"Summary of article by Ezra J. Mishan and Talbot Page: The Methodology of Cost-Benefit Analysis, with Particular Reference to the Ozone Problem" in Frontier Issues in Economic Thought, Volume 3: Human Well-Being and Economic Goals. Island Press: Washington DC, 1997. pp. 150-154

Social Science Library: Frontier Thinking in Sustainable Development and Human Well-being

"Summary of article by Ezra J. Mishan and Talbot Page: The Methodology of Cost-Benefit Analysis, with Particular Reference to the Ozone Problem"

Seemingly technical aspects of cost-benefit methodology can raise complex questions of ethical judgment, which economists cannot afford to ignore. The methodological dilemmas of cost-benefit analysis, as described in this article, are particularly important in cases of uncertain but potentially serious long-run problems, such as depletion of the ozone layer.

THE CONCEPT OF ECONOMIC EFFICIENCY

When economists compare alternative proposals, they begin from the assumption that the only necessary data are the orderings or the subjective valuations of the individual members of society, usually measured in terms of money. No other principles of "the general good" are needed; the underlying philosophical position is one of methodological individualism.

Since a large number of individuals are affected by economic changes, there is a need for a criterion that can rank alternative outcomes. Actual Pareto improvements would be uncontroversially welcomed, but in practice they are rare. A more relevant criterion is potential Pareto improvement: if the aggregate value of individual gains exceeds the aggregate value of individual losses, then an economic measure is said to have a net social benefit. This criterion allows the implementation of projects that make the rich richer and the poor worse off, which has led to objection to its adoption. Nevertheless, most economists have adopted it; an increase in economic efficiency usually means a change that meets the (potential) Pareto criterion.

Economic efficiency is a social norm for ranking alternatives, but it is distinct from political processes such as voting. In order for economic efficiency to be useful as a social norm, it must be grounded in an ethical consensus that transcends politics. The defense of potential Pareto improvements rests on the belief that such changes do not generally have regressive distributional effects, or that progressive taxation will provide a safeguard against undesirable redistribution, or that continual pursuit of efficiency will eventually raise the general level of welfare.

CONCEPTUAL PROBLEMS OF VALUATION

It is sometimes suggested that distributional weights should be used when aggregating costs and benefits. The proposed weights are necessarily arbitrary, and typically assume diminishing marginal utility of income, weighting impacts on lower-income groups more heavily. While

abstractly appealing, this approach would open the techniques of cost-benefit analysis to continual political lobbying and infighting, ultimately tending to discredit the results. There may be perfectly good reasons to approve a project that does not meet standard economic criteria, but it is not helpful to "doctor" the method of evaluation to make this point. Public projects should meet the test of the political process, independently of the results of cost-benefit analysis.

Technical economic analysis, if it is to be accepted by society, must be situated within the society's ethical consensus. In some cases this may require modifications to the utilitarian framework of cost-benefit analysis; some individual preferences may be ethically inappropriate to include in calculations of social welfare. Income gains for one group, for example, may give rise to feelings of envy and competitiveness on the part of others, but there could be general agreement that the negative effects of envious preferences should not belong in a calculation of social welfare.

THE LEGITIMACY OF DISCOUNTED PRESENT VALUES

Society's ethical consensus can be difficult to identify; recent controversy appears to have undermined an earlier sense of agreement on many issues. One such issue is the approach to valuation of future events and outcomes, as embodied in the technique of discounting. There are a number of technical problems [discussed in the original article] regarding the choice of the correct discount rate even within a single generation. Deeper philosophical problems arise when discounting is used in an intergenerational context, as in the case of cost-benefit analysis of long-term environmental issues such as ozone depletion.

The difficult question of intergenerational agreement on valuations can perhaps be addressed in a straightforward manner between two overlapping generations, in the years in which both are alive and economically active. However, over longer time horizons, there is no one year in which everyone affected by a proposal is alive, and no explicit agreement is possible. Technical analysis no longer leads to clear answers over long periods of time: for a proposal whose impacts last for even 100 years, the outcome of a cost-benefit analysis is critically dependent not only on the discount rate, but also on detailed assumptions about the increases or decreases in consumption, savings, and investment that would result from the proposal.

INTERGENERATIONAL EQUITY, RISK AND UNCERTAINTY

Future generations, if asked, would hardly approve of our use of discounting to analyze intergenerational problems, since any positive discount rate gives a low weight to future outcomes. Other standards, therefore, should be sought. A natural criterion is that each generation is entitled to the same per capita income -- or to a natural resource and capital endowment that will allow them to produce that income.

As in the framework of Arrow's theorem, it seems appealing to seek nondictatorial social choice rules that can be applied to intergenerational problems. Surely no single generation, such as the present one, should prevail in every case, even if not all future generations are unanimous in opposition. Discounted present value, "as a rule of intertemporal choice, is a dictatorship of the present." (97) An example of a nondictatorial rule would be that infinite majorities of future

generations should be decisive over finite minorities; for instance, if a project is beneficial for the next n generations (for any finite n), but damaging for all generations starting with number n+1, then it should be rejected. This rule is very future oriented, as can be seen when n is very large.

The role of the discount rate is to help define the acceptable set of intertemporal paths, from which one must choose an equitable resolution of intertemporal conflicts of interest. Once the acceptable set is defined, there is no need for further discounting procedures. This approach is especially important for problems such as ozone depletion, which involve long-term latencies and irreversibility effects.

The analysis of risks of known probability is a straightforward extension of standard theoretical methods. Yet in many cases the probabilities of important outcomes are uncertain. A variety of techniques have been proposed for analysis of uncertainty, including increasing the discount rate, building a probability distribution from experts' informed guesses, applying game theory models, and other mathematical devices. Unfortunately, problems such as ozone depletion may defy all such techniques: they are results of comparatively new, unfamiliar technology; they raise the real possibility of large-scale catastrophic outcomes; and they impose much or all of the damages on future generations.

CONCLUSION AND RECOMMENDATIONS

To address serious long-run problems such as ozone depletion, it is necessary to move beyond the conventional tools of economic analysis. A prudent rule would be that the larger the possible catastrophe and the higher its probability of occurrence, the stricter should be the regulatory regime. In cases involving potential irreversibility, there is a social benefit in not foreclosing irreversible options; this is particularly important, and provides grounds for caution, when irreversible events affect multiple generations. One way to proceed in the face of serious, uncertain events is to compare the consequences of unwarranted complacency versus the consequences of unwarranted alarm; there may well be a scientific consensus that the potential losses from complacency are far greater than the losses due to excessive alarm.

What policies should be pursued when there is more than a suspicion that an economic activity may cause serious harm, but not enough information to make a decision with confidence? Broadly speaking, either of two rules could be followed: "Rule A" would allow the activity to continue until it had been proven harmful, while "Rule B" would bar the activity until it had been proven safe. Rule A has generally prevailed in Western economies, at least since the Industrial Revolution. Yet it seems possible that we are moving into an era of more catastrophic risks, resulting from unfamiliar new technologies, making Rule B seem more appropriate. The situation might be different in a poor country where economic growth is satisfying urgent human needs; but a developed country like the United States already has a goods-saturated economy, in which it makes little sense to increase the risk of ecological disaster in exchange for additional economic growth of material goods.

> We are impelled to conclude that a valid cost-benefit calculation of actions to protect the earth's ozone shield cannot be undertaken in the present state of our ignorance concerning the relevant physical relationships and, therefore, in the present state of any

ignorance concerning the nature and magnitude of the risks posed by existing economic activities. Nor can the decision techniques devised by economists and others for problems involving future uncertainty shed much light on the issue... [Until there is much better knowledge of the causal mechanisms,] any society having a sense of obligation toward its citizens, and a sense of responsibility for generations yet to come, should adopt the prudent course entailed by the B rule. [108-109]