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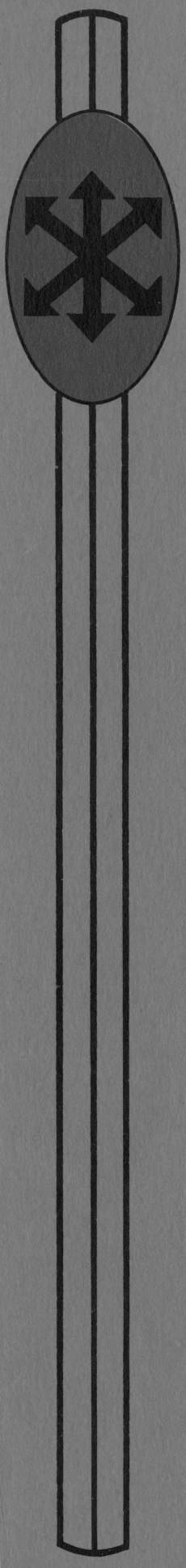

Staff Papers

Staff Paper 51 July 1977

Evaluating Non-Market Goods and Services:
Some Conceptual Considerations

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Paper presented to the Symposium on Evaluation of Non-Market Goods, at the annual meetings of the American Agricultural Economics Association, San Diego, CA, July 31-August 3, 1977

Staff papers are published without formal internal review by the Department of Agricultural Economics

Abstract

Compensating measures of consumers' surplus, i.e. "willingness to pay" for a preferred good and "willingness to accept compensation" and accept a less attractive good, are the appropriate indicators of value, unless redistribution toward the poor is an explicit project goal. In most cases, compensating measures, or acceptable approximations thereof, can be obtained without excessive difficulty. The conceptual bases of some currently used techniques of non-market valuation are examined, in order to identify the situations in which particular techniques are most appropriate. While valuation of non-market goods remains a challenging task, progress is being made in theory and application.

Evaluating Non-Market Goods and Services: Some Conceptual Considerations*

Alan Randall

Non-market goods come in a variety of economic forms. By this, I mean some are pure public goods and many are congestible public goods; many are nonexclusive as a non-ideological social response to the high cost of exclusion, while others are non-exclusive apparently as a result of social preference, whim or oversight; others are exclusive goods and perhaps even private goods which are provided by government or charitable organizations without charge, or at user charges which are not related in any perceptible way to market clearing prices. Some are easily replaceable goods with many close substitutes, while others have few and relatively poor substitutes and are irreplaceable given

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*In keeping with the purposes of a research symposium, this paper focuses on some conceptual concerns which are currently occupying my mind. Thus, this is not a carefully balanced overview of the state-of-the-art of valuation of non-market goods and services. Nor is it a finished scholarly paper complete with rigorous proofs of propositions which may be new or controversial.

I want to acknowledge the contribution of John R. Stoll, with whom I have explored many of these concerns and generated many of the propositions offered herein. If our work eventually achieves the scholarly quality to which we aspire, John will assume his rightful place as co-author of the resulting publications.

current and conceivable technologies. Some non-market goods re esoteric items known only to a few bird-watchers; others are as universally significant as human life itself.

The valuation of these goods in monetary terms is an enterprise of substantial difficulty which is undertaken by professional researchers and funded by research sponsors as an act of faith in the overriding social importance of the benefit/cost criterion. Without faith in the social value of perfecting benefit/cost and related economic analyses and expanding their purview to include more and more unlikely goods, services and amenities, there is little reason to devote economic and intellectual resources to non-market valuation.

The purpose of this symposium paper is to consider several important issues concerning the analytical techniques used for valuing non-market goods. The issues fall under the broad heading: "What are we measuring?". First, the appropriate indicator of value, consumer's surplus, will be discussed in some detail. Then, the conceptual bases of some currently used techniques of non-market valuation will be examined, with a view to identify the kinds of practical valuation problems to which each is most appropriately applied.

Consumers' Surplus

There is, I believe, a fairly solid consensus, at long last, that where a good or service exhibits a degree of indivisibility

and uniqueness within its market area, consumers' surplus is the appropriate measure of its economic value. However, to say that consumers' surplus is the proper measure of value is insufficient to lay to rest the fundamental conceptual question. Most associate the term, consumers' surplus with the Marshallian concept, i.e. the integral below the segment of the demand curve above the demand-supply intersection (and above the price line, in the case of priced goods). But, since Hicks (1943), it has been known that there are four measures of consumers' surplus equivalent surplus (ES), equivalent variation (EV), compensating variation (CV) and compensating surplus (CS), each of which provides an appropriate measure of value in some specific circumstances.

The Marshallian measure, the integral below the Marshallian demand curve is the appropriate theoretical construct in only one special case: that when the income effect of a price change or a change in the opportunity set is zero. In that case, the Marshallian consumers' surplus and all four Hieksian measures are equal. In all other cases, the Marshallian surplus is not the appropriate theoretical construct, although, as we shall see, it provides a useful approximation of the appropriate measure in some circumstances.

The four Hicksian measures are usually defined in terms appropriate for evaluating the welfare effects of price changes (e.g. in Currie et al, 1971), and they are sufficiently difficult to understand in that context. However, for valuation of

non-market goods and services we are usually concerned not with price changes, but with the movement of non-market goods into and out of opportunity sets. Thus, the Hicksian measures are defined here in terms of changes in the bundle of goods. Let us concentrate on the differences between equivalent and compensating measures (noting, first, that the difference between variations and surpluses is that the former are calculated after the consumer has made optimizing adjustments in his consumption set while the latter do not permit such adjustments). For a given change in the bundle of goods available to the consumer:

> The equivalent measures are defined as the amount of compensation, paid or received, which would bring the consumer to his subsequent welfare level if the change did not take place.
>
> The compensating measures are defined as the amount of compensation, paid or received, which would keep the consumer at his initial welfare level after the changes had taken place.

Observe that these different measures assume a different assignment of rights at the outset. The compensating measures assume the individual has a right to his initial welfare position: he has a right to avoid the uncompensated imposition of an inferior bundle of goods from which to choose, but has no right to windfall welfare gains from receiving an improved bundle of goods without paying for them. The equivalent measures assume

he has no right to his initial welfare position: he has either no right to avoid the uncompensated imposition of an inferior bundle of goods, or a right to windfall welfare gains from receiving an improved bundle of goods.

In order to better define the compensating and equivalent measures and their relationship to the common pragmatic measure of value, "willingness to pay", some helpful, if slightly complex notation is introduced at this point. This notation will make it clear that whether a particular measure of value is a compensating or an equivalent measure depends on the assignment of rights to the consumer, and his initial consumption set.

Let us consider two bundles of goods, 1 and 2, where 2 is the preferred bundle. The four relevant measures of value are

1. Willingness to pay to avoid bundle 1

   $WTP^{E}_{1/Y^{o},2,2}$

2. Willingness to pay to get bundle 2

   $WTP^{C}_{1/Y^{o},1,2}$

3. Willingness to accept compensation, and take bundle 1

   $WTAC^{C}_{2/Y^{o},2,1}$

4. Willingness to accept compensation to forego a right to bundle 2

   $WTAC^{E}_{2/Y^{o},1,1}$

where the superscript, E indicates the equivalent measure,
and C indicates the compensating measure;
the first subscript defines the individual's rights in terms of the bundle of goods (1 or 2) and his endowment, Y, which is defined as excluding the value of the bundle of goods. 1 or 2. Thus, $1/Y^O$, indicates that he has the bundle 1 and Y^O;
the second subscript indicates his starting bundle of goods; and
the third subscript indicates his final bundle of goods, after he has paid his WTP or accepted his WTAC.

Note immediately that there are both WTP and WTAC measures for both compensating and equivalent measures of consumers' surplus.[1] Which are the appropriate measures?

If the benefit/cost criterion is interpreted as testing for potential Pareto-improvements (as does Mishan, 1971, for example), it is immediately clear that compensating measures are the only correct measures of the welfare impacts of changes in the consumption set of non-market goods. Thus, WTP^C for preferred and $WTAC^C$ for inferior bundles of goods are the appropriate measures.

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[1]The literature abounds with examples equating WTP with the equivalent measure and WTAC with the compensating measure.

If the purposes of a proposed project explicitly include redistribution toward the poor, an argument could be made to use $WTAC^E$ as the measure of value of benefits (which flow to poor beneficiaries) and WTP^E as the measure of the value of losses (which are accrued by well-endowed losers). However, the analyst with no distributional axe to grind will always insist upon compensating measures of value, to be used in efficiency analyses.

It is quite commonly argued that reliable compensating measures of the value of non-market goods are difficult if not impossible to obtain. Below, are several propositions which, taken together, go a long way toward demonstrating that compensating measures, or acceptable approximations, may be obtained quite easily in many circumstances.[2]

Proposition 1

For normal goods, in absolute value terms,

$$WTP^E_{1/Y^o,2,2} = WTP^C_{1/Y^o,1,2} \lesseqgtr WTAC^C_{2/Y^o,2,1} = WTAC^E_{2/Y^o,1,1}$$

Implications:

(a) WTP^E to avoid being assigned a less preferred bundle of goods is equal to WTP^C to obtain the preferred bundle; $WTAC^C$ to accept the less preferred bundle is equal to $WTAC^E$ to forego a

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[2]Some of these propositions are well-known to readers of the recent literature on the subject, while others are, I believe, original. For the latter, I offer no formal proofs in this paper.

right to the preferred bundle; WTP is smaller in absolute value than WTAC, except in the case where the income effect is zero and WTP is equal to WTAC.

(b) There is no uncomplicated general rule about the relative size of the absolute values of equivalent and compensating measures.

(c) Given the above, it is useful for many purposes to drop the confusing nomenclature, equivalent and compensating, and speak instead of WTP and WTAC.

Proposition 2

While proposition 1 holds for the Hicksian variations and surpluses, the difference between WTP and WTAC is greater in the case of the surpluses.[3] The surpluses are the relevant measures for public goods.

Implication (of propositions 1 and 2):

The compensating measure of benefits (WTP^C) is smaller than the equivalent measure ($WTAC^E$), while the compensating measure of costs ($WTAC^C$) is larger than the equivalent measure (WTP^E). Thus, the use of compensating measures of value tends to be conservative, in that the burden of proof is placed on the proponents of change.

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[3]This proposition may appear contrary to the position taken by Maler (1974, pp 131-140).

Again, where redistribution toward poorly endowed beneficiaries is an explicit project goal, equivalent measures of benefits and costs may be appropriate.[4]

Proposition 3

In purely positive analyses, the compensating measure is relevant whenever the individual is in equilbrium at the outset (that is, his starting point is consistent with his rights, and his rights are unattenuated). The equivalent measure assumes an initial disequilibrium.

Implications:

(a) A Bradford (1970) bid curve (the fundamental demand-like concept from which value information for public goods is generated) measuring WTP (and WTAC) for improved (and inferior) bundles of goods, from the individual's actual equilbrium starting point, generates compensating measures.

(b) The individual is indifferent among all points on a Bradford bid curve (by definition). Thus, by comparing points on a Bradford bid curve, one may obtain fully compensated compensating measures of the welfare effects of successive changes in the bundle

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[4]It is interesting to surmise that a b/c analysis of freeing the slaves' using compensating measures of value (the slaves, WTP for freedom, and the owners' $WTAC^C$ for the loss of their slaves) would have found that the benefits of emanicipation are less than the costs. On the other hand, an analysis valuing the slaves' freedom at $WTAC^E$ and the owners' loss at WTP^E would probably have reached the opposite conclusion.

of goods available (as opposed to the potentially compensated compensating measures referred to in propositions 1 and 2). Along a Bradford bid curve,

$$WTAC^{C}_{2/Y',2,1} = WTP^{C}_{1/Y'',1,2}$$

where $Y'' = Y' + WTAC^{C}_{2/Y',2,1}$

(c) It is not possible to generate a true Bradford bid curve by bidding WTP^{E} to avoid successively worse bundles of goods (or $WTAC^{E}$ for foregoing the right to successively superior bundles). The values estimated by such a procedure are equivalent measures. By these procedures, one can plot only a series of points, each on a different bid curve.

(d) Where an individual currently enjoys an unpriced or underpriced good (as is often the case, for example, with outdoor recreation sites and amenities), a Bradford bid curve may be constructed by bidding maximum WTP for each possible level of provision of the good. The resultant curve will not pass through the individual's initial state, and with respect to the individual's initial (disequilibrium) state, each point will be an equivalent measure of his welfare change if he paid his maximum WTP. Nevertheless, each point on the bid curve provides a compensating measure, with respect to the origin. By comparing successive points on the curve, one may obtain fully compensated compensating measures of successive changes in the bundle of goods.

Proposition 4

When the income effect is small, or the income elasticity of demand is near 1.0, and the proportion of total income spent on the good or service in question is small, the difference between the $WTAC^C$ and WTP^E (and $WTAC^E$ and WTP^C) measures will be small and relatively inconsequential (Willig, 1976). For a given change in the bundle of goods, the Marshallian measure of the welfare impact will lie between WTAC and WTP.

Implications:

(a) For goods which meet Willig's criteria, the Marshallian consumers' surplus provides a serviceable approximation of the appropriate Hicksian measure.

(b) If one knows the empirical magnitude of any of the four measures ($WTAC^E$, $WTAC^C$, WTP^C and WTP^E), the income effect, or the income elasticity of demand for the good, the income of the consumer and the proportion of income spent on the good, one can calculate all of the other measures.

Proposition 5

Given certain, moderately restrictive, assumptions (Maler, 1974, pp. 112-128), and given knowledge of one of the Marshallian demand curve, the income compensated demand functions and the expenditure functions, it is possible to derive the others.

Implication (of propositions 4 and 5):

In a great many situations involving valuation of non-market goods, there is no compelling reason to fail to provide the proper

compensating measures of value. Where no direct observations of compensating measures are available, and where there is good reason to expect that direct "asking" may generate unreliable estimates, especially of $WTAC^C$ (Hammack and Brown 1974), it remains possible to calculate the proper compensating measures from data on equivalent measures, expenditure functions or Marshallian demand curves.

Some General Conclusions

What pragmatic guidelines for non-market valuation can be derived from all this? Let me suggest a few.

1. Where the non-market good or service is not especially unique, is not associated with an unusually large income effect, and payment of the full value for use would take an insubstantial proportion of the user's income, methods (such as the travel cost method) which generate Marshallian demand curves provide serviceable approximations of the proper compensating measures of welfare change.

2. Where these conditions do not hold, compensating measures of welfare change should be used.

3. It is commonly argued that $WTAC^C$ is not usually measurable with accuracy since (a) revealed demand measures such as the travel cost method provide Marshallian measures, and (b) bidding games which directly ask WTAC (either the compensating or the equivalent measure) are less reliable than those which ask WTP. This argument is insupportable, for all but the most unique and treasured of non-market goods, since

(i) WTAC can be calculated from WTP (proposition 4.b)

(ii) WTAC can be calculated from Marshallian consumers' surplus (proposition 5)

(iii) $WTAC^C$ can be derived indirectly from bidding games which ask only WTP questions, using proposition 3 (implications b and d) and making adjustments similar to those suggested by Willig, (1976).

4. Where a non-market good or service which is especially treasured is threatened, it is essential to use $WTAC^C$ as the measure of potential welfare loss. This is the case when a unique and beloved natural resource (e.g. a unique environment, an endangered species, or a human life) is threatened. In such cases, $WTAC^C_{2(Y^o),2.1}$ will be substantially larger than $WTP^E_{1(Y^o),2,1}$ and it is especially important that accurate measures of $WTAC^C$ be used in valuing the potential losses. In these cases, propositions 4 and 5 will be less helpful. WTP will not be a good approximation of WTAC and the information required to calculate the latter from the former may be unavailable, or not particularly reliable.

The Relevance and Applicability of Various Techniques for the Valuation of Non-Market Goods and Service

Now, let us consider some of the various techniques currently used for the valuation of non-market goods and services. The conceptual bases of some of these techniques will be examined, in order to identify the conditions under which each might provide

acceptable estimates of value. Unfortunately, time and space do not allow the systematic evaluation of all serious considerations and all known valuation techniques; my comments will be brief, incomplete and less than systematically organized.

Market Observations on the Value of Saving Human Life

My first example serves to amplify my general conclusion #4 (above), by showing its application in the valuation of something we value especially highly: the safety of human life.

There is currently much interest in the application of benefit/cost analysis to health and safety regulations, the evaluation of processes which produce hazardous and toxic wastes, etc. The economic value of saving a human life, by, say, reducing the probability of premature death by 1% and thus saving one unidentified life in 100, in some specified time period, is at issue. It is observed that people frequently make decisions which change the probability of death. Therefore, the value of saving a human life could perhaps be inferred by analysis of observed behavior in such situations.

Rosen and Thaler (1977) ha e performed a hedonic analysis of the increase in wages ($WTAC^C$), ceteris paribus, which will attract workers to high-risk jobs. In states where no motorcycle helmet laws exist, one could examine the market for motorcycle helmets and thus calculate WTP^C for a reduction in the probability of death. These are but examples; the possibilities are endless. Findings of such analyses could be used to determine the welfare

loss from increased risk to life resulting from, say, introducing a nuclear power plant or a nuclear waste disposal sight into some specified locality.

However, this procedure will provide systematic underestimates (lower-than-lower-bound estimates) of the welfare loss from imposed risk. The increased risk from taking the Rosen-Thaler high-paying job is fully compensated by increased wages. The increased risk derived from motorcycling, as opposed to not motor cycling, is jointly consumed with the pleasures of motorcycling and thus is fully compensated. It is axiomatic that an individual will voluntarily expose himself to increasing probability of death only if fully compensated by increased income, or utility from joint consumption.

The hazards of living near a nuclear power plant or waste disposal site are not voluntarily undertaken by those who lived in the locality prior to its construction. There is no joint consumption (since electricity is equally available to those who do, and those who do not, live near nuclear facilities). The proper measure of the welfare loss from the increased danger to life is $WTAC^C$ to induce voluntary acceptance of the imposed hazard.

WTP^C to reduce a hazard voluntarily undertaken in joint consumptior can be easily shown to be a serious underestimate of $WTAC^C$ to voluntarily accept an imposed hazard. $WTAC^C$ to accept hazardous employment is a more defensible measure, but is acceptable only if workers in high-risk jobs are similar to other citizens in

two characteristics: attitude to risk, and size of the opportunity set. However, it is axiomatic that workers in high risk jobs must have more restricted opportunity sets and/or less risk aversion than those in other occupations. Thus, $WTAC^C$ to accept hazardous employment, estimated by observations of wages paid to those intrepid few who accept such employment, must also underestimate $WTAC^C$ to voluntarily accept an imposed hazard. It is also clear that the necessary data are unavailable to use propositions 4 and 5 for the manipulation of market observations, such as these, to calculate the proper $WTAC^C$ measure.

Where the value of life saving opportunities, even when estimated by methods which generate lower-than-lower-bound estimates, exceeds the cost, one may have good deal of confidence that the life saving opportunity should be seized. In less clear-cut cases, decisions will be made in the virtual absence of reliable economic information, unless reliable techniques to estimate $WTAC^C$ to accept imposed hazards can be developed.

Recreational and Environmental Goods and Amenities

Compared with the fledgling field of valuation of human life (sometimes called risk-benefit analysis), the valuation of recreational and environmental amenities is a much more firmly established branch of applied economics. The empirical successes have been sufficiently impressive that rigorous theoreticians, for example, Maler (1974) have been attracted to the subject. Now, it

seems the time is ripe for a hard look at the conceptual underpinnings of some currently used techniques for valuing recreational and environmental amenities.

First, do these techniques capture the correct measure of value? The answer, in most cases, is "No, but this defect is not totally damning". The travel cost (Hotelling-Clawson) method of estimating demand for outdoor recreation estimates a Marshallian demand curve; but, given some not excessively demanding assumptions, compensating measures of consumers' surplus can be derived and, in many common cases, the compensating measure will be little different from the Marshallian measure. The problem is less amenable to simple solution, in the case of unique and treasured natural environments threatened by development projects (where $WTAC^C$ may be quite different from WTP^E) but, as we shall see, the travel cost method is not well adapted to valuation of unique and well-known attractions, anyway.

The household production function technique (see Crocker, 1977) directly generates compensating measures of value, but requires some fairly stringent assumptions in order to permit the calculation of any values at all. The property value analyses, which have been used to estimate the value of air pollution abatement in metropolitan areas inter alia, would, if all of the necessary assumptions were met, generate a Bradford bid curve for air pollution abatement and, thus, compensating measures of value.

Bidding games may be formulated to estimate any of the Hicksian measures of consumers' surplus (although only compensating measures can be arrayed along a single Bradford bid curve). However, there is some evidence (e.g. Hammack and Brown 1974) that questions which directly ask $WTAC^C$ in situations where the individual is not accustomed to being offered compensation are likely to get unreliable answers. As we have seen, it is possible with a little manipulation of the data, to derive $WTAC^C$ from the answers to questions framed in terms of WTP. Again, the problem is rather easily surmountable in many common cases, but not so easily brushed aside in the case of unique and treasured natural amenities.

Second, do the techniques permit proper definition and valuation of the good or amenity to be valued? Maler (1974 and 1977) rigorously states the conditions which must be satisfied if observations of the market for one good are to provide accurate data the valuation of another, non-market good. The conditions are quite demanding. For the valuation of air quality improvements using data on land sales, the following conditions must be met: weak complementarity between residential land and air quality (which implies that citizens are totally indifferent to air quality in their working, social and recreational environments); perfect markets in land, with full information and zero transactions and moving costs; air quality should be endogeneously related to land values; all individuals living in a given neighborhood should have identical preferences between environmental

quality and consumption in general; individuals can perceive environmental quality in all its relevant attributes; and, their expectations about environmental quality must be static. Maler (1977) concludes that, "it is next to impossible to get meaningful estimates of benefits from environmental quality improvements from land value studies" (p. 2-6). After allowing for Maler's propensity for hyperbole, one would have to accept his general conclusion.

The travel cost method of estimating recreation benefits is subject to many of the same necessary conditions, but is perhaps less damned by them. Nevertheless, the assumption of weak complementarity (in this case, requiring that the recreationist be indifferent to all non-site aspects of his trip) provides problems. Furthermore, travel time, as distinct from out-of-the-pocket travel expenses, has not yet been satisfactorily incorporated into travel cost models.

The bidding game technique does not seek to learn about the value of a non-market good by studying the demand for some related market good. Rather, it takes a head-on approach to the problem at hand, using questioning techniques to directly obtain estimates of the value individuals place upon the non-market good. The bidding game technique analyses data self-reported by respondents in answer to questions posed in a hypothetical context. Thus, it is potentially susceptible to a lengthy laundry list of biases (Maler, 1974): strategic bias, hypothetical bias,

enumerater bias, vehicle bias, starting point bias. In the eyes of some economists bidding games are guilty until proven innocent.[5]

Nevertheless, I tentatively conclude that bidding games value many non-market goods passably well. In a recent, quite demanding application of bidding games, no statistically significant evidence of any of the above biases was found (Randall et al., 1977). The values estimated via bidding games have been replicated by other techniques, and by later bidding game studies (Randall, et al., 1974, and Brookshire, et al., 1977) In the cases of many non-market goods and services, bidding games represent the only valuation method which seems applicable. For many non-market goods, no related market good which comes close to meeting Maler's (1974) criteria can be found. Therefore, I

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[5]Strategic bias is perhaps the most puzzling of these biases. Puzzling, because, while everyone since Samuelson (1954) can readily show that incentives for free rider behaviour exist in the case of non-exclusive goods, strategic behavior has not been observed when well designed bidding games are used. (Bohm, 1972; Brookshire, et al., 1976). Yet, since some incentive for strategic behavior remains in most good bidding game designs, the bidding game exponent is always under pressure to invent a game which totally eliminates this bias.

Tideman and Tullock (1976) confidently extol the virtues of the Clarke tax as a device which eliminates the free-rider incentive. However, its adaptability to bidding games seems limited, since it is not easily explained to respondents and it is unlikely that the respondent who understands the Clarke tax would believe it would actually be collected. So, it may be just as well to simply admonish the respondent to eschew strategic behavior.

The comment of Downing and Tideman (1976) that, after having explained the Clarke rules, all one needs to ask the receptor is "Tell us the height and the slope of your willingness to pay for changes in the slope of the cost function assigned to you" (p. 25) leaves the experienced bidding game practitioner unconsoled.

must conclude that the time has come for systematic and careful testing of the bidding game technique, not just to find cases in which it fails (for any fool can mess up a bidding game), but to identify the range of situations in which thoughtfully designed and carefully administered bidding games work well.

Moving now to some specific cases in recreation economics, the applicability of the travel cost and bidding game methods will be considered. It will be seen that each has a comparative advantage in certain situations to which it is well adapted. The travel cost method is poorly adapted to valuation of recreation sites in populated neighborhoods, since (1) many users can enjoy the site at zero or insubstantial travel expense, and (2) nearby residents may enjoy environmental amenities (and in some cases, suffer disamenities) associated with the site without ever leaving home. On the other hand, the travel cost method is poorly adapted to valuation of unique and nationally known recreation sites, since these are often visited on multi-purpose vacations (and, thus, the assumption of weak complementarity is violated). Option and existence values for unique resources are not measurable by the travel cost method. They appear to be measurable only by the bidding game techniques, and evidence of the reliability of bidding games for this purpose is sparse, as yet.

The travel cost method has (at last!) been adapted to satisfactorily consider the availability of substitute sites.

The marginal value of an additional site in a market area with many similar sites can be satisfactorily estimated (Knetch, 1977). Bidding games can, conceptually, measure the marginal value of an additional site. However, a practical problem emerges when bidding games are used to value a good which has many close substitutes which are provided by the public sector at less than the market clearing price, as is typically the case with outdoor recreation. The user fee for substitute sites (known to be an understatement of value) provides an upper bound for the bids of rational respondents, and the bidding game results are thus biased downward.

Concluding Comments

The valuation of non-market goods and services started as a largely pragmatic field. Commonsense and a good deal of ingenuity were applied to generate answers to questions previously thought unanswerable. By now, the question, "Is it possible to place money values on non-market goods and services?" has been answered in the affirmative, for at least some examples of such goods. More recently, the theorists have moved in, asking hard quest ons about what is being measured, and identifying precisely the assumptions which are necessary to permit us to legitimately do the things we have become accustomed to doing. My comments thus far have been in that spirit. I believe the time has come for a hard look at the validity of our research procedures.

Karl-Goran Maler has carefully examined the assumptions which are necessary in order to derive perfectly accurate values for environmental amenities. He concludes that many of these assumptions are violated in most practical valuation attempts. His "conclusions are negative. There are indeed very few possibilities for obtaining correct information about the demand for environmental services" (1974, p. 196). Where Maler looks at the cup of non-market valuation and pronounces it almost empty, I am more optimistic. I observe with some pleasure that the cup is not without content and, while a long way from full, is most certainly not empty.

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