Measuring Values of Extramarket Goods: Are Indirect Measures Biased?

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The well-known travel cost method (TC) has been widely applied to outdoor recreation. A second approach has been referred to in the past as the Davis method, the questionnaire approach, and contingent valuation. It will here be termed hypothetical valuation (HV), because it involves creating a hypothetical situation designed to elicit willingness to pay for or willingness to accept compensation for a recreational or other extramarket good (or bad). TC and HV are termed "indirect methods," because they do not depend on the direct information about prices and quantities that economists would prefer to use where available to value goods and services.

A number of potential sources of bias in HV and TC have been discussed in the literature and we shall summarize these in the first section of the paper. When summed together, these potential problems are sufficient to justify considerable skepticism about the accuracy of resulting value estimates. Still, the question remains: How large an impact do these supposed sources of bias have in actual practice? In the second section of the paper we report the results of an experiment where TC and HV values were compared to values based on actual cash transactions. Though preliminary, the results of this experiment indicate that substantial biases exist in both TC and HV estimates.

Potential Sources of Bias

In TC, differences in travel and possibly other costs to recreationists at varying distances from the recreation site are used to infer how recreationists would behave if prices higher than the actual admission fee were charged. Thus, potential sources of bias exist if there are substantial differences in the recreationists' tastes and preferences, access to substitutes, and income levels at varying distances from the recreation site. It is fairly straightforward to control statistically for differences in income. Potential problems relating to tastes and substitute availability are much more difficult.

A particularly thorny problem in developing TC value estimates relates to time costs. It is clear that those who live farther from the recreation site in question not only incur larger transportation costs, but also expend more time in travel. What sort of price should be attached to this time? Several factors make this a complicated issue. Clearly the wage rate of adults overestimates what they could earn from second jobs. Furthermore, in opportunity cost terms, if people were not traveling to the recreation site most would probably be engaged in other leisure time activities rather than working. What is leisure time in the next best recreational activity worth? Also, how to value time of children and adolescent participants is not well understood. To make matters even more complex it is not inconceivable that travel to some recreation sites may actually add to the benefits rather than the costs, as when the route is a scenic one. Cesario has suggested that time be valued at between one-fourth and one-half the wage rate. While this is a beginning, it must be considered as a very crude adjustment since it is based on urban transportation studies and offers little guidance as to the exact figure to be used. As we shall see below, whether a factor of one-fourth or one-half is used can make a substantial difference in the value estimates.

TC requires that recreationists treat travel expenditures as equivalent to admission costs, yet this is a questionable assumption which no one has examined empirically. Travel costs represent an aggregation of many smaller costs, some of which (e.g., tire wear) may not be obvious to the recreationist and which are not
actually imposed on the recreationists at the time when the recreation is demanded. Admission fees are paid immediately, usually in cash. Particularly in a world of satisfying, travel costs may not be perceived as equivalent to admission fees.

Still other potential problems with TC techniques need to be noted. One stems from the fact that increases in density which recreationists label as crowding may affect quality. A travel cost demand curve implicitly assumes that recreational quality remains constant over the range from zero use to full use at the going admission fee. Thus, it may completely neglect changes in quality as quantity declines along the demand curve. Also, no satisfactory method has yet been devised to handle multiple-purpose trips (e.g., recreation plus work) or multiple-site trips (e.g., vacations involving several stops).

Because of these potential biases and because TC techniques are not applicable to recreational activities involving limited travel (e.g., backyard birdwatching) and many non-recreational extramarket goods (e.g., air quality; public health programs), HV has evolved as a major alternative method of valuing extramarket commodities. Unfortunately, HV also has major potential sources of bias.

**Hypothetical Valuation**

Perhaps the source of bias that has most dominated the literature is gamesmanship. People who are asked hypothetically what they would be willing to pay for extramarket goods may recognize two different incentives to distort their responses. Perceiving that they will not actually have to pay and that their responses may influence the supply of an extramarket good or bad, people may respond in ways that are more indicative of what they would like to see done than how they would behave in an actual market. On the other hand, if people believe (correctly or incorrectly) that their responses will influence actual fees they may be more concerned about keeping their fees low than revealing their true values to the investigator. Similar thoughts apply if the HV measure is willingness to accept compensation (willingness to sell) rather than willingness to pay.

Furthermore, the hypothetical nature of the transactions may not be at all indicative of how people would behave in an actual market even if gamesmanship is not a major problem. When people buy things in a market, they may go through weeks or months of considering the alternatives. The process will often involve consultations with friends and may also involve professionals such as lawyers or bankers. It may also entail shopping around for the best deal on the product in question. And, for the majority of items in the consumer’s budget, there is a whole history of past experience in the market to base the decision on. All this is markedly different than spending an hour or two at most with a mail survey or a personal interviewer attempting to discern how one might behave in a market for a commodity for which one has never actually paid more than a nominal fee.

Numerous other potential problems exist. Like TC, HV measures relate only to the status quo of the good whereas quality may change along the demand curve as the impact of density on recreational quality is felt. All the problems associated with surveys and interviews also may arise including the necessity of obtaining an adequate response rate, interviewer bias, and variations in responses depending on the construction of individual questions and the overall survey instrument.

Furthermore, while economists have been more or less cognizant of the potential pitfalls of HV discussed so far, they have not given much attention to a whole literature in social psychology which is also rather discouraging about HV’s prospects for success. In a classic study from that field completed in the early 1930s, La Piere wrote to 251 restaurants, cafes, hotels, autocamps, and tourist homes asking the hypothetical question: “Will you accept members of the Chinese race as guests in your establishment?” Of the 128 that replied, 91% said no, 9% said they were uncertain or that it depended on the circumstances, and only one said yes. However, prior to mailing the letter, all 251 of the establishments had been visited by a Chinese guest and at only one was service refused. La Piere’s study was followed by a host of others examining the relationships between attitudes and behavior. In a review published in 1976 of 150 such studies, Schuman and Johnson (p. 168) concluded that the correlations between attitudes and actual behavior are usually so low that they will not “... support the substitution of measured attitude for behavior ...” In other words, it may not be safe to assume, as economists applying HV techniques do, that what people say is what they would actually do.
As a matter of fact, there is some evidence that people do not even report their past behavior very well. For example, out of 131 people surveyed in one study who had been hospitalized during the preceding twelve months, 42% did not report it when interviewed (Cannell, Fisher, and Bakker). Parry and Crossley found that people overreport contributions to the Community Chest by 40% and voter registration by 25%. If people sometimes fail to report accurately what they have done in the recent past, it is a big step to assume, as we do in HV, that they can adequately predict and report how they would behave if a market for an extramarket commodity were created.

Our intention is not to argue that all answers to hypothetical questions will be inaccurate. Success in predicting many election results would be a counter example. Still, research on both attitude-behavior relationships and recall raise very serious questions about the validity of HV results.

**But How Serious Are the Biases?**

While all these potential sources of bias in both TC and HV exist, by themselves they are not conclusive. Perhaps their impact is negligible or in total they counterbalance each other. What is needed is empirical research to assess the extent of the biases in practice.

Previously published empirical results are for the most part encouraging. Studies by Bohm, Scherr and Babb, and Smith tend to indicate that fears among economists relating to gamesmanship are exaggerated. Furthermore, Bohm’s results indicate that HV measures of willingness to pay may not be far from the mark. In the next section we will report the results of our own experiment, results which are not nearly so encouraging.

**Results of the Experiment**

Space constraints will not permit a thorough description of the experiment and how the results were arrived at. Only a summary will be presented here and the reader interested in a more thorough treatment is referred to an additional paper by Bishop and Heberlein.

The extramarket commodity that served as the subject of our study was 1978 early season goose hunting permits for the Horicon Zone of East Central Wisconsin. Nearly 14,000 such permits were issued and each entitled a hunter to take at most one goose from a well-defined area during the period 1 October through 15 October 1978. The hunters who were issued these permits fell into two groups. One group had applied for the early season as its first choice and automatically received a permit. The other hunters were allocated to the early season as their second choice, having lost in a lottery for middle season permits or applied for a middle season permit after the deadline.

Three entirely separate samples of goose hunters were drawn at random. The first consisted of 237 hunters who received actual cash offers for their permits. The offers were conveyed by mail along with checks ranging between $1 and $200 with instructions that each hunter should return either the check or his or her early season permit. A second sample (containing 353 hunters) received mail questionnaires specifically designed to develop HV measures of the value of its permits. A third (300 hunters) received questionnaires designed to estimate a travel cost demand curve for early season hunting.

The experiment itself was completed with response rates to all three surveys (recipients of the actual cash offers were surveyed after the early season) in the acceptable range of at least 80%. Comparison of the three samples using a one-tailed difference of proportions test on socioeconomic characteristics, commitment to hunting, past goose hunting experience and the like showed no intersample differences sufficient to interfere with comparison of the results across the samples.

Analysis of the results is still in progress, but our preliminary estimates are summarized in table 1. While our final results may vary somewhat in terms of absolute magnitudes, the data are sufficiently clear to justify confidence in our qualitative conclusions.

Responses to our actual cash offers yielded total consumer surplus associated with 1978 early season goose hunting permits of $800,000 for all hunters combined or $63 per permit. This estimate is a bit conservative since it assumes a maximum value per permit of $200 while both the econometric model and the data indicate that 10 to 12% of the hunters would not have sold at $200.

The actual willingness to sell figure is most easily compared with the HV measure of willingness to sell which turns out to be 60% larger at $101 per permit. This estimate is also based on a maximum value of $200 per permit. In
Table 1. Summary of Results

<table>
<thead>
<tr>
<th>Total Consumer Surplus</th>
<th>Surplus per Permit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual cash offers</td>
<td>$880,000</td>
</tr>
<tr>
<td>101</td>
<td></td>
</tr>
<tr>
<td>Hypothetical offers</td>
<td>1,411,000</td>
</tr>
<tr>
<td>Willingness to sell</td>
<td>293,000</td>
</tr>
<tr>
<td>Willingness to pay</td>
<td></td>
</tr>
<tr>
<td>Travel cost estimates</td>
<td></td>
</tr>
<tr>
<td>Model 1 (time value = 0)</td>
<td>159,000</td>
</tr>
<tr>
<td>Model 2 (time value = 1/4 median income rate)</td>
<td>387,000</td>
</tr>
<tr>
<td>Model 3 (time value = 1/2 median income rate)</td>
<td>63,000</td>
</tr>
</tbody>
</table>

In this case, the model predicted that 35% of the hunters would require offers of more than $200 before they would agree to sell their permits in hypothetical transactions. Thus, had the models been truncated at a higher figure the difference between willingness to sell measured using actual money and measured using hypothetical dollars would have been even more pronounced.

Comparisons of actual willingness to sell with hypothetical willingness to pay and the travel cost values are clouded by the well-known theoretical arguments relating to various measures of consumer surplus. However, following Willig, we would argue that for the range of values we are discussing here ($1–$200) and given any reasonable value for the income elasticity of demand for goose hunting permits, willingness to pay, and willingness to accept compensation should be quite close together. If so, then we could take $63 as being roughly the average willingness to pay of goose hunters for early season permits.

Referring again to table 1, it turns out that our HV measure of willingness to pay falls far short of $63 at only $21 per permit. The table also gives three TC values of willingness to pay based on three different assumptions about the value of time. Even using what the literature would indicate is a relatively liberal time value of one-half the income rate, the travel cost estimate averages only $45, 29% below the benchmark figure of $63.

Conclusions

We must be careful at this point to avoid sweeping conclusions based on a single experiment. Our results may not be able to be generalized to other situations. Furthermore, although the market we created for goose permits used real money, it was still highly artificial and may include biases of its own. Still, the results summarized here must be interpreted as supporting the hypothesis that the sources of bias listed above do have significant impacts on HV and TC values for recreation and other extramarket goods. Had we attempted to value goose hunting permits using an HV measure of willingness to sell, a substantial overestimate would have been obtained. If we had used HV willingness to pay or a TC measure of demand we would have apparently fallen substantially short of the true value of willingness to pay.

While a full set of conclusions from our study must come after additional analysis, some tentative conclusions are evolving which will have important implications for future recreation economic studies. First, there has been a tendency to view HV willingness to pay as more or less accurate and HV willingness to sell as badly distorted. Our results suggest that both measures are biased, but in opposite directions. It appears that HV willingness to pay should be considered a lower bound and HV willingness to sell, an upper bound. Secondly, our results support those who have voiced concerns about adequately accounting for time costs in TC studies. Differences in tastes and the availability of substitutes may also be a significant source of bias here.

Finally, and on a more general level, we would suggest that recreation economics has a long way to go before it can claim accuracy comparable to analyses of market phenomena. Much more research is needed to further develop and refine both TC and HV measures. To the extent possible, this should involve experiments like the one reported here. Furthermore, we hope that our results will encourage the discovery of new, improved approaches to valuing extramarket goods of all kinds. Such research is essential if economists are to help society recognize the contribution of extramarket goods to the overall level of economic well-being and facilitate sound assessments of the trade-offs between market and extramarket goods and services.

References

Bishop, R. C., and T. A. Heberlein. "Travel Cost and Hypothetical Valuation of Outdoor Recreation:


