

Psychological Biases in Contingent Valuation Studies

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The best way to discover what someone thinks is to ask him. Such is the case, it turns out, unless one is interested in uncovering preferences, which everyone is assumed to have but which are notoriously difficult to observe for some commodities such as environmental goods. The value placed by individuals on marketed goods is generally believed to be easy to observe since the prices paid for the goods are themselves observable. However, in the case of environmental goods there is no market and so no price, and further, environmental goods are not valued only by the people that use them since it is typically recognized that people derive pleasure simply from knowing that the goods exist. As a result, the researcher interested in discovering the value of such goods is left with some less desirable methods than watching buying behaviour closely. One such method, contingent valuation, involves simply asking individuals the value they place on the good in question. Unfortunately the values elicited by this technique suffer from several biases caused by psychological incentives and misinterpretation. On the other hand, after reviewing these biases it becomes clear that survey structure can play an important role in reducing or eliminating them.

Portney (1994) provides a useful introduction to contingent valuation. The technique derives its name from the fact that the values elicited from respondents are contingent upon the characteristics of a market simulated by the survey

where the good in question can be bought or sold. The first study suggesting the survey technique was apparently Ciriacy-Wantrup (1947), but the method caught on quickly to the point that Carson et. al. (1994a) has identified over 1400 studies employing it. Neither has its use been dwindling: from 1990 to the present the EconLit database contains over 1300 contingent valuation references. However, as Hanemann (1995) points out, opposition to the method was also quick to appear, beginning with Eckstein (1958).

Due to the growing opposition to the contingent valuation method Cummings, Brookshire, and Schulze (1986) organized a conference with the specific purpose of identifying concerns explicitly, and provide extensive discussion of the suspected biases. The first of these is a strategic bias that can have two opposing effects. The first is a free-rider effect, whereby the respondent anticipates that the survey will somehow affect government policy and underreports the true value she holds for the good in question because she feels that enough other people will report large enough values that the good will be provided and so she will be able to enjoy it without paying for it. The second is an altruistic effect, whereby the respondent feels that he will never be made to pay for the good but feels that it is important so exaggerates the value he places on it to ensure that the good will be provided. This line of criticism is not generally pursued much further however, and is scarcely mentioned by more recent critics such as Diamond et. al. (1993) and Diamond and Hausman (1994). The reason is, as explained by Freeman (1986), that contingent valuation surveys clearly present a hypothetical situation so that it is not feasible for

respondents to believe that their responses will influence actual policy in any way.

Another type of bias is termed vehicle bias, and is related to variation in reported willingness to pay for an environmental good due to changes only in the proposed vehicle by which the good will be funded. For example, someone who is opposed to income taxation will report a value for a pristine lake setting less if its provision will involve an increased income tax rate than if the funding is to come from say less expenditure on education and constant or less income tax. However, it is not clear that this constitutes a proper bias. Several commentators at the conference organized by Cummings, Brookshire, and Schulze (CBS), including Kenneth Arrow and Daniel Kahneman, argue that differing payment vehicles will cause a change in preferences and so a change in the value placed on the good rather than simply a psychological impression that confuses the respondent's notion of value. Several studies in the early 1980s, such as Daubert and Young (1981), investigated this issue and determined that the proposed payment vehicle certainly has an effect on the aggregate value of the good in question derived from the survey. Because this introduces a change in preferences though a conclusion of the CBS conference was that the vehicle proposed by contingent valuation surveys should reflect the method by which the good would most likely have to be funded in reality.

A third structural bias is known as starting point bias. Randall, Ives, and Eastman (1974) was the first study to recognize that, when the question of how much the good is valued is posed in an iterative bidding process, respondents

tend to choose a value based on the value that the bidding starts at. Again this bias is associated with two separate effects. The first stems from the fact that the respondent feels the given starting value and the rate at which the bids increase as bidding continues define an appropriate or acceptable range of possible answers. In discussion regarding McFadden and Leonard (1993), a study that concludes that starting point bias is likely to be a significant problem, McFadden has stated that this is a well-known psychological effect that is evident in “other psychometric contexts where people are asked to do ranking tasks” (qtd. in Hausman, 1993, 209). The second effect postulated by Randall, Ives, and Eastman (1974) is the possibility that the bidding process is too tedious and some respondents eventually express that they would not be willing to pay the suggested value to end the process while in fact they would be willing to pay a higher amount. Mitchell and Carson (1986) criticize the CBS conference for understating the importance of starting point bias and cast doubt on the validity of the iterative bidding process in developing estimates that adequately reflect the true value of non-marketed goods.

Each of these biases embodies a conflict between the attitudes or notions of respondents and their actual intended behaviour. To a certain extent researchers have the leverage to examine the data for signs of this conflict and remove suspect observations, a practice that Diamond and Hausman (1994) suggest is standard. For example a stated zero willingness to pay can be classed as a protest zero if it is obvious, perhaps even from verbal communication with the surveyor, that the respondent does value the good in

question but does not reveal this in protest to the cause of environmental activists. In such a case this particular observation is likely to be discarded.

Another class of bias referred to rather ambiguously by Cummings, Brookshire, and Schulze (1986) and the literature reviewed therein is information bias. The idea here is that the outcome of a contingent valuation survey is dependent upon the amount of information provided to the respondents, a fairly unsurprising conclusion. The issue is central to the validity of contingent valuation though, since it brings to the forefront the question of whether people know their preferences. If they do it should make no difference what information regarding the good, income, substitutes, or anything else is provided since the good should be automatically associated with a preference and so a value. However, as Hanemann (1995) has said, “[p]eople do not know their [willingness to pay] for most goods, private *or* public, in the way they know their shirt size. Nor can they discover it by inspecting their utility function, as in the textbooks” (90-91). The point is that people can reveal their preferences for marketed goods because the market, or more generally the real-life scenario, does a good job of reminding consumers of substitutes and the budget constraint: since environmental goods are not marketed it would seem important for the market simulated by the contingent valuation survey to also simulate this aspect of markets. This concords well with the CBS conclusion that surveys should attempt to provide as much information as possible without crossing the threshold beyond which respondents can no longer process the information, since ignoring superfluous information would seem to be easier in a market

setting than an intensive interview session where it would cause a bias by confusing the respondent.

In his comments for the CBS conference Kahneman explains an additional bias likely in contingent valuation studies that Kahneman and Knetsch (1992) later called an embedding effect, and that has been studied in more detail by, for example, Desvovges et. al. (1993). In general the problem can be explained as respondents embedding within their stated value for a specific environmental good the value they place on the environment in general. More specifically, Kahneman initially reported results from a contingent valuation survey that suggested the aggregate willingness to pay for cleaning up all lakes in Ontario was little more than willingness to pay for cleaning up only lakes in a certain region of Ontario. This implies that respondents asked about lakes in the certain region stated the value they place on those lakes in addition to the value they place on the cause of clean lakes in general, or even on the value they place on doing something they feel is good or respectable. Hanemann (1994) has argued that such discrepancies are caused by three separate effects, namely a scope effect, a sequencing effect, and a sub-additivity effect, and notes that these have caused bias in only a very small minority of poorly designed surveys. Be that as it may, the most heated debate regarding the embedding effect is not over its existence but whether or not the so-called warm glow derived from paying for a general cause should be included in the value of a specific good. Hanemann (1994) quotes Gary Becker and Kenneth Arrow to the effect that it should be included, but critics of the contingent valuation approach disagree and the

question is primarily a normative one, unlikely to be answered to the satisfaction of all parties. Diamond and Hausman (1994) also discuss two other problems related to the embedding effect, namely paternalism, where some willingness to pay responses have embedded in them an altruistic component regarding the specific consumption of environmental goods desired by one person for all other people, which leads to double counting; and the fact that warm glow is exhausted after so many charitable payments, so that stated willingness to pay depends not only on income and so on but also on the amount of previous donations made.

It was mentioned at the outset that the extent of these biases is affected by the design of the survey instrument. This is a central conclusion of Arrow et. al. (1993), a report published by a panel of leading researchers assembled by the National Oceanic and Atmospheric Administration (NOAA) to determine the validity of contingent valuation in assessing environmental damages for the purpose of litigation. The report contains several recommended conditions that, if met by the survey procedure, should lead to valid conclusions. Broadly, these include the following: careful pre-testing of the questionnaire and actual survey situation to ensure that respondents are not likely to be misled; the willingness to pay question posed in a yes or no format so that it resembles voting in a referendum, or more fittingly, choosing to purchase or not purchase a good from a store shelf; follow-up questions and debriefing sessions to ensure that the respondents understood the questions and so actually expressed their perceived preferences; personal interviews as opposed to telephone interviews or mail surveys so that respondents can be carefully monitored; reminders of substitutes

and implications for income if the payment is made; and finally, for statistical accuracy, a large number of respondents chosen by probability sampling.

Immediately it can be seen that these recommendations reduce the potential for biases to arise. Strategic bias can be completely eliminated if pre-testing is extensive enough and the questionnaire is changed until there is no misinterpretation to the effect that respondents suspect their responses will influence policy. Changing the payment vehicle, as discussed earlier, constitutes a change in preferences, but through follow-up questions it can be ensured that respondents understand how the payment is to be made and so have expressed their preferences that are consistent with the particular vehicle. Starting point bias is mostly eliminated through the avoidance of the iterative bidding process, but it is also possible that respondents will feel obliged to answer yes to the referendum question if they feel the proposed payment is somehow the expected or appropriate one. However, this feeling of obligation can be uncovered and corrected either with follow-up questions or by modifying the questionnaire after pre-testing. In all cases the debriefing sessions are useful in identifying protest zeros or otherwise untruthful or uninformed responses to be disregarded, a practice that is benign in terms of the sample as long as the final point mentioned above is met so that there are adequate observations to maintain randomness.

Information bias and the embedding effect are more troublesome. Taking the latter first, the recommendations made by Arrow et. al. (1993) provide several opportunities to discover what responses are likely to have embedded in them a warm glow or concern for a more general cause than the one being considered,

and even give the leverage to remove such observations. However, little can be drawn regarding the desirability of removing or retaining them except some general exhortations to minimize warm glow effects and produce a conservative estimate of aggregate willingness to pay. Several researchers though, such as Willis (1995) and Hanemann (1994 and 1995), suggest the possibility that even a conservative estimate should include charitable payments. An interesting point raised by such suggestions is that, if warm glow responses are to be considered as genuine preferences, so too should protest zeros. A market analogy exists here. If some consumers consider themselves environmentally conscientious and choose to pay 10 cents extra for a tin of dolphin-friendly tuna, clearly this reflects their willingness to pay and so the value they place on the particular tin of tuna, although this has embedded in it 10 cents worth of a concern for the general cause of dolphins. Likewise, someone who is opposed to environmental lobbies may choose to forego consuming tuna if only dolphin-friendly tuna is available, or at least substitute to 'dolphin-unfriendly' tuna if it is available. In this sense the value he places on a specific tin of dolphin-friendly tuna is zero even though he places a positive value on tuna and is avoiding the dolphin-friendly variety out of protest. Should the value of non-marketed commodities not also reflect these moralistic actions? Again, the question is a normative one.

That a survey can be designed such that all so-called information bias will be eliminated is a strong statement because it implies that it is possible to simulate all aspects of a market setting through person-to-person communication. This is unlikely since it places too high a responsibility on the

shoulders of the surveyors and survey designers, who would be expected to understand all the nuances of a market that in reality has never existed. The NOAA panel was well aware that simulating a market involves high information demands and so recommended that the survey procedure contain detailed descriptions of the good in question. However, they did not tackle the issue raised at the CBS conference of a threshold information level, although such a level could be discovered during pre-testing and the information provided adjusted accordingly. Also, Willis (1995) has raised further questions regarding the way that different people process information and the effects of previous views in censoring information. Clearly this is another as yet unresolved issue.

The first problem with the Arrow et. al. (1993) recommendations then is that they do not by themselves guarantee a flawless survey instrument and provide implementation instructions that will lead to true and unbiased estimates of the value of non-marketed goods. This is certainly unfortunate, but the guidelines do give the vigilant researcher a method to conservatively estimate the value of an environmental commodity. Indeed it is important to produce such estimates for goods that can also be valued by the travel-cost or other revealed preference methods as a way of evaluating contingent valuation and the NOAA recommendations. Carson et. al. (1994b) perform such an analysis and determine that well-designed contingent valuation surveys display little structural bias compared to revealed preferences, in fact slightly underestimating them. Furthermore, there is considerable scope for extending such analyses in discovering the effects on comparability of the estimates caused by including

identifiable warm glow observations and protest zeros in the sample, and also by providing additional information that may better simulate a market setting.

A more serious problem with the recommendations is that they are costly to implement, representing substantial investment in designing the survey, preparing the information, training the surveyors, and carrying out the interviews. It is probably for this reason that recent contingent valuation studies vary widely in question format, information provided, questionnaire type, and so on. Willis (1995) examines the British literature to determine what recommendations are in use and what others appear to be feasible. He finds that the importance of follow-up questions, pre-testing, personal interviews, and descriptive information are well understood, but that other recommendations, such as the referendum type willingness to pay question, probability sampling and a large number of observations, and reminders of substitutes and income have not been embraced unanimously. Further, he also suggests that survey designers looking for favourable results may intentionally overlook the NOAA recommendations.

The feasibility of the recommendations is a major concern because the US Court of Appeals has upheld the NOAA's damage assessment regulations, which permit trustees to use contingent valuation (NOAA, 1997). Since Arrow et. al. (1993) are skeptical of the validity of results obtained when the recommendations are not considered it is important to make them cost effective so that NOAA damage assessments too can be cost effective and will provide valid results. One possible solution is to develop internet-based surveys. Although this precludes personal interviews it would still be possible to monitor responses after

they are submitted and follow up with the respondent by e-mail if necessary. This technique also allows less costly dissemination of information, since links could direct respondents to other informative websites. This is also a potential solution to the threshold problem, since respondents can choose to follow as many or as few links as suits them. Otherwise the recommendations can be accommodated in an online setting, and with potentially substantial cost savings over the personal interview approach. In addition, randomization can be programmed into the survey to further reduce the potential for any strategic responses. Trudy Cameron of the University of California at Los Angeles is currently undertaking such an online survey, with the goal of estimating willingness to pay for climate quality and the derived benefits (see <http://globalpolicysurvey.ucla.edu>). Her results will be an important next step in determining the validity of contingent valuation.

Well-designed contingent valuation surveys are capable of producing conservative estimates of willingness to pay for non-marketed goods, but further work is needed if the remaining biases are to be eliminated and more exact measures produced. Of particular concern are discovering what information is necessary to effectively simulate a market setting and to what extent willingness to pay for a moralistic concern should be included in the value of a specific good. Once the conditions under which contingent valuation can lead to unbiased estimates are identified it is important to ensure that they can be achieved cost effectively. Online survey procedures will doubtlessly prove useful in this regard as well as in meeting the conditions themselves.

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