Some Issues in Discrete Response Contingent Valuation Studies

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The use of survey or contingent valuation methods to estimate an individual's valuation of non-marketed goods, especially environmental resources, has attracted increasing attention in recent years. Initially, research efforts in this area were viewed by a majority of the economics profession with considerable skepticism. However, with the increased need for information on individuals' valuation of a whole range of environmental resources and limitations on the ability of indirect market-based methods for valuing all of these resources, there has been a substantial increase in the use of contingent valuation methods to provide this information. Indeed, a recent state-of-the-art assessment (see Cummings et al. [1984]) of the contingent valuation method (CVM) has been able to develop a set of reference operating conditions under which it was reasonable to expect the CVM approach would yield estimates with accuracy that was approximately comparable to the indirect methods. Clearly the definition of these conditions is a judgmental one. Nonetheless, it was based on a substantial number of comparative studies evaluating the relationship between CVM and indirect market estimates of the benefits associated with changes in specific environmental resources. Moreover, it does reflect the changing attitude toward the CVM approach. It is therefore particularly appropriate to consider new directions in the development of the contingent valuation method.

Michael Hanemann has provided an insightful discussion of several issues that could easily form the basis for a new line of research on refining the contingent valuation methodology. My comments on his paper focus on two generic issues raised by his discussion of the relationship between discrete response modeling and contingent valuation studies. The first of these concerns the development of models that are capable of describing how individuals will respond to a contingent valuation experiment and the use of these models in helping to understand CVM responses. The second is a somewhat general issue. It arises in Hanemann's discussion of extensions to the CVM methodology, and the role of maintained hypotheses in the development of benefit estimates for environmental resources. After describing each topic in the next two sections, the paper will conclude with a brief summary.

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Modeling the Individual Response Process: The Role of Talking to a Data Point

One of the central questions in interpreting contingent valuation survey results concerns how the individual respondent treats the questions that are posed to him (or her). Quite appropriately, Hanemann approaches this problem by suggesting that current research should move beyond the classification of survey biases and address the problem of modeling how individuals respond to contingent valuation questions. He suggests that CVM responses be treated as containing systematic and non-systematic components. The analysts' problem is to develop a framework that allows the systematic component to be uncovered from the overall responses. One way to recover the systematic portion of the response (which is assumed to be associated with the individual's true preferences) is to develop a formal model of individual behavior in responding to the hypothetical institutions posed by the CVM experiment.

A variety of such models have been developed in the past. Thayer [1981], for example, was the first to propose that a contingent valuation bid was the weighted average of the starting point suggested by the interviewer to the respondent along with the individual's true valuation of the resource (or the change in

resource). A number of other investigators, Carson, Casterline, and Mitchell [1984] for example, have used a variety of decision rules to describe the way in which individuals might be assumed to respond to CV questions. Hanemann extends this work by proposing that a formal optimizing model be used to describe an individual's preferences. Moreover, he outlines a framework for Unking that model to these CVM response decision rules in either a stochastic or a non-stochastic format. This is clearly a significant advance over the past literature because it provides an explicit behavioral explanation of an individual decision rule rather than an ad hoc description of what might be governing the process.

My principal suggestion is that such models should be based on attempts to understand how individuals interpret CVM questions. If economists are serious about the process of using survey research to understand individuals' valuation of environmental resources, then it is important to learn what other social scientists have recognized long ago. Communication with individuals is not automatic. Our terms, as well as our conception of how households will understand and adjust to an activity, may not correspond to what individuals would describe on their own. This is not to suggest that economic models of individual behavior are irrelevant, but rather to acknowledge that individuals' explanations of what they are doing may not correspond to the way we would describe their actions to them. Consequently, we need to learn to listen before we ask or model individuals' responses to CVM questions. This suggestion not only reinforces McCloskey's [1983] recent call for greater tolerance to the use of questionnaires and self-descriptions, but argues that they are not limited to testing preconceived theories. If we are to avoid what he describes as "foolish inquiries" and the misuse of survey respondents, we must learn to communicate with the individuals we wish to interview. This will often mean asking them what *they think* we are asking for!

As the complexity of the survey research tasks and the degree of discrimination we request of individuals increases, it is especially important to discuss with potential respondents the questions we wish to ask, and how they interpret those questions. Often they can tell us how to explain the situation so as to elicit the information we want. In effect, this suggestion argues that there is a step which precedes the introduction of a formal model. It is an inductive evaluation of how individuals perceive the questions asked of them before forming their responses to a contingent valuation survey. After this step has been satisfied (and it will likely need to be satisfied in a wide array of CVM applications before it is possible to substantively improve the formal modeling of the individuals' responses), then we should be able to significantly enhance the behavioral restrictions used in decomposing individuals' responses to contingent valuation surveys.[1]

The Role of Maintained Hypotheses in Benefit Estimation

Applied micro economic research has seen a systematic change in the way in which the behavior of economic entities, both households and firms, is described empirically. Initial empirical work in modeling household demands for goods and services and in describing firm behavior used fairly "loose" specifications of the behavioral relationships estimated in that no close ties to economic theory were offered. We have seen progressive enhancements in the practice of empirical research in both areas with fairly detailed functional forms developed as well as more attention to the criteria for selecting among them.[2] There has been growing interest in the development of models for benefit estimation based on specific maintained hypotheses. Hanemann's proposals to develop methods for enhancing the quality of contingent valuation results are examples of this type of modeling. This approach argues (in the case of demand modeling) that the specific estimating equation should be derived, analytically, from a specific utility function and budget constraint under the assumption of constrained utility maximization.

An alternative approach would impose fewer restrictions of the function estimated, arguing instead that it is an approximation to a function that would result from the same optimization process. Without knowledge of the

[1] This is an activity that economists feel uncomfortable with. Nonetheless, there is a growing recognition that this type of research is essential to the design of survey instruments. Indeed, the use of focus groups in marketing research has been a significant basis for the design and evaluation of survey research (see Bellenger et al. [1979], Axelrod [1979], and Buggie [1983].

[2] For discussion of this work in production modeling, see Jorgenson [forthcoming]. A somewhat early survey of demand modeling is given in Powell [1974].

form for the utility function, it is implicitly argued that few restrictions should be imposed. Rather the data are presumably allowed to "tell their story." Neither approach is ideal for obvious reasons. To develop exact estimating equations that follow from the behavioral descriptions of household actions requires that simple tractable utility functions and budget constraints be used in describing the household preferences. Often these functions will impose significant structure on the nature of these demand functions. By necessity, these restrictions become a part of the maintained hypotheses used in organizing sample information and therefore in the estimation of benefits.

The alternative often relies on "high speed (but hopefully mindful) groping" to describe the nature of an individual's demand. This has been widely criticized because it has tended to completely misuse the principles of classical inference (see Wallace [1977], Learner [1978], [1983], and Ziemer [1984] as examples). Hanemann' s proposal follows the general logic of the first approach and offers an interesting adaptation for the case of CVM surveys. He argues that individuals may *not* know what their valuation of a particular environmental or natural resource might be. For example, he observes that

> "I want to suggest that, most of the time, people do not consciously *know* their preferences; they usually cannot introspect their utility functions. Instead, they discover their preferences when they actually make a choice: a decision 'pops into' their head. Their preferences are revealed to them as part of the actual choice. However, preferences are fairly stable (there may be a random component but there also is a substantial deterministic component); therefore, if a person has faced the same choice on several previous occasions, he can estimate his own preferences with reasonable accuracy—he can predict what he would do if the choice arose in the future—by observing his own past actions." (p. 3)

Under these circumstances, Hanemann suggests a contingent valuation question that asks the individual to gauge whether his (or her) willingness to pay for a change in an environmental good exceeds some bound may be easier to respond to and therefore provide a more accurate response.[3] One might criticize this approach on the grounds that it is inconsistent with the estimation of valuation information. Hanemann's argument is that it need not be. The responses to such questions together with the assumption that a specific utility function describes individual's preferences will allow the analyst to recover an estimate of that individual's willingness to pay. Thus, this is a clear example of how the prior information from theory can be used to help in organizing sample responses. In this case, even though the responses are not specific willingness to pay bids, it is possible to recover estimates of these values. The maintained hypothesis of utility maximization together with the assumption of a form for the utility function and the budget constraint provides the needed supplementary information.

This seems quite sensible given our conventional models of household behavior. However, it is important to appreciate just how far we are ''pushing that theory.'' Consider, again, the explanation that is being used to describe how the individual responds. Each individual does not know his (or her) willingness to pay for new or previously unexperienced goods or services. As a result, they are best confronted with a threshold and asked to judge how their willingness to pay relates to it. However, economists that analyze their responses *are assumed to know exactly what the nature of each individual's utility function is* (up to a monotonic transformation). Otherwise, it would not be possible to recover estimates of the individual's willingness to pay. This seems to be an unreasonable set of assumptions. It remains an open question whether, even accepting the Hanemann model of the decision process, the estimation strategy involving a revised question and specific utility function will provide "better" estimates of individual valuation than questions that elicit bids used together with less restrictive prior information. This general issue can be applied to the whole line of research which begins with utility (or production) functions and attempts to derive estimating equations. It is an important and as yet unresolved issue. As Hanemann is implicitly suggesting, it may be especially important to the CVM approach to benefit estimation.

It is not sufficient to argue that the imposition of parametric utility functions insures consistency, permits extrapolation, and avoids large differences between willingness to pay and willingness to sell questions. Each of these results may be symptomatic of errors in the way in which we are modeling individual

[3] This follows the approach used by Bishop and Heberlein [1979] and has been discussed in detail in Hanemann (1984],

preferences or the constraints to behavior. Imposing a set of rigid maintained hypotheses to eliminate these inconsistencies does not necessarily improve the quality of the information we get as a result.

Summary

Hannemann's paper raises a number of important and interesting issues associated with improving the use of contingent valuation methods in benefit estimation. It will surely stimulate a wide range of research in this area. Moreover, in the process of developing his arguments, Hanemann implicitly raises an important issue for benefit estimation. That is, in the development of economic models to describe individual behavior two approaches have been used. One might be characterized as the detection of economic structure with some maintained hypotheses but relying on empirical searching of the potential models. The alternative to this approach has been to impose fairly rigid maintained hypotheses and thereby "smooth" or reduce erratic responses from a given data set. It is not clear that the latter is necessarily superior to the former. If empirical research seeks to improve the quality (in terms of both bias and precision of our estimates) and to learn how individuals make the decisions we wish to describe, some mixture of the two strategies is likely to offer a better strategy. By exposing these issues, Hanemann has offered not only a specific guide to new research in the use of the CVM approach, but has also exposed a more general set of issues concerning the appropriate use of the deductive insights from economic theory and the inductive information from observing and talking to economic agents in benefit estimation.

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