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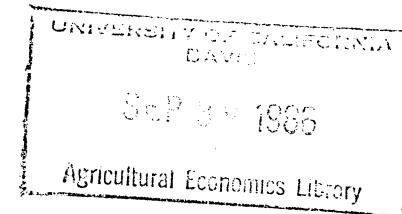
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THE VALIDITY OF THE CONTINGENT VALUATION METHOD FOR  
ESTIMATING NON-USE COMPONENTS OF PRESERVATION VALUES  
FOR UNIQUE NATURAL RESOURCES

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The contingent valuation method (CVM) increasingly is being employed to measure the social benefits of preserving unique resources such as natural environments and endangered species. Pragmatic concerns have largely motivated researchers' adoption of the method in these often difficult valuation contexts. One attractive feature of CVM is its adaptability in resource valuation situations where the non-use components of societal value are hypothesized to be large relative to direct and indirect use value components. This is usually the case with many unique natural resources where direct and indirect uses of the resources, for both consumptive and non-consumptive purposes, are severely restricted. Social value in these instances largely stems from human appreciation for the mere continued existence of the resource for aesthetic or ethical reasons (existence value), and from human perception of the resource as an asset to be held in store for future generations (bequest value). Due to their non-use character, it is impractical to measure these components of value using surrogate market methods such as the travel cost approach, hence the preference for CVM.

Although a perceived strength of CVM is its flexibility in difficult valuation circumstances, little attention has been devoted to external validation of CVM estimates of non-use components of preservation values. The purpose of this paper is to present evidence that major disparities exist between the relative magnitudes of actual monetary contributions made to preservation causes and estimated values reported in a number of

recent CVM studies. Our explanation for this anomaly is that participants in CVM studies apparently ignore substitute expenditure options when formulating willingness to pay responses for particular resources. They also tend to report generic preservation values which are not specific to any particular resource. Consequently, estimates of non-use components of preservation values derived from CVM responses may grossly overstate actual willingness to pay for unique resource preservation.

#### Overview of Recent CVM Estimates of Preservation Values

Since 1980, a number of studies have used CVM to estimate preservation values for animal species and natural amenities. Generally speaking these studies are not concerned with testing whether CVM generates reliable and robust value estimates. Instead, emphasis is on showing that the various components of total preservation value are positive. The underlying premise is that if option, existence, and bequest values are positive, then they should be quantified, extrapolated and included in preservation benefit-cost analysis.

Attention here centers on reported estimates of non-use components of total preservation value, in particular existence values. Table 1 contains a sample of existence value estimates from five recent studies. Other existence value estimates are also reported in the studies, each varying depending on such factors as sample group and assumed discount rate. For those studies where researchers reported two or more estimates for existence value, the lowest estimate is considered here.

Admittedly it is difficult to make direct comparisons between

Table 1. Recent Estimates of Non-Use Components of Preservation Values for Unique Animal Species and Natural Amenities

Resource	Estimated Annual Value Per Capita
<u>Animal Species</u>	
Grizzly Bear (a)	\$ 15
Bighorn Sheep (a)	7
Whooping Crane (b)	1
Blue Whale (c)	6
Bottlenose Dolphin (c)	5
California Sea Otter (c)	5
Northern Elephant Seal (c)	5
<u>Natural Amenities</u>	
Water Quality-S. Platte River Basin (d)	\$ 9
Visibility-Grand Canyon (e)	34

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(a) Brookshire, et al. (1983)  
 (b) Stoll and Johnson (1984)  
 (c) Hageman (1985)  
 (d) Greenley, et al. (1981)  
 (e) Schulze, et al. (1981)

individual existence value estimates across the five studies because of sample differences, inconsistencies in CVM application, and lack of definitional agreement on the extent to which existence value is divorced from current and future use. Nevertheless, two characteristics of the data are striking. First, on an individual and aggregate basis, the values represent non-trivial monetary commitments by respondents to various preservation causes. Averaged across seven animal species, annual willingness to pay is approximately \$6. The average for all nine animal and amenity resources is \$9. Both these averages should be viewed as conservative in view of our selection of lower-bound existence value estimates. When aggregated across all ten resources, willingness to pay for all nine resources amounts to \$87 annually. On face value, therefore, it would appear that respondents are willing to commit sizable contributions each year towards preserving a small group of rare animals and amenities, even under circumstances where current and future uses of the resources are significantly restricted.

A second significant characteristic is the similarity between the values in terms of absolute magnitude. All range between \$1 and \$34, and a third of the reported values differ by only a few dollars. This similarity, incidentally, carries over to all existence values reported in the studies, even upper-bound estimates.

#### Comparisons With Actual Philanthropic Giving

Each year American citizens contribute time and money to preservation causes. Estimates of monetary and in-kind

philanthropic giving in the U.S. are published annually by the American Association of Fund-Raising Counsel, Inc. (AAFRC). AAFRC data sources include surveys of charitable organizations, and U.S. Internal Revenue Service statistics. For 1984, it is estimated that a total of \$74 billion was given in a wide range of contribution areas (Table 2). Included in this total are monetary and material contributions by individuals (83 percent of the total), estates (6 percent), foundations (6 percent), and corporations (5 percent). The estimated total does not account for donor contributions of volunteer time.

Although aggregate philanthropic contributions add up to many billions of dollars annually, the total represents only about 2 percent of U.S. personal income. This percentage has remained nearly constant over the past fifteen years (AAFRC, 1985). Expressed on a per capita basis (individuals over 18 years of age), the average donation was \$431 in 1984. Of this, 78 percent went to recipients in religious, health and hospitals and educational areas.

Monetary contributions to preserve natural resources are included in the "Civic and Public", and "Social Services" contribution areas on Table 2. The Social Services category includes significant donations to the United Way, and, through it, to such organizations as the Boy Scouts and the American Red Cross. Any environment component would be a small part of the \$8 billion total. The relatively smaller Civic and Public category (\$2 billion) includes contributions to environmental groups such as the Sierra Club, National Audubon Society and the National

Table 2. American Philanthropy: 1984

Contribution Area	Total Contributions	Contribution Per Capita >18 yrs.	Percent
Religion	\$36 billion	\$210	48%
Health & Hospitals	10	58	14
Education	10	58	14
Social Services	8	46	11
Arts & Humanities	5	29	6
Civic & Public	2	12	3
Other	3	18	4
Total	\$74 billion	\$431	100%

Source: American Association of Fund-Raising Counsel, Inc. 1985.  
Giving USA Annual Report 1985.

Wetlands Conservation Project. However, also included are contributions for equal right protection, legal defense funds, crime prevention, and neighborhood rehabilitation. Per capita contributions in both areas combined was \$58 in 1984, \$46 for Social Welfare and \$12 for Civic and Public. It is uncertain how much of this collected amount was earmarked specifically for natural resource preservation, but we suspect that actual donations per capita are probably an insignificant percentage of the total.

Further empirical support for this suspicion is found in recent studies of the amount of donations collected in nongame wildlife income tax check-off programs. These programs, utilized by 31 states in 1984, have become popular means to secure financial resources to conduct a variety of wildlife preservation projects including research, management and critical habitat acquisition. In 1984, a total of \$9 million in monetary donations was collected through nongame wildlife check-offs (McCance, 1986). Donations per eligible donor was \$0.22.

Comparisons between recent estimates of willingness to pay for resource preservation and the amount of money actually contributed to such causes suggests that gross disparities exist. For example, the average existence value for a particular species or amenity given in Table 1 (\$9) equals 75 percent of the total per capita donations in the "Civic and Public" contribution area. This comparison suggests that, on the average, individuals are hypothetically willing to pay nearly as much to preserve one animal or amenity resource as they in fact actually paid in 1984

for all civic and public causes. Furthermore, the aggregate of per capita existence value estimates (\$87) for the handful of resources given in Table 1 is over 150 percent greater than the \$58 per capita actual combined contribution for all civic, public and social services causes. Even greater disparities are evident in the level of actual per capita contributions to nongame check-off programs (\$0.22) and the hypothetical average willingness to pay to preserve the existence of the animal species given in Table 1 (\$6).

#### **Explanations of an Apparent Disparity**

Two explanations exist for the apparent disparity between hypothetical and actual willingness to pay for preserving unique natural resources when direct use is restricted. One plausible explanation is that estimates of actual monetary donations reported by AAFRC do not adequately represent individuals' maximum willingness to pay for public goods such as preservation of unique natural resources. One might argue that the disparity should be expected because actual donations are at best lower-bound value estimates of true willingness to pay due to the public good nature of resource preservation. Alternatively, actual contributions are not forthcoming because potential donors believe that involuntary tax payments adequately finance resource preservation causes. It could be argued that larger contributions could be obtained through perfect price discrimination, elimination of free-ridership, and increased public awareness of preservation needs. While on the surface this outlook seems convincing, the fact cannot be ignored that fund-raising in the United States is an aggressive and highly

competitive \$74 billion industry. If considerably more donations could be collected, then why is it that professional fund raisers have not successfully tapped this source?

An alternative explanation for the disparity is that CVM estimates of preservation values are upward biased, and have little correlation with individuals' actual willingness to pay to preserve a particular unique resource or a group of such resources. We argue that existence values for single resources calculated from CVM responses in partial equilibrium valuation contexts represent a somewhat fixed percentage of individuals' "preservation of unique resources" budgets. CVM estimates do not reflect respondents marginal rate of substitution of income for continued preservation of the resource being valued.

The logic of this explanation rests in consumer welfare theory and can be briefly explained as follows. An individual's determination of his or her maximum willingness to pay to preserve a particular unique natural resource is the outcome of a two-stage process: 1) determination of a overall budget for preservation payments, and 2) allocation within this budget to specific preservation causes.

Consider first the problem of setting a budget for preservation payments. The individual's budgeting problem is to allocate a fixed income over weakly separable sets of generic activities so as to maximize utility. Assume that one activity set can be labeled "preservation of unique natural resources that have little direct use." Elements in the set consist of the continued preservation of all such unique natural resources known

to the individual. Factors influencing budget share determinations include: 1) the perceived marginal utility of the various elements in each generic activity set, and 2) prices or costs of elements within each generic set. Assuming convex preferences, the optimal interior solution to the problem entails allocating total personal income across generic sets so as to equate the marginal utility of budget shares across the sets. In so doing, no welfare improvements can be gained through budget reallocations between generic sets.

Each budget share does not necessarily represent the individual's maximum willingness to pay for elements contained in the generic set. It does, however, represent an optimal expenditure plan conditional on existing prices and preferences. Based on the AAFFRC data on philanthropic giving, the typical U.S. citizen appears to budget an amount no greater than, and probably considerably less than \$58 to the "preservation of unique natural resources" generic set.

Once generic budget shares are determined, the next step is to allocate funds amongst elements that comprise the set so as to maximize utility, subject to a budget share constraint, and prices (costs) of set elements. Optimizing purchase patterns over the "preservation of unique natural resources" generic set is non-trivial for many individuals. The set is large and has boundaries that are vaguely defined. Furthermore, actual costs of preservation for many unique resources are largely unknown or uncertain to the average individual.

Now imagine the individual confronted in a CVM interview setting designed to elicit his or her maximum willingness to pay

to preserve a particular unique resource "X". Suddenly the individual is faced with a positive price for resource X, where previously it was probably considered free. Constrained by a self-determined preservation budget, and assuming no strategic behavior, the individual is inclined to state an amount that does not exceed his or her budget constraint. The preservation budget constraint may act as an upper bound on willingness to pay to preserve resource X. In addition, however, there is uncertainty about potential other expenditure needs that may arise during the current planning period to preserve unique natural resources other than X. Finally, there may be uncertainty about true preferences for X, especially if the information is limited due to lack of direct or indirect use (Samples, Dixon and Gowen, forthcoming).

A simple way for the individual to deal with these complexities is to resort to an implicit, and perhaps unconscious, rule-of-thumb policy and express willingness to pay to preserve X as some more or less fixed percentage of the total preservation budget. Depending on the characteristics of the interview setting, expressed willingness to pay could include budget allocations from other consumption sets that contain a discretionary component. By offering a fraction, albeit significant, of his or her total preservation budget, the individual still retains an unspent balance to pay into other causes if the need arises.

This behavior was exemplified in a 1985 CVM survey conducted by the authors of 113 undergraduates at the University of Hawaii.

Respondents indicated a willingness to pay of \$36 to preserve humpback whales, and a willingness to pay of \$58 to preserve all endangered plants and animals. On the average, respondents allocated 62 percent of their total preservation budget towards the preservation of the first unique resource that they were forced to place a positive price to ensure its continued existence.

Behavior such as this is analogous to how individuals may deal with door-to-door solicitors seeking monetary contributions to various civic and public causes. The first solicitor to contact an individual within a certain time period is probably more likely to obtain the highest possible payment for their cause compared with the second and third solicitor who contacts the individual. This effect certainly appears evident in taxpayers donations to nongame wildlife check-off programs. Harpman and Reuler (1986) found that a negative and significant relationship exists between average per capita donations made to wildlife preservation and the number of competing check-off alternatives included on tax forms. In 1984, alternative check-off options solicited contributions for programs in the areas of art development, domestic violence, drug abuse, election campaigns, and the U.S. Olympics, among others. Harpman and Reuler found that at the point of sample means, inclusion of an additional check-off would reduce per capita wildlife donations by 70 percent. The authors conclude that "it is apparent that nongame donations may be drastically eroded or 'diluted' by the addition of other types of check-offs to the tax form."

Behavior such as this, if routinely manifested in CVM

studies of non-use components of preservation values, would lead to the following expected outcomes. First, estimated values for various resources would tend to be similar in magnitude since each represents some rule-of-thumb fixed percentage of respondents' total preservation budgets. Second, respondents would tend to allocate a substantial portion of the preservation budget to whatever particular preservation cause happened to be presented first in the CVM framework. This may be true regardless of the resource in question.

#### Conclusions

Despite the perceived usefulness of CVM to estimate non-use components of preservation values, resulting estimates may be upward biased indicators of true willingness to pay. Major disparities appear to exist between expressed (hypothetical) willingness to pay to preserve unique natural resources and actual donations made to preservation causes. One plausible explanation is that respondents ignore substitute expenditure options when formulating responses to CVM willingness to pay inquiries. They also may tend to report rule-of-thumb fixed percentages of preservation budgets rather than their true marginal rate of substitution of income for continued preservation.

As a consequence of this behavior, estimated non-use values for particular resources appear to grossly overstate true underlying values that would be obtained in a general equilibrium valuation setting. If this is true, comparisons between values becomes difficult and aggregation is altogether inappropriate.

We believe that data presented here serves to signal important limitations in CVM as a practical tool to estimate non-use components of preservation values. Before the method becomes widely adopted for use in policy analysis due to its convenience, more research is needed to further validate CVM estimates of non-use components of preservation values for unique natural resources.

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