next year's consumption, they would require more than \$1 to make them as well off. The rate of trade-off of consumption in any two (not necessarily adjacent) periods is the marginal rate of time preference.

Consumers are always concretely faced with choices about temporal sequences, since they can borrow or lend (invest) resources, thereby either orienting their consumption toward or away from the present, respectively. They are assumed to make these decisions on the basis of discrepancies between their own tradeoff preferences and those made possible by market transactions. They engage in transactions up to the point where the two tradeoffs are equal. Consumers evaluate consumption streams over time in terms of these preference tradeoffs. But this leads to our second function.

(2) Time flow comparability. Suppose we are considering two projects which have a sequence of benefit and cost outcomes over a number of years. In the simplest case let both have constant net benefit flows over time. Then

the two can be compared simply by comparing net benefits in any year. Now let them have invariable time streams but with one having annual entries that always exceed the other. Again the comparison is trivial. The problem stops being trivial when the streams cross, so that net benefits in one exceed the other in some years, while the other is greater in other years. The excess in one direction in one year must be compared with the excess in the other direction in another year.

This is accomplished by specifying the preference tradeoff between every pair of years (not necessarily adjacent). This enables, for example, every payoff in year  $t$  to be expressed as a payoff with equivalent gratification-potential (or, more simply, as an equally desirable payoff) in year  $t-1$ . By such a series of linkages each payoff in period  $t$  can eventually be expressed as an equally satisfactory payoff in the current period: i.e., each payoff at any date is discounted back to give a present discounted value. The result is twofold: (1) payoffs in all years are made comparable with one another; (2) by adding together all present discounted values an entire sequence of payoffs can be expressed as a single number, the present discounted value (or really a capitalized value of a benefit stream).

Discounting is a process which can be used with temporal streams of benefits and costs of any type. We have presented it in the context of consumption streams, and so employed as discounting factor the preference tradeoffs derived from marginal rates of time preference. In discussing the third function we shall show how the same discounting function can be applied to productivity streams emanating from investment activities. The key difference is that the discounting factor must be appropriate to the

true choice situation in which each investment activity is embedded. The general principle is that discounting, which expresses only a set of inter-temporal tradeoffs, must always express the rates of tradeoff that the particular decision-maker would in fact be most willing to make under the specific circumstances.

(3) Opportunity cost for durable investments. A durable investment is a use of resources in which, although the commitment of resources may (or may not) occur within a single time period, the benefits arising from that commitment extend over a non-trivial number of time periods. Investments will differ as to size of the initial commitment, number of years over which the benefits extend, time shapes of these benefits (uniform, rising, falling, etc.), and absolute levels. A technique for rendering different investment prospects comparable is essential. Discounting is such a technique, since it can give the present discounted value of any initial resource commitment: i.e. it can give both a present discounted value of costs and benefits, thus reducing the entire project to a single dimension: present discounted value of costs and benefits, thus reducing the entire project to a single dimension: present discounted value of benefits minus costs, or net benefits.

Under certain circumstances a further degree of comparability is useful. To adjust for the fact that different projects may have different sized resource commitments (costs), an internal rate of return (or rate of return over cost) can be calculated for each. This represents the rate of net productivity of the project. It is computed as that discount rate which, when applied uniformly to all benefit elements in the stream, yields a present discounted value equal to that of total costs.

Discounting yields a measure of the capitalized value of net benefits, rate of return calculations yield a measure of the rate of net benefit production. Both can be used either to measure net payoffs to a project under consideration or the opportunity costs of such a project. For the latter the rate of return is more convenient, since alternative investment scale does not have to be specified.

Capitalized net benefits uses a discount factor that reflects market opportunities for temporal tradeoffs. For mutually exclusive alternatives, that with the highest net benefits is chosen. In general, by correctly accounting for opportunity costs, every project with positive net benefits is selected. Rate of return uses an internal discount factor, one that does not reflect either market opportunity or preference temporal tradeoffs. Hence these are introduced by comparing each project with all others, since in terms of temporal sequence it is mutually exclusive with all. In effect the comparison is conducted by asking, for each project, whether its rate of return exceeds that obtainable elsewhere, with market rate of interest often serving as shorthand measure of the set of opportunities available.

Both criteria will render the same verdict on alternatives where a fixed total use of resources is involved; but where variable amounts of resources are involved, maximum capitalized net benefits is the correct criterion while maximum internal rate of return will sometimes diverge.\*

These three functions of interest rates - essentially comparing different consumption streams, comparing investment streams, and comparing consumption with investment streams, are linked together because transactions engaged in by the respective decision-makers form a capital market. In a

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\*Use of rate of return in a sequential, incremental manner will make it correct.

perfect capital market prices and volumes of different types of transactions vary until the market interest rates equate the marginal rate of time preference for all consumers and the marginal productivity (internal rates of return) of investment. That is, the rate of return on the marginal project is just equal (1) to that of the next project which is superseded, and (2) to the marginal rate of time preference for all consumers adjusting to their most desired time sequence of consumption. In such an equilibrium each decision-maker's choice problem - whether consumer or investor - will permit the same interest rate to be used as a basis for performing the appropriate discounting function: "the" market interest rate.\*

The real situation is not so simple. First, it is widely held, that the capital market possesses a variety of imperfections, so that the interest rate on a particular transaction does not reflect the true social opportunity cost in terms of private sector temporal tradeoffs (plus characteristic riskiness). Second, a highly controversial issue has been developed as to whether the discount rate appropriate to a social evaluation of temporal tradeoffs is the same as the market rate which reflects predominantly individual private tradeoffs. The notably different time span of private decision-makers and government has been adduced as the principal ground for arguing that even a perfect private capital market would yield a rate of discount significantly higher than what is appropriate to public sector attitudes toward the future. The private and social rates of discount differ.

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\*There are rates on different types of transactions, but differences among them are assumed to reflect differences in riskiness, not intertemporal transfers.



Cost-benefit analysis, concerned with public sector decisions, must use the appropriate social discount rate.

The problem for cost-benefit, therefore, is to resolve the question of discrepancies between private and social discount rates arising from both private market imperfections and a different structure of decision-making between the two sectors. An appropriate social discount rate must be selected. This must be used on all alternative projects, public and private, so as to render all public projects comparable with one another, and with the private projects they would supersede.

Unfortunately, no definitive resolution of the problem yet exists. Treatments differ substantially. This is quite important, since differences in discount rate used within the actual range of treatments can radically affect social evaluation in almost every choosing situation. Variations in this factor can effect larger changes in outcome than even substantial errors in most of the other dimensions of the evaluative schema, in situations where the time dimension is important. In the absence of resolution there will continue to be an important source of disagreement about the interpretation of cost-benefit results. One technique which is employed to offset this controversiality is to run the cost-benefit calculations for more than one discount rate - typically a high, middle and low - and examine the sensitivity of the results. As suggested above, problems with intersecting, alternative long-term benefit and cost streams are likely to show high sensitivity; but problems with short time streams, and few intersections, may be only minimally affected.

## 10. Examples of Applications

To conclude this essay, we shall very briefly note some of the areas in which applications have been made and indicate the distinctive strategy that has been used in each. No attempt is made to give a detailed appreciation of these treatments. We seek only to suggest how the characteristics of the policy area have influenced the evaluative emphases.

### 10.1 Water Resource Development

This has been one of the oldest of cost-benefit areas, and probably the one receiving most extensive theoretical and applied attention. The programs evaluated have been federal, and have had an area of impact either predominantly or mainly rural or conglomerate - at least not predominantly urban. The benefit area has been wide, and the costs have had a dispersion much wider than the benefit population (chiefly the federal financing of the program). Under these circumstances attention could be focused on level of income effects, with redistributive impacts omitted. The federal jurisdiction also has made questions of relevant population negligible. The chief tasks have therefore resolved around: (1) how to measure the aggregate income-creating effect of an increase in the supply of one input (irrigation water) out of many in a set of production processes (agriculture); (2) how to measure the income effects of an increase in electric power supply, available navigation, flood control, recreation, etc; (3) how to perform measurements with a production process that produces multiple products, some saleable in ordinary, competitive, commercial markets, some saleable with the special linkages between seller and buyer that characterize a public utility, and some non-appropriable altogether.

Difficult issues are encountered, dealing, among other things, with substitutions among inputs and outputs, with the measurement of diffuse non-marketable outputs, with allocations of costs in multi-product operations, with the effects on complicated system costs of input-intermediate output configuration changes, with public-private competition in the sale of electricity, and of course with the question of the appropriate social discount rate.

## 10.2 Highways

The highways evaluated have largely involved federal or state projects, and been usually rural, or interurban. Recently, there has been a growing interest in intraurban highways, where different problems have been encountered. For the former, here too the diffuseness of adverse effects relative to the beneficiaries, and the presumption that the federal government in particular possessed adequate powers to rectify untoward income distribution effects, if it wished, has led to an omission of distributional considerations. The chief focus has been on income level effects. Three major kinds of impact have been central: the economic significance of the saving of time, both business and consumer; the influence of an improved transportation system on the economic development of a region; and the reflection of benefits to non-highway users in adjacent land prices.

The more recent concerns with urban highways make additional issues relevant. Such highways have a high density use at certain times of the day: they experience rush hour congestion. Moreover, their operation close to *and* within highway populous areas results in their having a number of external impingements upon non-users, such as air pollution, noise, accidents,

multi-mode traffic congestion in central business districts, aesthetic affronts, and spatial disruption of urban neighborhoods. Finally, their use is related to the presence and use of certain alternative transport modes, like rail and bus lines, taxis, etc.

These additional dimensions raise new income level impacts to be measured: congestion effects, the values lost by the various adverse impingements, and the substitution effects on alternative transport modes. In addition, they raise to notable importance the existence and pattern of distribution effects within the city: the portion of the population benefitted, the portions hurt.

The distinction, then, between non-urban and urban highway evaluation is of major importance. The latter raises many of the issues that are raised in evaluating a wide variety of types of project whose domain is an urban area. We shall see this immediately below.

### 10.3 Urban Renewal

Urban renewal is another example of a type of project whose urban setting raises to importance various repercussions stemming from the highly interdependent character of urban concentrations. Here the central foci are the distribution of land uses within the metropolitan area and the interaction between poverty and the housing market. A variety of subtle, highly indirect income level effects go hand in hand with important redistribution effects. The latter are generally more visible than the former, and the projects appear to many of the relevant population like primarily adversely redistributive programs, where well-to-do established business and residential interests benefit at the expense of the slum (largely ghetto slum)

poor. The fact that administration of the program is local accentuates the largely irremediable nature of the distributional impacts. Thus, a spelling out of both income level and distribution effects is essential.

The multidimensionality of effects is a special problem, aggravated by the interconnections among types of outcome. Various income level impacts have to be abstracted out of composite relationships like city-suburb competition, poverty-housing-slum causations, land-use and efficiency of resource allocation, local government and intra-metropolitan decision-making. The last of these opens an extremely important conflict between the relevant population as locus of political responsibility and as the population of project impact. The distribution effects are sizable relative to income level effects and have not been too difficult to delineate, although not at all easy to measure. The income level effects, whose very delineation is critical, given the appearance of distributional dominance, have been controversial. The author's own characterization of these stresses the importance of three kinds of externalities: neighborhood effects on the value of residential location; coherent slum sub-culture patterning on the self-fulfilling, self-sustaining disabilities of slum living; political jurisdiction interdependencies on the financial and expenditure constraints of central city governments. Measurement of income level effects, stemming from these factors, is notably difficult. Important categories seem intractable at this time.

#### 10.4 Education

Education has recently experienced heavy evaluational attention from a variety of directions, of which cost-benefit is only one. But the perspective

of cost-benefit has its distinctive character. The focus has typically been local. While some distributional issues seem important, since competitive advantages are entailed between primary beneficiaries and others, this has been neglected, since the positive spillovers of education onto third parties is assumed to be substantial and have usually been omitted (except in specific problems dealing with transmission of new knowledge - but these typically fall under a technical change rubric).

The usual approach in this area is to ask what is the contribution of additional education to national income and then measure this in terms of how additional education enhances the income-earning potential of the primary beneficiaries - those receiving the additional education. Education inputs are usually undifferentiated as to content, and specified only as an additional year at a specified education level (primary school, high school, college, graduate school). The cost of education is listed as the direct schooling costs (which are intended to cover the real resource costs of providing the schooling as well as explicit additional expenses facing the students) plus the income opportunities foregone by the students during the extra school year. In earlier studies the whole of the differences in present discounted value\* of lifetime earnings associated with individuals of different schooling was ascribed to the effect of schooling. Subsequent studies have attempted to adjust this for differences in ability and family upbringing and connections. The relative displacement effects on job allocations (i.e., education as a rationing device to assign scarce jobs) have sometimes been noted as a further offset but not measured. On the other side,

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\*Special problems inhere in the appropriate discount rate for this investment in human capital.

these studies measure only the asserted function of education as building employable skills - i.e., as creating human productive capital. They do not deal with the worth of education as a consumption good in itself. This aspect too has generally been mentioned but not measured.

The skill-creating effects of education have been measured with such indirection and paying so little attention to the specific content of the education process that some investigators have seriously doubted their relevance. They have turned instead directly to the schooling process as a process of production and tried to relate specific resource allocations (input combinations) to educational outputs. While measuring the value of various input commitments in terms of money, educational outputs have been measured in "natural" non-monetary output dimensions (like test scores). Preliminary results suggest that the aggregate, indirect income-enhancing capacities via skill creation may be more problematic than even the later, refined studies have been willing to allow.

#### 10.5 Model Cities

This is perhaps the most difficult area of application. It must be pointed out that there is no one version of Model Cities project, nor at this time do there exist projects of any kind well under way. No full-scale cost-benefit study has been undertaken. The present description is therefore meant only as a suggestion of a kind of emphasis that may well be appropriate for some of the local projects that subsequently come into full operation.

Unlike most of the other areas described, many of the projects here may turn out to reflect what seems the major orientation of the national program - namely, a substantial, multi-faceted redistributional effort to

upgrade the life-chances of poor people living in selected, relatively homogeneous neighborhoods. If this is so, cost-benefit evaluations may focus on the relative efficiency with which different resource use configurations succeed in bringing about these redistributions. It is income level effects that may be negligible. Complicated social impacts of project activities on motivations, productive capacity and decision-making processes may well have to be estimated, as well as more conventional notions of living standards, in order to predict continuing future consequences of present projects. Moreover, in keeping with the emphasis of the program, separable influences may have to be ascribed to the various elements of a single project even though they are expressly called upon to be simultaneously varied, and are understood to have highly interactive effects on the social situation of the target neighborhoods. Social policies operating on social milieux of such high mutual complexity certainly strain the capabilities of cost-benefit analysis. Real ingenuity will be required to fit the instrument to such more and more demanding uses.

## 11. Conclusion

Very little is left for a conclusion. As a broad emphasis on the importance of carefully sifting out the balance of desirable and adverse consequences of an explicitly formulated set of mutually exclusive alternatives it is unexceptionable. More narrowly, for providing a detailed framework of such consequences in certain choosing situations it is an instrument with attractive strengths and probably very poor competition. In other choosing situations, however, where significant distributional consequences are involved, some of its assumptions make it a more controversial instrument,



for it is in the area of distributional ethics that its distinctive separation of income level and distribution comes most into question. Even here, although its conclusions must be supplemented and its overall relevance may be ambiguous (especially with regard to its politically perceived legitimacy), it may, from absence of a superior tool, constitute an essential component of social evaluation.

Nonetheless, regardless of its methodological claims, its practical usefulness will be most decisively at the mercy of the availability of data. Very serious inadequacy of relevant data exists in almost every area for which cost-benefit analyses have been undertaken. To some extent this has been, and can be, by-passed by sheer human ingenuity in reformulating problems and reconstructing data. But ingenuity is not a perfect substitute for data availability. Analyses in most fields suffer from crude measures in some categories and total exclusion in others. As more and more intricate social policies require evaluation, the already sorely strained credibility of cost-benefit authoritativeness may dissolve beyond essential communication.

Pessimism may not be called for. Despite data paucity, methodological hangups, and a still-ambiguous political relevance, the technique of cost-benefit has shown remarkable development, both in scope and refinement, over what is still a period of infancy. Having called out so soon after birth for "Drink! Drink!" it is hard to believe that it will not grow fast enough soon to drink us all under the table.









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