The Discipline of Cost - Benefit Analysis

THE DISCIPLINE OF COST-BENEFIT ANALYSIS

*AMARTYA SEN**

ABSTRACT

Cost-benefit analysis is a general discipline, based on the use of some foundational principles, which are not altogether controversial, but have nevertheless considered plausibility. Divisiveness increases as various additional requirements are imposed. There is a trade-off here between easier usability (through locked-up formulae) and more general acceptability (through allowing parametric variations). The paper examines and scrutinizes the merits and demerits of these additional requirements. The particular variant of cost-benefit approach that is most commonly used now is, in fact, extraordinarily limited, because of its insistence on doing the valuation entirely through an analogy with the market mechanism. This admits only a narrow class of values, and demands that individuals be unconcerned about many substantial variations, ignored in the procedure of market valuation. The use, instead, of a general social choice approach can allow greater freedom of valuation and can also accommodate more informational inputs.

THE discipline of cost-benefit analysis—if discipline it is—has fearless champions as well as resolute detractors. It is, partly, a battle of giants, for there are heavyweight intellectuals on both sides, wielding powerful weapons of impressively diverse kinds. It is also, partly, a conversation between great soliloquists—very skilled in making their points, and somewhat less troubled than Hamlet (''To be,'' say some, and ''Not to be,'' announce the others).

The main object of this paper is not so much to decide who is right but to identify what the issues are. However, that is not my only objective. I also have some personal views and assessments, which I shall not hesitate to present. But principally (and I believe, more importantly) I will try to isolate the questions that divide us. We can agree on the questions even when we do not agree on the answers. There are several difficult issues here, which must be addressed in one way or another.

* Master, Trinity College, Cambridge, and Lamont University Professor Emeritus, Harvard University. For helpful comments, I am most grateful to Eric Posner.

[*Journal of Legal Studies*, vol. XXIX (June 2000)]
 0047-2530/2000/2902-0015$01.50

I. The Themes and the Debates

I shall proceed gradually from some basic principles that characterize the foundations of the general approach of cost-benefit analysis. These elementary principles would be accepted by many but rejected by some who are not that way inclined at all. The latter group would, then, have reason to go no further (given their rejection of one or other of these foundational cost-benefit principles). However, those who are ready to live with these foundational principles will then have to consider what additional requirements they are willing to consider to make cost-benefit analysis more specific and pointed. Any such narrowing will, of course, also make the approach less ecumenical and permissive. Indeed, the mainstream approach of cost-benefit analysis uses a formidable set of very exacting requirements, and we have particular reason to examine these additional conditions. Indeed, the list of requirements considered here follows the mainstream approach quite closely, though I shall also briefly refer to alternative possibilities as we go along.

I shall divide these additional demands into three groups: structural demands, evaluative indifferences, and market-centered valuation. To give away my main theme at the very beginning (this is definitely not a detective story), let me list the main headings under which the principles will be considered, in the sections that follow the more general Section III.

III. Foundational Principles
  A. Explicit Valuation
  B. Broadly Consequential Evaluation
  C. Additive Accounting
IV. Structural Demands
  A. Assumed Completeness
  B. Full Knowledge or Probabilistic Understanding
  C. Noniterative and Nonparametric Valuations
V. Evaluative Indifferences
  A. Nonvaluation of Actions, Motives, and Rights
  B. Indifference to Intrinsic Value of Freedom
  C. Instrumental View of Behavioral Values
VI. Market-Centered Valuation
  A. Reliance on Willingness to Pay
  B. Sufficiency of Potential Compensation
  C. Disregard of Social Choice Options

There is, I fear, much ground to cover, but before I try to get on with it, I would like to make three clarificatory points. First, the term ‘‘cost-benefit

analysis'' has considerable plasticity and various specific procedures have been called by that name (by the protagonists and by others). There is nothing particularly wrong in this permissiveness, so long as terminological unity is not taken to be the same as conceptual congruence. It is indeed perfectly possible for someone to accept the foundational outlook of cost-benefit analysis and yet reject one or more of the requirements imposed by the structural demands, evaluative indifferences, and market-centered valuation that characterize the mainstream applications. While the literature is full of repeated applications of a very well-delineated method that incorporate all these demands, this should not, in itself, be taken to compromise the claims of other procedures or approaches to be seen as legitimate cost-benefit analysis.

Second, the acceptance or nonacceptance of the foundational principles themselves may, in some ways, be as useful a classificatory device as the divisions produced by the insistence on all the requirements invoked by the mainstream methodology. Indeed, there are analysts who see themselves as defenders of cost-benefit analysis and who accept the foundational principles of this approach, who nevertheless cannot but be intensely unhappy with the elaborate methodology of valuation hammered into the mainstream procedure. If there is room for them too, I should apply for accommodation.

Third, the subject has been in vogue for many decades now and has generated vast literatures, some more oriented toward analytical issues and others more concerned with problems of practical application (usually of the delineated mainstream methodology). Many conceptual issues have received attention, and with them I shall be, in one way or another, concerned in this paper (even though I shall not attempt to make this into a ''survey paper'' with references to specific publications). But cost-benefit analysis—or a collection of procedures bearing that general name—has also been used in many practical decisions, generating corresponding literatures. It would be nice to attempt a comparative assessment of the varieties of particular methods that have been used and to discuss their respective suitability—absolute and comparative—in handling diverse decisional problems in practice. Whether this is feasible at this time, I do not know. But I do know that I am not in a position to do this, given the monumental size of the literature and my own limited knowledge. While I shall not go in that direction, I mention it nevertheless, since I do believe that it may be quite useful as an exercise to go from practice to principles, rather than the other way round (as attempted in this paper). Understanding can come in different ways, and despite my using only one general line of investigation (based on assessing the principles involved), I do not intend to deny the relevance of other ways of getting at these questions.

II. Costs and Benefits in General Reasoning

The basic rationale of cost-benefit analysis lies in the idea that things are worth doing if the benefits resulting from doing them outweigh their costs. This is not, of course, by any means, noncontroversial, but before getting into the controversies, it is useful to see first that there is some intelligible reasoning here. Indeed, we may well puzzle a bit if someone were to tell us ''This project has little benefit and much cost—let us do it!'' We would think that we are entitled to ask ''why?'' (or, more emphatically, ''why on earth?''). Benefits and costs have claims to our attention. Furthermore, it may even be argued, with some plausibility (though, I believe, not total certainty), that any ''pro'' argument for a project can be seen as pointing to some benefit that it will yield and any ''anti'' argument must be associated with some cost.

Indeed, the language of benefits and costs is used by many who would have nothing to do with cost-benefit analysis as it is standardly practiced. Consider, for example, the big political debate that is going on in India right at this time about the big irrigation project called the Narmada Dam, which will provide water to a great many people but will also drown the homes of many others (who have been offered what is seen as inadequate or unacceptable compensation). The decision to produce the dam (and to continue with the project despite the opposition it generated) was, of course, based on cost-benefit analysis. However, in arguing against the decision, the opponents of it also point to costs, sometimes called ''human costs,'' that have been ignored or not adequately considered.[1]

The framework of costs and benefits has a very extensive reach, going well beyond the variables that get standardized attention in the usual techniques associated with the application of cost-benefit analysis. Indeed, the ordinary procedure of considering, in a general way, the benefits and costs associated with alternative possibilities and then assessing their respective advantages is usable in a wide variety of problems, from appraising economic development or the quality of life to scrutinizing the extent of inequality, poverty, or gender disparity.[2]

[1] For a powerful and strongly reasoned exposition of the case against the dam, see Arundhati Roy, The Greater Common Good: The Human Cost of Big Dams, 16 (11), Frontline, June 4, 1999.

[2] See, for example, Amartya Sen, On Economic Inequality (enlarged ed. 1997) (1973); A. B. Atkinson, Social Justice and Public Policy (1983); Keith Griffin & John Knight, Human Development and International Development Strategies for the 1990s (1990); The Quality of Life (Martha Nussbaum & Amartya Sen eds. 1993); Women, Culture and Development: A Study of Human Capabilities (Martha C. Nussbaum & Jonathan Glover eds. 1995); Development with a Human Face (Santosh Mehrotra & Richard Jolly eds. 1997).

III. Foundational Principles

A. Explicit Valuation

Despite the sweeping reach of reasoning invoking costs and benefits, cost-benefit analysis as a distinct approach (or, more accurately, as a class of distinct but related approaches) imposes certain restrictions on evaluative rules and permissive procedures. Perhaps it is appropriate to see the demand of explicit valuation as the first general condition imposed by the discipline. This is a forceful demand for fuller articulation, which involves the rejection of a commonly adopted position hallowed by tradition, to wit, that we may know what is right without knowing why it is right. At the risk of oversimplification, explicit valuation is a part of the insistence on a rationalist approach, which demands full explication of the reasons for taking a decision, rather than relying on an unreasoned conviction or on an implicitly derived conclusion.

Despite its rationalist appeal, explicit valuation as a principle is not without its problems. If one were to insist on this in all personal decisions, life would be quite unbearably complicated. The making of day-to-day decisions would, then, take more time than would be available for it, and decisional defenses might look terribly pedantic (perhaps even pompous, in much the same way the wine experts' specialist recommendations tend to sound, invoking such notions as the wine's ''melodic quality'' or ''big nose'' or ''innate cheerfulness'').

However, public decisions have more need for explicitness than private choices or personal actions. Others not involved in the decision may legitimately want to know why exactly something—rather than another—is being chosen. The demands of accountability apply not merely to implementation but also to choices of projects and programs. There is, thus, a case for fuller articulation and more explicit valuation in public decisions than in private ones.

Here too there may be problems. What Cass Sunstein calls ''incompletely theorized agreements'' may be quite important for agreed public decisions.[3] A consensus on public decisions may flourish so long as the exact grounds for that accord are not very precisely articulated. Explicit valuation may, thus, have its problems in public decisions as well as private ones.

There is, nevertheless, a case for explicitness, if only to encourage the possibility of reasoned consent and to present some kind of a barrier against implicit railroading of unacceptable decisions that would be widely rejected if properly articulated. There are several conflicting issues of pragmatic

[3] See Cass R. Sunstein, Legal Reasoning and Political Conflict (1996).

concern as well as analytical clarity in the insistence on explicit valuation, but judged as a technique of analysis (as opposed to rhetoric of advocacy) this insistence does have some very basic merit. Also, diverse grounds for agreement on a particular policy judgment can be accommodated within a general approach of relying on the intersection of partly divergent rankings over policy alternatives (on which more later—in Section IV).[4]

B. Broadly Consequential Evaluation

A second basic principle of cost-benefit analysis relates to the use of consequential evaluation. Costs and benefits are evaluated, in this approach, by looking at the consequences of the respective decisions. Broadly consequential evaluation allows the relevant consequences to include not only such things as happiness or the fulfillment of desire on which utilitarians tend to concentrate, but also whether certain actions have been performed or particular rights have been violated. This inclusiveness is resisted by some. Since consequentialist thinking has been very closely linked with utilitarianism and related approaches, there is a long tradition of taking a very narrow view of what can count as consequences (roughly in line with what utilitarians wish to focus on).

As a result, many political theorists have argued against taking an inclusive view of consequentialism. It has been claimed, for example, that a performed action cannot be included among the consequences of that action. But one has to be quite a pure theorist to escape the elementary thought that an action that has been successfully undertaken must have resulted in that action's occurrence, no matter what other consequences it may or may not have (the main argument against asserting this may be the difficulty in stating something quite so obvious, without sounding rather foolish).[5]

Similarly, if recognized rights are violated by particular actions (for example, by the jailing of dissidents), there is no great difficulty in seeing that these actions have resulted in the violation of those rights. We do not even face a tremendous intellectual challenge in understanding such statements as, ''1976 was a very bad year for civil rights in India, since there were

[4] On the use of intersection partial orderings, see also Sen, *supra* note 2; and Amartya Sen, Employment, Technology and Development (1975).

[5] There are interesting issues of agent-relative ethics that are sometimes thought to be incompatible with consequential reasoning. But even this rather more sophisticated claim is hard to entertain except through a slightly disintegrated attempt to get to agent-relative action judgments starting from agent-independent judgments on states. Once that bit of implicit schizophrenia is eschewed, the reach of broad consequential reasoning is correspondingly extended to permit agent relativity in evaluating actions as well as states; on this see Amartya Sen, Rights and Agency, 11 Phil. & Pub. Aff. 3 (1982); Amartya Sen, Well-Being, Agency and Freedom: Dewey Lectures 1984, 82 J. Phil. 169 (1985).

many violations of civil rights as a consequence of policies that were followed during the so-called 'Emergency period.''' The vast majority of the Indian voters who defeated the proposed continuation of the Emergency (as well as the government that had imposed it) did not have to manage without consequential reasoning. Indeed, looking at consequences on rights and freedoms—though allegedly alien to rights-based reasoning in some modern political theories—is not really a new departure, as anyone studying Tom Paine's *Rights of Man* or Mary Wollstonecraft's *The Vindication of the Rights of Women* (both published in 1792) can readily check.

Taking a broad view of consequential evaluation does not, however, make it nonassertive. It wrestles against deciding on actions on grounds of their ''rightness''—irrespective of their consequences. This is a debate that has gone on for a long time and remains active today. Those opposed to consequential evaluation—even in its broadest form—have shared a common rejection of being guided by consequences (the ''right'' action may be determined, in this view, simply by one's ''duty''—irrespective of consequences). But they have often argued for very different substantive positions on deontological grounds. For example, Mahatma Gandhi's deontological insistence on nonviolence irrespective of consequences clashes substantially with Krishna's deontological advocacy, in *Bhagavadgeeta*, of the epic hero Arjuna's duty to take part in a just war. On the eve of the great battle, as Arjuna rebels against fighting (on the grounds that many people will be killed on both sides, that many of them are people for whom Arjuna has affection and respect, and, furthermore, that he himself—as the leading warrior on his side—would have to do a lot of killing), Krishna points to Arjuna's duty to fight, irrespective of his evaluation of the consequences. It is a just cause, and as a warrior and a general on whom his side must rely, Arjuna cannot, in Krishna's view, waver from his obligations.

Krishna's high deontology has been deeply influential in Indian moral debates in the subsequent millennia. It is also eloquently endorsed, among others, by T. S. Eliot, in a poem in the *Four Quartets*. Eliot summarizes Krishna's view in the form of an admonishment: ''And do not think of the fruit of action. / Fare forward.'' Eliot explains: ''Not fare well, / But fare forward, voyagers.''[6] Cost-benefit analysis, on the other hand, suggests that we try to ''fare well'' and not just ''forward.'' The ''wellness'' that results must take note inter alia of the badness of violation of rights and duties (if such things are admitted into consideration), but the decision cannot be reduced just to doing one's ''duty, irrespective of consequences.''

[6] T. S. Eliot, Four Quartets 31 (1944) (The Dry Salvages). I have discussed the issues involved in this debate in Amartya Sen, Consequential Evaluation and Practical Reason, 97 J. Phil. (in press, 2000).

It should, thus, be clear that consequential evaluation as a principle does impose a demand with some cutting power. I would argue that the principle does make good sense, but I know that deontologists would not agree and would, no doubt, decide that they have overwhelming reasons to reject that approach (the world is full of ''very strange and well-bred'' things, to use William Congreve's perplexed phrase). The world of costs and benefits (which includes taking note of the badness of nasty actions and of violation of freedoms and rights) is quite a different decisional universe from the sledgehammer reasoning of consequence-independent duties and obligations.

C. Additive Accounting

Cost-benefit analysis not only bases decisions on costs and benefits, it also looks for the value of net benefits after deducting costs from benefits. While benefits can be of different kinds and are put together—to the extent that they can be—through a selection of weights (or ranges of weights), costs are seen as forgone benefits. Thus, benefits and costs are defined, ultimately, in the same ''space.''

The additive form is implicit in all this. When different kinds of benefits are added together, with appropriate weights, the framework is clearly one of addition. It may be wondered whether there is anything to discuss here, since many people are so exclusively familiar with the additive form of reasoning (compared with all other possible forms) that addition may appear to be simply the natural form—perhaps even the only form—for getting together diverse benefits and costs. However, multiplicative forms have also been used in the evaluative literature (for example, by J. F. Nash in what he called ''the bargaining problem'').[7] Other forms are possible too.

In fact, there is a strong case for using concave functions that respond positively to benefits (and thus negatively to costs) but do not have constant weights and a linear format. In fact, concavity is very often the most plausible shape of an objective function involving different good things and has been used to derive variable weights at different points and correspondingly variable shadow prices of resources (for example, through use of the so-called Kuhn-Tucker Theorem).[8] In fact, in general we would expect some strict concavity (or at least strict quasi concavity, corresponding to dimin-

[7] See John F. Nash, Jr., The Bargaining Problem, 18 Econometrica 155 (1950).

[8] See H. W. Kuhn & A. W. Tucker, eds., 1 & 2 Contributions to the Theory of Games (1950, 1953); Samuel Karlin, 1 Mathemetical Methods and Theory in Games, Programming and Economics (1959). The relevance of concave—as opposed to strictly linear—programming for cost-benefit analysis in general and for shadow pricing in particular is discussed in Amartya Sen, Choice of Techniques (3d ed. 1968).

ishing marginal rates of substitution between different kinds of benefits), and in this sense, the additive form of cost-benefit analysis requires careful handling. One way of dealing with the problem is to confine attention to relatively marginal changes, so that the weights may not change very much and the framework may be approximately linear (some would refer to Taylor's Theorem and to local approximations, at this point). But many projects are relatively large, and the benefits may be so particularized (especially in a distribution-sensitive accounting) that the weights may have to change quite readily. In that case, there is no alternative—if one were to use the additive form of cost-benefit analysis—to taking note of the need for varying weights as the magnitudes of different kinds of benefits change. The exercise must then take the form of a conjoint determination of quantities of benefits and their weights. I shall not go further into the technicalities here, but it is important to recognize that the additive form that cost-benefit analysis adopts is chosen at the cost of some limitation and certainly calls for more simultaneous reasoning of quantities and values as substantial alterations are considered.

Even with all these qualifications (explicit valuation, broadly consequential reasoning, and additive accounting), general cost-benefit analysis is a very ecumenical approach. It is compatible, for example, with weights based on willingness to pay as well as some quite different ways of valuation (for example, through questionnaires), which may supplement or supplant that willingness-to-pay framework.[9] There is reasoning here of great generality (despite the qualifications and disclaimers already considered), and it is important to see the reach of the general approach before we go on—from this point onward—to adding more and more restrictive requirements that make the procedures more specific and particular, at the cost of reducing the wide freedom given by the general approach of taking decisions by cost-benefit reasoning.

IV. Structural Demands

A. Assumed Completeness

As it is standardly practiced, cost-benefit analysis tends to invoke completeness of evaluations. This requires not only that each consequence be identified and known (more on this presently) but also that the weights, at

[9] See Partha Dasgupta, Stephen Marglin, & Amartya Sen, Guidelines to Project Evaluation (prepared for UNIDO, 1972). See also Sen, *supra* note 8; I. M. D. Little & James Mirrlees, Manual of Industrial Project Analysis in Developing Countries (1968); Cost-Benefit Analysis (Richard Layard ed. 1972); Amartya Sen, Employment, Technology and Development (1975); P. S. Dasgupta & G. M. Heal, Economic Theory and Exhaustible Resources (1979).

the appropriate point, are definitive and unique. It is often presumed, without any explicit argument, that if we are evaluating benefits and costs, then every possible state of affairs must be comparable—and be clearly ranked—vis-à-vis every other. This presumed requirement has sometimes been seen by critics of cost-benefit analysis as being quite implausible. How can we always compare every alternative with every other, especially since so many considerations are involved, which incorporate imprecise measurement and ambiguous valuation? Can we always find a best alternative? What if we fail to rank some states of affairs vis-à-vis others?

Some see completeness as a necessary requirement of consequential evaluation, but it is, of course, nothing of the sort. A consequentialist approach does involve the use of maximizing logic in a general form, but maximization does not require that all alternatives be comparable and does not even require that a best alternative be identifiable. Maximization only requires that we do not choose an alternative that is worse than another that can be chosen instead. If we cannot compare and rank two alternatives, then choosing either from that pair will fully satisfy the requirement of maximization.

The term maximization is often used quite loosely, rather than in its mathematically well-defined form. Sometimes the term is used to indicate that we must choose a best alternative. This is, technically, better described as optimization.[10] The technical definition of maximization in the foundational literature on set theory and analysis (in the form of picking an alternative to which there is none better) captures all that needs to be captured for being able to choose systematically and cogently through pairwise comparisons. Maximization and optimization coincide if the ordering is complete, which it may or may not be. If, for example, it so happens that (1) there are two options A and B that cannot be ranked vis-à-vis each other, but (2) each of them is better than all the other alternatives, then maximization would require that one of those two—A or B—be chosen.[11]

The distinction can be illustrated with the old story of Buridan's ass, which saw two haystacks that it could not rank vis-à-vis each other.[12] Buridan's ass, as a vigorous optimizer and a great believer in complete order-

[10] On the nature of this requirement and its implications, see Amartya Sen, Collective Choice and Social Welfare, ch. 1* (North-Holland 1979) (1970).

[11] This is indeed the way maximality is defined in the mathematical literature, both in pure set theory (for example, in N. Bourbaki, Éléments de Mathématique (1939); and Nicholas Bourbaki, Theory of Sets (English trans. 1968)) and in axiomatic economic analysis (for example, in Gerard Debreu, Theory of Value (1959)). The axiomatic connections between maximality and optimality are discussed in Amartya Sen, Maximization and the Act of Choice, 65 Econometrica 745 (1997).

[12] There is a more popular but less interesting version of the story of Buridan's ass, according to which it was indifferent between the two haystacks and could not decide which to choose. However, if the donkey were really indifferent, then either haystack would,

ings, could not choose either haystack (since neither was shown to be clearly the best), and it thus died of starvation. It starved to death since it could not rank the two haystacks, but of course each would have generated a better consequence than starvation. Even if the donkey failed to rank the two haystacks, it would have made sense—good cost-benefit sense—for it to choose either rather than neither. Cost-benefit analysis does need maximization, but not completeness or optimization.

When a particular exercise of cost-benefit analysis ends up with a complete ordering and a clearly optimal outcome (or an optimal set of outcomes), then that may be fine and good. But if that does not happen, and the valuational ordering is incomplete, then maximization with respect to that incomplete ranking is the natural way to proceed. This may yield several maximal solutions that are not comparable with each other, and it would make sense to choose one of them. If the valuations come in the form of ranges of weights, we can also do sensitivity analysis of the effect of reducing the ranges of variations on extending the generated partial ordering.[13] The extent of imprecision can be reflected in the assessment, and the choices can be systematically linked to the valuational ambiguities.

However, in the literature, completeness is sometimes insisted on, which tends to produce arbitrary completion in terms of imperious valuational judgments or capricious epistemic assessments. The result often enough is to ignore the less exactly measured consequences or less clearly agreed values, even though they may be extremely important (of which we can be sure even without zeroing in on an exact weight—the entire range of acceptable valuational weights may speak clearly enough). The neglect of the so-called human costs relates partly to this despotic quest for complete orderings. These are cases in which a little more sophistication in the technical exercise can allow us to include many variables that some technocrats find too messy to incorporate.

B. Full Knowledge or Probabilistic Understanding

The presumption of full knowledge of the consequences involved is rather similar to that of complete availability of definitive and precise valuational weights. It is relevant to see the sources of epistemic ambiguity and their far-reaching effects. No less importantly, there is a need to consider

---

clearly, have been as good as the other, and even a resolutely optimizing ass would not have faced an impasse.

[13] The technical connections are discussed in Sen, *supra* note 10, ch. 7 & 7*; Amartya Sen, Interpersonal Aggregation and Partial Comparability, 38 Econometrica 393 (1970); and Sen, Employment, Technology and Development, *supra* note 4. See also the recent literature on the use of ''fuzzy sets'' and ''fuzzy valuations.''

ranges of values of factual variables (like that used for evaluative weights), which lead mathematically to similarly partial orderings of alternative proposals (on the basis of intersection of all the total orderings compatible with each set of values within the respective ranges).[14] Again, the discipline of maximization provides a much fuller reach than the usual insistence on optimization.

It is sometimes presumed that the problem can be avoided by looking at expected values, with probability-weighted valuations. Indeed, this can often work well enough. However, for it to make sense, the choice of probability weights needs justification, as does the axiomatically demanding framework of expected value reasoning. These issues have been extensively discussed elsewhere, and I shall not go further into them here.[15] The use of partial ordering and maximization can be sometimes supplemented by the device of probability distributions and expected value optimization, but the extension may be purchased at some real cost.

The helpfulness of assuming complete knowledge, or less demandingly (but demandingly enough) the usability of expected value reasoning, cannot be doubted. What is at issue is whether substantially important decisional concerns get neglected because of these presumptions. I flag the question as important but will not further pursue this issue here.

C. Noniterative and Nonparametric Valuations

Valuational judgments we make can take various forms. One distinction relates to judgments that are basic in the sense that they are not parasitic on any underlying factual presumption (other than those which are part of the subject matter of the judgment itself). Nonbasic judgments may, however, draw on factual presumptions, often made in an implicit way, and thus remain subject to revision in the light of more knowledge—indeed even in the light of the results of applying these nonbasic judgments themselves.[16]

When dealing with nonbasic judgments, say, in valuational weights, we have to be aware that the valuational priorities may undergo alteration as the implications of the presumed weights become more fully known or un-

[14] The practical bearing of such variations is discussed in Sen, Employment, Technology and Development, *supra* note 4; and Amartya Sen, Resources, Values and Development, essays 12, 14, & 17 (1982).

[15] See Mark J. Machina, ''Rational'' Decision Making versus ''Rational'' Decision Modelling? 24 J. Mathematical Psychology 163 (1981); Daniel Kahneman, P. Slovik, & A. Tversky, Judgement under Uncertainty: Heuristics and Biases (1982). I have tried to discuss the issues involved in Amartya Sen, Rationality and Uncertainty, 18 Theory & Decision 109 (1985).

[16] The distinction between ''basic'' and ''nonbasic'' judgments is discussed in Sen, *supra* note 10, ch. 5 (1970).

derstood. For example, we may not fully seize the implications of choosing one set of values over another, until we see the results of using that set of values. This suggests the need for iterative exercises of valuation, for example, through the procedure of parametric programming. Rather than taking the weights given as unalterable entities, they could be offered as tentative values, which remain open to revision as and when the results of using those values become clear. Then, instead of having a one-way sequence of valuation, we could proceed from tentative values to the applied results and then rethink as to whether the weights need revising in the light of the generated rankings of alternatives.

In some cases we have clearer values on particular elements in the list of benefits than we have on overall assessments of total happenings. In other cases, however, the overall assessments may speak more immediately to us, in terms of the valuations that we may entertain. Examples are easy to give of both kinds of judgments from the recent literature on contingent valuation as applied to environmental interventions.[17] The format of cost-benefit analysis allows iterative valuation and parametric techniques, even though the mainstream applications go relentlessly in one direction only. Again, the pragmatic convenience of suppressing iterative determination of weights has to be balanced against the practical importance of two-way influences on the nature of elementary valuations and their integrated effects.

V. Evaluative Indifferences

A. Nonvaluation of Actions, Motives, and Rights

In the context of discussing broad consequential evaluation, there was already an opportunity of commenting on the inclusiveness of consequential reasoning, such as taking note of the nature of actions and the fulfillment and violation of recognized rights. Motives too can come into the accounting, even though they are more important in personal decisions than in public choice.[18]

The neglect of these considerations in mainstream cost-benefit analysis does reduce the reach of the ethical analysis underlying public decisions. The literature on human rights brings out how strongly relevant—and closely related—some of these concerns are to what people see as important. These concerns remain potentially pertinent to cost-benefit evaluation

[17] See, among many other writings, Contingent Valuation: A Critical Assessment (Jerry A. Hausman ed. 1993); Daniel Kahneman & Jack L. Knetsch, Contingent Valuation and the Value of Public Goods, 22 J. Envtl. Econ. & Mgmt. 90 (1992); W. Michael Hanemann, Valuing the Environment through Contingent Valuation, 8 J. Econ. Persp. 19 (Autumn 1994).

[18] On this see Amartya Sen, On Ethics and Economics (1970).

even when people have no opportunity of expressing their valuations of these concerns in limited models of cost-benefit assessment (for example, in terms of market-price-based evaluations).

B. Indifference to Intrinsic Value of Freedom

The neglect of the freedoms that people enjoy is no less serious a limitation than the neglect of rights. Indeed, recognized rights often tend to take the form of claims on others for compliance—or even help—in favor of the realization of the freedoms or liberties of the persons involved. These entitlements may take the form of cospecified perfect obligations of particular individuals or agencies, or—more standardly in the case of many of the claims of human rights—imperfect obligations of people or agencies who are generally in a position to help.[19]

It is possible for consequential cost-benefit analysis to take note of the substantive freedoms that people have (formally this will require valuation of opportunity sets, and not merely of the chosen alternatives). This can be an important distinction. For example, a person who voluntarily fasts (rather than involuntarily starves) is rejecting the option of eating, but to eliminate the option of eating would make nonsense of the voluntariness of his choice. Fasting is quintessentially an act of choosing to starve, and the elimination of the option of eating robs the person of the opportunity of choice that makes sense of the ''sacrifice'' involved in fasting.

The case for consequential analysis based on comprehensive outcomes (taking note of processes used and freedoms exercised, as opposed to merely culmination outcomes) closely relates to this question and to the extensive reach of consequential reasoning.[20] Insofar as the restricted format of mainstream cost-benefit analysis neglects the importance of freedom, there is a manifest limitation here, and the contrast with a more general consequential approach is clear enough. On the other hand, the practical convenience of allowing that neglect may be very easy to see. It is not crucial that we agree on what exactly is to be done (whether to go for the more

[19] Both ''perfect'' and ''imperfect'' obligations are Kantian concepts, even though modern Kantians seem to focus much more on the former than on the latter. Indeed, the view that human rights may not be properly formulated ''rights'' of any kind seems to relate to the idea that rights must be matched by perfect duties and it is not adequate to link them to imperfect and more general obligations of others. See, for example, Onora O'Neill, Towards Justice and Virtue (1996). A contrary position is defended in Amartya Sen, Development as Freedom, ch. 10 (1999); and also in Sen, *supra* note 6.

[20] On this see Amartya Sen, Internal Consistency of Choice, 61 Econometrica 495 (1993); Amartya Sen, Maximization and the Act of Choice, 65 Econometrica 745 (1997); Amartya Sen, Freedom and Social Choice, in Freedom, Reasoning and Social Choice: Arrow Lectures and Other Essays (forthcoming).

inclusive but more difficult approach, or the opposite), but it is quite important to see what the debate is about (and indeed that there is a debate here to be faced, which many exponents of the limited mainstream methodology seem rather reluctant to acknowledge).

C. Instrumental View of Behavioral Values

Values influence our actions, and in assessing the consequences of public projects, valuational assumptions are standardly made. But it is also the case that substantial projects, particularly those involving cultural challenges and also movements of people from one cultural setting to another (for example, from rural to urban areas), may tend to lead to modification of values.[21] This opens up a big issue as to how such value modifications are to be assessed and, in particular, in terms of which values—the prior or the posterior beliefs—the evaluation should occur.

The issue, though enormously complicated, has received attention from some social analysts.[22] I do not have a great solution to offer here, but if a serious problem is neglected—even if for the excellent reason of our not knowing how to go about dealing with it—it is right that the neglect should be flagged. It may conceivably turn out to be rather relevant in our decisional analysis, even if only for the reason that it may make us more modest about insisting on the unquestionable excellence of the advocated decisions.

VI. Market-Centered Valuation

A. Reliance on Willingness to Pay

In mainstream cost-benefit analysis, the primary work of valuation is done by the use of willingness to pay. This approach is, of course, based on the rationale of the discipline of market valuation. Indeed, the use of valuations based on a market analogy has some of the merits that the market allocation system itself has, including sensitivity to individual preferences and tractability of relative weights.

The basic limitations of this approach include those experienced also by market signaling. There is, for example, the neglect of distributional issues, both (1) in the form of attaching the same weight on everyone's dollars

[21] It is, however, important to distinguish between genuine changes in values and those that reflect alterations of relative weights because of parametric variations of the determining variables; on this see Gary S. Becker, Economic Approach to Human Behavior (1976); and Gary S. Becker, Accounting for Tastes (1996).

[22] See, for example, Jon Elster, Ulysses and the Sirens: Studies in Rationality and Irrationality (1979); and Jon Elster, Sour Grapes: Studies in the Subversion of Rationality (1983).

(irrespective of the poverty or the opulence of the persons involved), and (2) in the shape of not attaching any weight to distributional changes resulting from the project or program (since those changes, even if valued positively or negatively by the citizens, are not up for valuation as a private good in the market system).[23] There are also signaling difficulties when there are interdependences and externalities.

In addition to shared problems of (i) the actual market system and (ii) market analogy valuation, the latter has some additional problems as well. This applies particularly to public goods, where valuations based on market analogy have often been invoked. Getting people to reveal what they are really willing to pay is not all that easy, when the question is not followed by an actual demand for that payment. And when it is so followed, there are also strategic considerations that may distort the revealed willingness to pay, for various reasons, of which free riding is perhaps the most well known. There are, of course, proposed devices to deal with incentive compatibility in implementation, but no general surefire method has emerged.

Estimation of willingness to pay is particularly hard in the case of contingent valuation of existence values of prized components of the environment—a centrally important exercise for cost-benefit analysis. The contingent valuation (CV) procedure takes the form of posing hypothetical questions about how much people would be willing to pay to prevent the loss of some particular object.[24] In the legal context, dealing with damage caused by oil spillage and other such acts, the contingent valuation approach has tended to be used as both (1) a measure of the actual loss involved and (2) an indication of the extent of culpability of the party whose negligence (or worse) led to the event that occurred.

The actual use of the CV procedure in devised experiments has tended to yield results that seem to go contrary to what is standardly seen as rational choice.[25] One of the problems—the so-called embedding effect—is illustrated by the finding that the average willingness to pay to prevent 2,000 migratory birds being killed was much the same as the willingness to pay

[23] The weights are sometimes interpreted not directly in terms of their actual and immediate consequences, but in terms of their potential use, as reflected in compensations tests of one kind or another. I comment on this line of interpretation in the next section (Section VI*B*).

[24] The question can also be put in the form of how much one would accept as compensation for the loss. This should tend to exceed—for good ''Hicksian'' reasons—the willingness to pay to prevent the loss. But the actual margins of difference in the answers to the two sets of questions have tended to be much too large to be readily explainable in this way.

[25] See, for example, Kahneman & Knetsch, *supra* note 17.

for preventing the destruction of 20,000 or 200,000 birds.[26] Had those birds been a threatened species, this set of choices need not have been so hard to follow, since each option may be seen as containing the ''valuable'' thing of continuity of that species (the people involved are perhaps not valuing anything else). However, the birds in question were not of the threatened type. It is, in fact, hard to judge what choices are or are not consistent or irrational, without going in some detail into the way the choosers see the problem and what they think they are trying to achieve.[27] I shall return to this question presently when discussing the requirements of a social choice formulation of the problem, as opposed to a market analogy valuation.

B. Sufficiency of Potential Compensation

It is possible to interpret aggregates of willingness to pay in terms of the potential possibility of redistribution, including the compensation of any loss that some people may suffer. Given certain assumptions, such compensational interpretations do indeed have some plausibility. The question, however, is the relevance and persuasive power of ethical reasoning based not on actual outcomes but on potential compensational possibilities that may or may not be actually used.

There is a real motivational tension in the use of the logic of compensation for reading social welfare. If compensations are actually paid, then of course we do not need the compensation criterion, since the actual outcome already includes the paid compensations and can be judged without reference to compensation tests (in the case of Kaldor-Hicks criterion, after compensations have been paid, the result will be a case of a simple Pareto improvement). On the other hand, if compensations are not paid, it is not at all clear in what sense it can be said that this is a social improvement (''Don't worry, my dear loser, we can compensate you fully, and the fact that we don't have the slightest intention of actually paying this compensation makes no difference; it is merely a difference in distribution''). The compensation tests are either redundant or unconvincing.[28]

The assistance that cost-benefit analysis has sought from compensation

[26] See William H. Desvousge *et al.*, Measuring Natural Resource Damages with Contingent Valuation: Tests of Validity and Reliability, in Hausman ed., *supra* note 17.

[27] On this see Amartya Sen, Internal Consistency of Choice, *supra* note 20; and Amartya Sen, Environmental Evaluation and Social Choice: Contingent Valuation and the Market Analogy, 46 Japanese Econ. Rev. 23 (1995).

[28] On this see Amartya Sen, The Welfare Basis of Real Income Comparisons, 17 J. Econ. Literature 1 (1979), reprinted in Sen, Resources, Values and Development, *supra* note 14.

tests has not been particularly well reasoned. This does not, however, obliterate the merits of the approach of willingness to pay (without the odd use of compensational logic). No matter how the requirements of efficiency are specified, there is need for sensitivity to individual preferences, and in this willingness to pay would have a role. If, in a case without externality, a person is willing to pay far less for A than for B, then to give that person B rather than A, when either can be given to her, would involve a loss. This much can be acknowledged even without addressing the distributional issue (since the Pareto criterion is adequate here), and such subchoices will be typically embedded in larger choices (incorporating distributional issues as well).[29] So the information involved in the willingness to pay has some relevance to efficiency, no matter how anemic may be the equity conclusions drawn from it through the hallowed compensation tests. We must not grumble against small mercies, but nor need we dress them up as large triumphs.

C. Disregard of Social Choice Options

It was discussed earlier that market-centered valuation has ambiguities especially when it comes to interpreting what people say they are ready to pay for public goods, including environmental preservation and existence values. In this context, it may be useful to ask what kind of social choice interpretation underlies the contingent valuation procedure.[30] The philosophy behind contingent valuation seems to lie in the idea that an environmental good can be seen in essentially the same way as a normal private commodity that we purchase and consume. The valuation that is thus expressed is that of achieving single-handedly—this is crucial—this environmental benefit. Consider, for example, a case in which it is inquired how much I would pay to save all the living creatures that perished as a result of the *Exxon Valdez* disaster, and I say $20. As interpreted in CV, it is now presumed that if $20 paid by me would wipe out altogether all these losses, then I am ready to make that payment. It is hard to imagine that this question and answer can be taken seriously by any practical person (with some idea of what the *Exxon Valdez* disaster produced), since the state of affairs I am asked to imagine could not possibly be true. (Indeed, if I were really to believe that my $20 can on its own clear up the mess created by the

[29] On this see Amartya Sen, Real National Income, 43 Rev. Econ. Stud. 19 (1976); reprinted in Amartya Sen, Choice, Welfare and Measurement (Harvard Univ. Press 1997) (1982).

[30] The discussion that follows draws on Sen, Environmental Evaluation and Social Choice, *supra* note 27.

Exxon Valdez disaster, then I am not sure any importance should be attached to what I do think.)

The condition of independence of irrelevant alternatives, formulated by Kenneth Arrow in *Social Choice and Individual Values*, states that in making choices over the relevant alternatives (that is, over the alternative states in the actual opportunity set), the social choice should not depend on our valuation of irrelevant alternatives (that is, the ones not in the opportunity set).[31] The imagined state of affairs in which I have paid $20 and all the losses from the *Exxon Valdez* spill are gone is certainly not a relevant alternative, since it is just not feasible, but somehow our valuation of that irrelevant alternative is being made here into the central focus of attention in choosing between actually feasible alternatives—relevant for the choice.

The very idea that I treat the prevention of an environmental damage just like buying a private good is itself quite absurd. The amount I am ready to pay for my toothpaste is typically not affected by the amount you pay for yours. But it would be amazing if the payment I am ready to make to save nature is totally independent of what others are ready to pay for it, since it is specifically a social concern. The ''lone ranger'' model of environmental evaluation—central to the interpretation of CV valuation—confounds the nature of the problem at hand. We have no escape from having to use valuations derived from other methods of information gathering, such as questionnaires that describe the social states more fully.

Some have argued, with considerable cogency, that even though the formal question in the CV questionnaire refers to what each would pay alone to save that bit of nature, the answers are best interpreted as if they had been asked how much they would contribute in a joint effort to achieve that result.[32] It does indeed require much less willing suspension of disbelief to answer this allegedly de facto question seriously than the question that is actually asked. But it raises other difficulties. What I am willing to contribute must, given the nature of the task, depend on how much I expect others to contribute. There could be effects in different directions. I may be willing to contribute something if others also do, making this an assurance game.[33] On the other hand, I may feel a less pressing need to do something myself if others are in any case going to do a lot and my own sacrifice could make little difference to the social object in question (this is one route toward free

[31] Kenneth J. Arrow, Social Choice and Individual Values (1951).

[32] See, for example, Daniel Kahneman *et al.*, Stated Willingness to Pay for Public Goods: A Psychological Perspective, 4 Psychological Sci. 310 (1993).

[33] On assurance games, see Amartya Sen, Isolation, Assurance and the Social Rate of Discount, 81 Q. J. Econ. 112 (1967); and Angus Deaton & John Muellbauer, Economics and Consumer Behaviour (1980).

riding). If the lone-ranger model of CV is tightly specified but incredible, the contribution model is credible but severely underspecified.[34]

How might we make better use of the social choice approach to interpret this valuational issue?[35] One requirement would be to make sure that the individuals consider the actual alternative states from which the social choice is to be made. Properly devised questionnaires can easily achieve that. This is where the market analogy is particularly deceptive, since the market does not provide specified social states to the individuals to choose from. Given the prices, I choose my basket of commodities, and you choose yours; neither has to look beyond our nose. There are many problems for which all this works extremely well, but environmental evaluation is not one of them. In order to get people's views on what is to be done, they have to be told what the real alternatives are, involving specification of what will be done by the others. This is not the language of market valuation, nor a part of its epistemic probe. It requires specification of particular proposals of actions to be undertaken, with articulation of the actions of others as well (including contributions to be made by them). Valuation of social states is a part of a standard social choice exercise, but not of a market valuation exercise. The market analogy is particularly deceptive in this case since it does not deal with social alternatives.

VII. Concluding Remarks

To conclude, cost-benefit analysis is a very general discipline, with some basic demands—expressed here in the form of foundational principles—that establish an approach but not a specific method. Even these elementary demands would be resisted by those who would like a different general approach, involving, say, implicit valuation (rather than explicit articulation) or the use of pure deontological principles (rather than broadly consequential evaluation). There are also technical issues in the strategic use of additivity (despite the plausibility of concave objectives). However, even with these various foundational demands (I have tried to defend them, up to a

[34] There is a further difficulty in using the willingness to pay for ''existence value'' because of a problem in interpreting why a person is willing to pay a certain amount in order to try and achieve the continued existence of a threatened object. As Eric Posner has pointed out to me, if the payment offered comes not from the person's own expectation of benefit but from a sense of ''commitment'' (a commitment she has to try to bring about the continued existence of the threatened object), then the logic of interpreting the sum total of willingness to pay by all who promise to pay cannot be easily seen as the aggregate benefit they receive altogether.

[35] On this issue see Sen, Environmental Evaluation and Social Choice, *supra* note 27. See also the papers included in Social Choice Re-examined (Kenneth Arrow, Amartya Sen, & Kotaro Suzumura eds. 1997).

point), the approach of cost-benefit analysis is rather permissive and can be adopted by many warring factions in the field of public decisions.

Divisiveness increases as additional requirements are imposed, including structural demands and evaluative indifferences. There are gains and losses—the gains mainly in convenience and usability and losses mainly in the reach of the evaluative exercise. I have tried to indicate what the pros and cons are. While the mainstream procedures tend to incorporate all these requirements, it is easy to see how some of these demands may be dropped in a particular procedure of valuation.

The mainstream approach of cost-benefit analysis not only takes on the foundational principles, the structural demands, and the evaluative indifferences, but also uses a very special method of valuation through direct use of, or in analogy with, the logic of market allocation. This market-centered approach is sometimes taken (particularly by its advocates) to be the only approach of cost-benefit analysis. That claim is quite arbitrary, but given the importance of this approach, I have devoted a good deal of this paper to scrutinizing that approach in particular.

The market analogy has merits in the case of many public projects, particularly in providing sensitivity to individual preferences, relevant for efficiency considerations (in one form or another). Its equity claims are, however, mostly bogus, even though they can be made more real if explicit distributional weights are introduced (as they standardly are not in the mainstream approach).[36] The use of compensation tests suffers from the general problem that they are either redundant or entirely unconvincing.

Even the efficiency claims of the mainstream approach are severely compromised in the case of many public goods, and much would depend on the nature of the valuations in question. There are particular difficulties with environmental valuations, especially existence values. In this case, the valuational demands of social choice are easy to see, but not easy to reveal through the device of willingness to pay. The specification of social states that is needed for intelligent valuation (including the identification of who will do what) is simply not provided by the market-based questioning (either in the form ''How much would you pay, if you could single-handedly bring about the environmental change?'' or in the form ''How much would you contribute, assuming whatever you want to assume as to what others are doing?''). The spectacular merit of the informational economy of the market system for private goods ends up being a big drag when more information is needed than the market analogy can offer.

[36] See, however, Dasgupta, Marglin, & Sen, supra note 9, for examples of techniques that combine willingness to pay with distributional weights (as well as recognition of ''merit goods'' and general social concerns).

When all the requirements of ubiquitous market-centered evaluation have been incorporated into the procedures of cost-benefit analysis, it is not so much a discipline as a daydream. If, however, the results are tested only in terms of internal consistency, rather than by their plausibility beyond the limits of the narrowly chosen system, the glaring defects remain hidden and escape exposure. Daydreams can be very consistent indeed. Sensible cost-benefit analysis demands something beyond the mainstream method, in particular, the invoking of explicit social choice judgments that take us beyond market-centered valuation. The exponents of the mainstream need not face much questioning from the deontologists (who will not speak to them), but they do have to address the questions that other cost-benefit analysts raise. The debate may be, in a sense, ''internal,'' but it is no less intense for that reason.