

Contingent valuation design and data treatment: if you can't shoot the messenger, change the message

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Abstract. The contingent valuation method has become an established and major part of the toolbox used to produce monetary values for evaluating environmental changes. It has been used to inform everything from the value of ecosystem services to cultural heritage to loss of life. The method has been highly controversial at various stages but despite this, or perhaps due to the publicity, it has grown in scope and scale. Numerous occurrences of 'bias' and 'anomalies' in results have been addressed by improved design, so providing guidance on perfected approaches to making sure respondents reveal preferences in accord with theoretical expectations. That respondents may not wish to and often fail to conform is seen as a challenge for the design team to be more ingenious with their incentive mechanisms which get respondents to act 'rationally'. Failing this, data can be classified and treated to derive 'conservative' results. I document in this paper how whole areas of evidence from contingent valuation have been removed from consideration by design, with respondents expected to conform to an idealised rational agent model or to suffer branding and exclusion as having the 'wrong motives'. While the method is then susceptible to manipulation (eg to meet sponsors' requirements), if used more scientifically it also holds the potential to reveal fundamental flaws in economic theory and ways to advance that same theory.

Introduction

Over the last twenty-five years economic applications attempting to value environmental change and assets have expanded exponentially. While cost–benefit analysis (CBA) and monetary valuation remain only one element in government decisions, and often not a primary one, they remain ever present and often important in specific contexts. Thus, cases are easily found of large projects, taxes, and government decisions or policy justifications involving valuation of this sort. In the environmental context CBA is evident from global analyses, such as the Stern report, through to local projects. Environmental economists have been highly vocal in their advocacy of the CBA approach and of the spread of its individual methods, if critical of some applications. Their main success has been the contingent valuation method (CVM), which has supplied numbers for government agencies in North America [especially via benefit transfer (see Spash and Vatn, 2006)], has been picked up by ecologists to produce their 'ecosystem values', is accepted as legal evidence in courts of the USA, and is often in the background when monetary numbers are produced for environmental change. In this paper I offer a reflective overview of the conduct and practice of contingent valuation in the environmental context.

In trying to address the problem of how to achieve an efficient allocation of resources, mainstream economists call upon the preferences of individuals to inform their policy recommendations. These preferences have traditionally been assessed by analysis of actual market demand to obtain a welfare measure of a proposed project or policy change. However, because many environmental aspects have no explicit market price they have been given a pseudomarket or shadow price. This requires either assessing the welfare changes in markets which are related to the environmental aspect

of interest or designing hypothetical markets. The hypothetical market approach is typically and most commonly applied using the CVM to obtain stated (as opposed to expressed or observed) preferences.⁽¹⁾ This method was largely developed during the late 1970s and early 1980s by researchers at the University of Wyoming as an experimental technique, but was catapulted into the limelight by use as evidence in the courts of the USA.⁽²⁾

In theory, the aim is to assess compensating and equivalent surplus measures of economic welfare (Hanley and Spash, 1993). In practice, numbers are normally produced with little attention to such theoretical abstractions. Basically, the CVM asks individuals to give their maximum willingness to pay (WTP) or minimum willingness to accept (WTA) compensation for an environmental quality or quantity change. A popular alternative is to offer a specific amount to be, hypothetically, paid or received and to ask if this is acceptable or not (ie dichotomous choice).

CVM surveys are claimed to access a range of value categories (ie option, existence, and bequest values), besides those which relate to the direct use of a resource as traditionally considered in economics. The collective term for these values in the courts of the USA is passive use value, although a more theoretically correct term is indirect use value.⁽³⁾ The combined effect, of a simple approach and of the large numbers obtained by including the indirect use value, has been to make CVM studies popular amongst those trying to show that ecosystems and species loss and environmental degradation should be taken more seriously in policy circles.

Mainstream economists argue that the figures have the credibility of a 'market vote' from members of the general public which provides political acceptability by conforming with free-market democratic ideals. Stated-preference methods are backed by detailed, expert-produced, government-sponsored guides (eg, Arrow et al, 1993; Bateman et al, 2002). This adds an air of rigour and objectivity. In fact, practitioners must make numerous difficult decisions about survey design, conduct, and analysis. As Hanemann's (1994) apologia for the CVM states:

"The method, though simple in its directness, is in fact difficult to implement without falling into various types of design problems that require effort, skill and imagination to resolve" (page 38).

The general contention of stated-preference practitioners is that all problems can be designed away. That is, the basic economic theory is taken for granted and defended against the occurrence of empirical evidence which shows flaws in that theory. Fundamentally mainstream economics assert value monism (Norton and Noonan, 2007), while the underlying message coming from the CVM is of value pluralism (Spash, 2000a). Those economists who fear a harbinger of the need for change in orthodox thinking may ridicule and dismiss the method. Alternatively, others believe the CVM has the potential to spread market valuation and have devoted their careers to perfecting design to remove 'biases' and 'anomalies'. This has involved preventing some forms of CVM design, which in effect is an attempt (which has had some considerable success) at killing off whole areas of research. A more subtle approach has been to

⁽¹⁾ A sister stated preference technique is choice modelling, formerly choice experiments, which is a strong minority pursuit amongst environmental economists while CVM is applied by noneconomists and economists alike. In Australia the notoriety and bad press surrounding the Kakadu CVM study meant only choice experiments survived. Much of what follows applies to all stated preference methods but I restrict the explicit argument to CVM for brevity.

⁽²⁾ Cases concerned clean up of industrial-waste sites under Superfund legislation and later the high-profile Exxon Valdez oil spill case under natural-resource damage-assessment legislation.

⁽³⁾ The term nonuse value has been used by some authors, particularly in the UK, and is highly misleading as all economic values, as defined under microeconomic theory, are related to the usefulness of an entity or object—that is, utility for human ends.

change the message arising from CVM studies by developing various forms of ‘treating’ data. This raises the potential to meet the expectations of those paying for the studies, so that the ‘right’ numbers may be forthcoming. I follow Vatn (2004) in arguing for a middle path between outright rejection and conformist acceptance of the CVM. There is then a clear case for listening to all that this rare (in economics) primary data source has to offer.

These issues are addressed in two main sections. First, the approach taken to survey design and specifically some major debates in the literature are discussed. In this section three issues are presented: the institutional context of contingent values and whether they are more political votes or market prices, the emphasis on design for ‘conservative’ numbers which has excluded WTA formats, and the role of information in forming and informing preferences. These are selected as areas of persistent debate which are highly relevant to the contention that observing what humanity does in practice is far from the primary goal. The second main section then addresses what economists do with the data they have gathered. Here, I define approaches taken to data classification, its treatment, and its analysis. The aim is to identify the type of approaches which are seen as acceptable practice and to identify how this can lead to unscientific data manipulation. I conclude with some reflections upon the potential for CVM to play a positive role in the development of some new economic thought about environmental values, if only the data were gathered openly and were accepted at face value.

Targeting unwanted messengers

A variety of attempts have been made to control for various problems or ‘biases’ by redesign and refinement of the survey instrument. Most notable amongst these is the National Oceanic and Atmospheric Administration (NOAA) report (Arrow et al, 1993), arising in the aftermath of the Exxon Valdez oil spill in Alaska and the ensuing litigation which involved CVM as court evidence. This report involved two Nobel-prize-winning economists from different sides of the court case and set many CVM industry standards which have persisted through to today as best practice for addressing problems. While the NOAA report is taken as a major reference point by most CVM practitioners, there are a large number and range of problems referred to as ‘biases’ in the literature over the last three decades, extending to a list of at least twenty.⁽⁴⁾ Rather than conduct a comprehensive review of these biases, the objective here is to draw out key issues, and three illustrative main areas are chosen to do so: choice format, conservative design, and information provision.

Political vote or market payment

A key change in the 1990s concerning survey design was a shift away from open-ended bid questions towards the dichotomous-choice format, the main reason being the NOAA panel recommendation that CVM surveys be essentially self-contained referenda in which respondents vote to tax themselves (Arrow et al, 1993, page 20). However, the single dichotomous-choice referendum recommended by NOAA was soon criticised as exacerbating several problems (eg ‘yea saying’ even for high bids, and mixing protests with zeros). Bidding games and iterative bidding arose as preferred approaches by many, while others moved to choice experiments. Choice experiments have been regarded as a natural progression and have been described as a generalisation of dichotomous-choice

⁽⁴⁾ These include the following factors cited as ‘bias’: strategic behaviour, nonresponse, starting point, range, relation, importance, position, interviewer, sponsor, theoretical misspecification, symbolic misspecification, part–whole, metric misspecification, problem of provision, payment vehicle, property rights, method of provision, budget constraint, elicitation question, and question order.

contingent valuation—that is, where a sequence of dichotomous-choice valuation questions are asked involving two or more goods (Hanley et al, 2001, page 448).

While some claim that dichotomous choice only supplies the ‘truth’ (Hanemann, 1994, page 23), dichotomous choice, in its various forms, is far from problem free. The results are sensitive to the analyst’s selection of bids from which respondents must choose, and the functional form used for mean estimation adds to variability in results while there is no clear theoretical reason to choose between forms. Bateman et al (1999) found that dichotomous choice shows anchoring in single-bounded approaches and starting-point bias in multiple-bounded cases and

“that the bid amount presented to respondents dominates their responses, to the virtual exclusion of other socio-economic and preference factors” (pages 530–532). Meanwhile, the problem of ‘yea saying’ creates overestimation. Dichotomous choice has been found to exceed open-ended bids and to have a greater standard error—that is, substantial variability (Desvouges et al, 1993).

However, debate about the technical differences between the original open-ended and more recent dichotomous-choice formats can be misleading as a selection guide. Design of a dichotomous-choice survey requires selecting the bids to be offered to respondents, which, as noted above, are key to the results. An open-ended approach is often used to establish the initial bids required for dichotomous choice, so even dichotomous-choice practitioners then rely upon open-ended formats. On a practical basis the choice of format is affected by the sample size because dichotomous choice requires a larger sample to estimate the bid from a probit or logit model. The available survey budget is then clearly important. Thus, design is not purely motivated by theoretical concerns.

Indeed, rather than being a purely technical matter, the format selected may have more to do with the analyst’s view on political economy. In defending the CVM against its critics, Hanemann (1994) follows the line of “valuation as voting in a referendum” (page 22), uses this to dismiss CVM work that fails to use “voting” formats (page 25), which basically means all earlier studies, and defends lack of public knowledge about what they are asked to value on the basis that, under voting, “prior experience or training are irrelevant” (page 29). Dichotomous choice, he claims, is advantageous because posted prices are normal in the USA rather than bargaining; it is easier to answer because you do not need to think of a number, so there is less tendency to anchor on costs and no strategic bias (page 23). These points are far from lacking in contention. For example, there is no reason to expect cost to act as an anchor in open-ended formats as opposed to dichotomous choice, and this can only arise in the former if this is explicit in the information pack (so easily avoided). More generally, the extent to which the institutional context of the USA can be generalised is limited and the acceptance of markets as well as referenda and their structure is also culturally specific. For example, Willis (1995) notes that voting on hypothecated taxes is totally outside UK experience. Even within the USA, Hanemann (1994) notes that “there are few cases where local governments actually set environmental quality” (page 20), which means his advocacy of the NOAA approach of a referendum on taxes is actually promotion of an unrealistic and unfamiliar scenario to respondents.

Confusingly, there is also inconsistency in describing what exactly dichotomous choice does represent. Bateman et al (2002, page 139), which includes Hanemann, seek to justify the approach as ‘normal’ because it represents the same choice as making a supermarket purchase.⁽⁵⁾ This again seems to be adoption of a specific

⁽⁵⁾ Actually, many supermarket purchases are habitual, but this explanation, which is common in social psychology and marketing, appears hard for many economists to grasp.

context and institutional framing to produce an overgeneralisation for purposes of rhetorical persuasion. In many countries, haggling is normal in the market place. Actually, even where single posted prices exist the model fails to hold because people can and do shop around. The growth of ebay also shows that people can and do, even in the USA, haggle and state maximum bids and participate in iterative auctions. Thus, there seems to be a desire for a model of political economy to justify design practice but a lack of clarity over the relevant model. Is the CVM meant to be a market choice, a referendum vote, or some artificial hybrid, and, if it is a market choice then which model of the market should it represent and why?

One thing arising from this discussion is the potential for alternative institutional arrangements for articulating values (Vatn, 2005). In effect, economists have stumbled blind into the area of political science and deliberative democracy. Some have then pointed out the potential for monetary valuation to occur in various forms from straight CVM surveys to those involving variants on citizens' juries (see Niemeyer and Spash, 2001). Moving in this direction raises issues of how to handle individual versus group deliberation and the whole social and political context of environmental valuation (Spash, 2007). However, the aim of mainstream economists is not to engage in a debate over "deliberative monetary valuation", but rather to control the process so that studies limit their design to achieve conformity with expectations from a narrowly interpreted theory (Spash, 2008).

Design for conservative numbers: WTP versus WTA

The tendency of certain designs to consistently push the numbers in the same direction leads to the potential for manipulating outcomes through design choices. For example, Bateman et al (1999) cite the desire for "conservative numbers" (page 535) as the reason a UK government agency rejected their dichotomous choice results in favour of open-ended ones. A similar issue also arose during the conduct of the UK's largest ever CVM study (DETR, 1999), and will be discussed further below. The idea of design for conservative numbers comes from the NOAA panel. Their primary concern in this regard was the long-recognised potential for WTA formats to far exceed those from WTP (Knetsch and Sinden, 1984; Thayer, 1981).

Twenty years of empirical studies, including actual goods in experimental situations, have found people systematically value losses, measured by WTA, two to four times more than otherwise-commensurate gains, measured by WTP (Knetsch, 2005, page 96). Attempts at explaining the difference within a neoclassical economic framework have included income effects, strategic behaviour, and goods having imperfect substitutes (Hanemann, 1991; Shogren et al, 1994). However, these accounts fail where the conditions required by standard theory are violated (Knetsch, 2005), and cannot explain the large and consistent variations in CVM surveys. An alternative explanation is the psychological impact of 'ownership' of a good actually changing the demand function and indeed causing it to become kinked.⁽⁶⁾ This has been termed by economists an "endowment effect" (Thaler, 1980; Knetsch and Sinden, 1984), with the associated psychological explanation being loss aversion (Kahneman et al, 1991). Experimental results show large differences between people's valuations of gains and losses, and are inconsistent with economic-preference-order axioms of completeness, transitivity, and dominance. That is, economic analyses and predictions of consumer behaviour are largely based on theories inconsistent with actual choices (Knetsch, 1995).

⁽⁶⁾ The WTP–WTA divergence has also been given explanations relating to ethical motives. These include feelings of responsibility for harm, dissociation of entities or changes from the market place and trade-offs (ie that there is a legitimacy problem), and the activation of social norms [see the review by Brown and Gregory (1999)].

The NOAA Panel recommendation of exclusive WTP usage effectively removed this troublesome aspect of behavioural findings from further consideration.

Indeed, the argument has been put forward that WTP is a good substitute for WTA because it is less problematic, is preferred by business, and causes less protesting (Hanley and Shogren, 2005). In fact, the choice requires an implicit decision over the ruling property rights. The WTP framing assumes polluters, for example, have the right to use the environment for their own ends. This denies the fact that property rights may be contested so that the general public, as in the case of environmental damages, must assert their position. The determining factor is then the reference state which people associate with a given environmental change (Knetsch, 1994), and their feeling of psychological ownership rather than legal entitlements (Knetsch, 2005). However, under CVM these factors are predetermined by effectively killing all WTA messengers as a principle of design. For example, Hanley and Shogren (2005, pages 16–17) describe in successful terms the replacement of WTA by WTP in the UK aggregates study (DETR, 1999). The process involved a complaint by the industrial polluters against the WTA format, government back down to commission a new study, and the newly commissioned experts adopting WTP to produce ‘conservative’ numbers. A few points are missing from this account. In the expert discussions of design, Hanemann argued that people are unfamiliar with the WTA format, which seems strange given that every payment by a purchasing agent is matched by an acceptance of monetary compensation on the part of the selling agent—that is, every market transaction involves a simultaneous WTA and WTP. The design alone apparently proved inadequate at producing the stated desire for ‘conservative numbers’, perhaps due to the dichotomous-choice format. Thus, a 25% discount rate was used in the final analysis to substantially reduce the damage estimates (DETR, 1999).

The concept of ‘conservative design’ seems to be aimed at justifying some highly dubious practices and imposing general rules regardless of context. For example, there is no reason to expect WTP to diverge from WTA under the loss aversion theory if there is no aversion to loss—for example, when the person accepting payment is in the business of selling and that is indeed their purpose. Unfortunately, some then make the tortuous tautological argument that if only people were educated in the ways of the market and given the right incentives (carrots and sticks) then they would conform and produce the required results consistent with market theory (List, 2003). After all, “evidence exists suggesting that people can learn to act rationally” (Hanley and Shogren, 2005, page 29), and the problem is apparently that behaviour goes “unpunished by market discipline” (Shogren and Hayes, 1997, page 243). In contrast, researching compensation as a serious issue shows how people differentiate between types of exchange relationships and monetary framing removes the realms of justice and care (Claro, 2007). Monetary framing is then an implicit message to respondents, as to how the issue is expected to be treated, which will not be universally acceptable.

Informing and forming preferences

In environmental valuation, information has largely been discussed in terms of whether providing more information on an issue is likely to increase WTP. On the basis of microeconomic theory, respondents are assumed to have preformed preferences. The assumption is that objective information relevant to the valuation of an entity can be provided by the interviewer in different quantities with the aim of merely informing the respondent.

Consider then the problem of embedding or part–whole bias. Kahneman and Knetsch (1992), amongst others, have raised concerns about the extent to which the CVM claims to measure a value for a specified environmental change but in fact

proves insensitive to changes in scope or scale of that change. They attribute this to a moral motivation diverging from standard economic explanations.⁽⁷⁾ A widely cited example is that of Desvousges et al (1993) where WTP estimates to protect 2000 birds were not statistically different from those to protect ten times as many birds. A variation on this type of insensitivity is where the component parts of an individual's valuation, if assessed separately, are found to exceed the valuation placed upon the whole (Bateman et al, 1997). Carson et al (2001) believe design and information provision are to blame:

“Poorly executed survey design and administration procedures appear to be a primary cause of problems in studies not exhibiting sensitivity to scope. None of the commonly cited studies with scope insensitivity bears much resemblance to the current state-of-the-art CV surveys where respondents are presented with a substantial amount of information about the good they are asked to value in a manner which facilitates their comprehension of the material” (page 183).

The suggestion is that all such studies exhibiting embedding problems should be ignored (shoot the messenger) because information supply was somehow insubstantial and so failed to facilitate comprehension. As noted earlier, Hanemann (1994) has argued that under voting “prior experience or training are irrelevant” (page 29), which rather conflicts with the need noted above by Carson et al (2001) for “a substantial amount of information” to be taken onboard by respondents.

The NOAA panel recommended that the CVM aims for a level of information provision “at least as high as that which the average voter brings to a real referendum on the provision of a specific public good”, and use “follow-up questions” on understanding (Arrow et al, 1993, page 4607). Their guidelines state that:

“Adequate information must be provided to respondents about the environmental program that is offered. It must be defined in a way that is relevant to damage assessment” (page 4608).

However, the meaning of being ‘adequately’ informed with ‘relevant’ information is vague and the methods by which individuals assimilate and process information, and to what ends, is unexplained.

Addressing these issues would require attention to cognitive and social psychology, while opening up consumer preferences to question on grounds of motivation. That is, poorly informed bids are unequal to well-informed ones and may be motivated by a variety of undesirable factors as far as good judgment might be concerned (eg total disinterest, inattention, lack of engagement, malicious intent). Modern economics has closed down research on motivation, preferring to take preferences as sacrosanct. Indeed, economists conforming to orthodox political economy regard motivation as irrelevant.

“The answer from economic theory is very clear: it is utility whatever its source that matters for total value. Motives are essentially irrelevant from the perspective of economic theory (although policy makers may care) and acceptance of consumer sovereignty is one of the most enshrined principals [sic] of economics” (Carson et al, 2001, page 177).

For such economists, the mythically sovereign consumer can make choices on whatever grounds they like. Information provision then poses rather a major challenge.

⁽⁷⁾ The embedding and part–whole problems have also been linked to warm-glow giving because individuals then are regarded as deriving utility from the act of giving itself rather than from the consequences of that giving. There is also evidence from experimental work which argues that the embedding problem may be a symptom of a broader problem in economic theory rather than merely an issue for CVM surveys (see Bateman et al, 1997).

Survey design means bounding the information set in terms of the issues to be presented—their format and detail. Recognition that information must be selected and adapted to the survey design means the information issue is often conceptualised as a ‘framing’ problem (eg Boyle, 1989). A separation is then attempted between objective data and the way in which information is delivered. Changes in the former are expected to impact perceptions and valuations while if the latter do so this is regarded as a bias. Objective data are meant to describe the ‘commodity’ to be valued while the framing is merely the method of obtaining a WTP or WTA measure.

This division assumes environmental change can be defined ‘objectively’. Yet, even describing changes in common-market commodities can involve disagreements between different individuals over the condition of commodities, their qualities, and the definition of their attributes (Spash, 2002). A divergence between actual and perceived conditions then becomes harder to define and reliance falls upon subjective perception. The problem is compounded for complex environmental issues. The situation is one where the CVM practitioner has no practical anchor for accuracy and relies upon individual perceptions, which means value variations can reflect differences in perceptions of the hypothesised commodity (Cummings et al, 1986, pages 57–58), rather than objectively defined characteristics.

Munro and Hanley (1999) conclude that CVM practitioners face “major problems” which they describe in orthodox economic terms as determining “the optimal extent of information provision” and “what is ‘true and accurate’ information?” In a more worried tone they note:

“Putting responsibility onto the researcher for the supply of information creates ethical dilemmas. To the extent that subjects view interviews as unbiased sources, the possibility of altering the information set gives the unscrupulous researcher the opportunity to produce CV results which reflect the experimenter’s preferences rather than those of the respondents” (1999, page 277).

What these authors fail to notice is the extent to which totally scrupulous economists may just have a different world view from other people and may hence impose their personally preferred perspective on their respondents.

That economic analysts may conceive of issues in ways which diverge widely from those of respondents has been termed an issue of differential encoding and decoding by Burgess et al (2000). For example, environmental issues concern value conflicts and one of those relates to disagreements over the role of markets and how environmental issues should be addressed. Economists take as given that all things are commensurable and that trade-offs are normal, even if implicit. This contrasts to common evidence to the contrary (Aldred, 2002; 2006). So, for example, concerns over justice and rights can then conflict with the very assumptions behind survey design. Fairness has also been noted to be a common underlying concern of respondents (Jorgensen et al, 2001).

Response motives based upon such ‘moral’ perspectives have been described as a failure of the survey to engage with respondents (Ajzen et al, 1996). The argument goes that the motive to process information is determined by an individual’s ability to understand the issue and their perception of the personal relevance of the issue to them. If their motivation is high then they enter central processing mode and scrutinise and evaluate information with regard to the substance of the argument. A low motivation means that peripheral processing mode is entered and moods and subtle cues become determining factors in responses so that individuals are susceptible to stimulation of a moral perspective (Ajzen et al, 1996). Spash (2002) offers a different explanation and conceptual model where ethical beliefs, such as utilitarianism or rights, are likely to be key motivations. Along with environmental attitudes and social

norms, such ethical beliefs can feed into the reasoning over whether to make a monetary trade-off. Contrary to Ajzen et al (1996), evidence supports a model where those in central processing mode actually call upon ethical positions to value environmental changes (Spash, 2002; 2006). Interestingly then, CVM practitioners treat such noneconomic motivation as bias, and recommend censoring and removing what they designate as “ethical protesting” (Bateman et al, 2002, page 276; Hanley et al, 2001, page 451).

Extracting the desired message

The treatment of data can be regarded as comprising three stages which take place after data collection. In the first stage the raw data on bids are assigned to a particular ‘classification group’. In the second stage decisions are made as to how to treat particular classification groups—for example, removing or imputing values. In the third stage data is analysed with the possible testing of bid curves and calculation of aggregate results. The following sections concentrate on the first two stages and draw out implications of these for the third stage. Figure 1 provides a guide to the first-stage categorisation of CVM results to be described next.

Classification groups

The most common classification in treatment of CVM data is between positive and zero bids. This is a key distinction affecting the mean or median value. At first sight the distinction seems almost trivial and rather self-evident. However, the literature has developed from simply accepting all zeros as the same to questioning the validity of responses and how bids should be classified. This is extremely significant given the

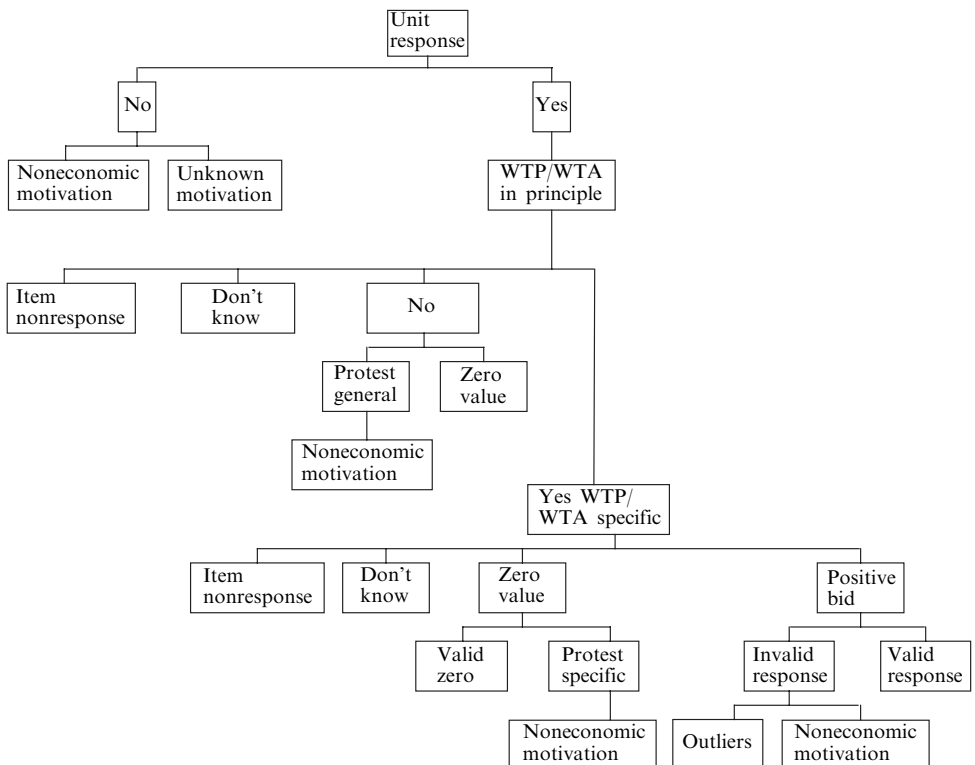


Figure 1. Possible response categories for contingent valuation method surveys.

large number of such bids, so that any outcome will be highly susceptible to classification and treatment decisions. Furthermore, positive or zero bids may also be reclassified into one another. As Hanemann (1994) explains, with respect to the use of follow-up questions, “This information can be exploited in the data analysis. One can monitor for the misunderstandings, measure statistically how they affected respondents’ willingness-to-pay, and adjust accordingly. For example, if a subject who voted ‘yes’ appeared to be valuing something different than the survey intended, this case can be dropped or the ‘yes’ converted to a ‘no’ ” (page 24).

A payment-in-principle question now often precedes the actual payment question creating a separate class of nonbidders—that is, those who have no apparent intention to pay at all. When the payment question is then asked, those bidding zero are a class who would pay-in-principle but not in this specific case. A zero bid may be further classified as a protest zero and may thus be assigned to a separate group. One reason for the payment in principle question would seem to be the desire to separate out potential protest bidders concerned about the idea of monetary valuation from those who find this particular circumstance (eg institutional setting) problematic. That is, two classes of protest bidder are then identified, the general and specific, as shown in figure 1.

A neglected distinction is worth making here in order to clarify nonresponse research. First, a class of refusals to participate in the hypothetical market can be classified as unit nonresponse. That is where a potential respondent refuses to take part in a survey. Such refusals give no information on the motives underlying responses to the hypothetical market. These refusals are assumed to be unrelated to the bid question because they occur prior to the market scenario or central content of the survey being introduced (this cannot be inferred for nonresponse postal surveys). Motives for unit nonresponse are likely to be general, such as lack of interest in the overall survey topic (Morton-Williams, 1993).

Second is item nonresponse where a respondent participates in the survey but refuses to answer a question. This is of particular interest when the payment question is left unanswered while other questions are filled in. There has been a tendency to refer to nonresponse without making such a difference clear. For example, Loomis (1987) fails to make any distinction when he is in fact referring specifically to unit nonresponse. In general, unit nonresponse has received more attention than item nonresponse with one measure of a survey’s success being the proportion of those sampled who responded. However, unit nonresponse is in fact unrelated to design or content if the survey has not even been administered to or, for postal surveys, has not been read by the respondent. In contrast, item nonresponse can provide insight into respondents’ motives and has implications for the estimation of the monetary values which will be associated with an environmental entity.

In order to investigate the motives behind bid item nonresponse clear categories of nonresponse are required. Unfortunately, most contingent valuation work tends to treat as identical refusing to bid (item nonresponse) with stating ‘don’t know’ with giving a zero bid. All are often regarded as zero bids and no separation of categories may even appear in the survey. The main exception is to classify some respondents as protestors.

Protest bids are zero bids given for reasons other than a zero value being placed on the environmental change in question. Yet the classification of protest bidding remains largely a matter for the analyst. For example, a respondent may refuse any amount of compensation for loss of an environmental entity which they regard as unique or which they feel should be protected at all costs. Respondents may refuse to state a WTP amount because they reject the survey’s implicit institutional approach to the problem,

or because they have an ethical objection to the language of trade-offs used to frame the issue. They may hold preferences which reject some types of trade-offs such as a lexicographic preference (see Spash, 1998; 2000b; Spash and Hanley, 1995). Whether an individual is classified as a protest bidder or as somebody who places no value on the environmental change in question depends upon the extent to which the analyst can be bothered to design and include follow-up questions and the way in which they separate out, using their own judgment, classes of valid from invalid responses.

Positive bids have been far more neglected in terms of subclassification despite the obvious requirement that these bids be real intentions. That a positive amount is given has seemed more acceptable and less pressing to explain than zero bids. One reason is the aim of the survey being to elicit a positive WTP/WTA measure, which means that a considerable number of zeros are seen as a problem whereas nonzero bids are desirable.⁽⁸⁾ Exxon funded work addressing the meaning of positive bids using verbal protocol analysis (Schkade and Payne, 1993; 1994) suggested multiple reasons underlying value formation. Construction of responses during the CVM process was then found to rely on grounds “other than trading off a change of wealth against a change in provision of an environmental good” (Schkade and Payne, 1994, page 103), although the sample size ($N = 105$) for this work was small. Vadjnal and O’Connor (1994) used follow-up questions to classify bid reasons. They found that 63% of respondents gave responses which indicated that the meaning of the values given was inconsistent with economic interpretations ($N = 240$). Debriefing interviews revealed five categories via content analysis. These referred to uniqueness, sense of place and personal memories, community value, aesthetic qualities beyond price, and protecting the environment.

Perhaps the most in-depth analysis of positive bids is that of Burgess, Clark, and Harrison who conducted discussion groups as follow-up procedures on an independently conducted CVM study (Burgess et al, 1998; 2000; Clark et al, 2000). They found respondents had problems in conceptualising the worth of the environmental change they had supposedly valued, they suffered part – whole problems, and expressed incommensurability with respect to values for ‘nature’. They take their results to indicate that the CVM is ineffective at capturing complex cultural values for nature and landscape. In addition, respondents would have preferred a forum for engaging in collective deliberation with scientists and others claiming responsibility for management of the local environment.

In a series of studies, I show how noneconomic motivation plays a key role in explaining WTP for environmental changes (Spash, 1997; 2000b; 2000c; 2002; 2006; Spash and Hanley, 1995). This includes analysis of positive bidders via follow-up questions on ethical beliefs, attitudes, and, more recently (Spash et al, 2008), social norms and perceived behavioural control. These studies have tended towards reasonably large samples ($N = 700$ to 1000) and have been conducted in different countries and contexts. The basic and consistent finding is that a large proportion of positive bidders claim motivations which are inconsistent with economic theory. That is, they specifically identify themselves with rights-based beliefs, explicitly rejecting consequentialist reasoning, and often express preferences consistent with lexicographic orderings. There are those respondents who also give reasons consistent with economic expectations but they seem to be in the order of only half the sample. The divergence in motivations means that, while some may regard their bids as a value in exchange for an environmental change, others may regard themselves as giving a charitable contribution,

⁽⁸⁾ Early researchers did apparently show some concern about positive bid motivation, largely because they could not explain the large remainder term in their results, until they conceived of the category of indirect use values (personal communication with Ralph C d’Arge).

making a political gesture, or supporting deeply held nonutilitarian ethical beliefs. The resulting bids cannot then be simply aggregated as equivalent measures of value.

Yet, despite the evidence for mixed motives underlying positive bids, the majority of CVM literature ignores any requirement to question the monetary values being produced. Positive bids are generally accepted at face value as trade prices. The only concern seems to be that they do not appear ‘too large’ relative to the mean bid, and that they seem ‘reasonable’ in light of the respondents’ income level. If respondents fail to meet these expectations they may be classified as ‘outliers’.

The outlier should not be confused with the protest bidder. These are individuals who bid large amounts and so have a strong influence on the sample mean bid. In economic terms, this should only be regarded as a problem when the bid is unlikely to occur because the individual lacks the income to pay or would actually accept a much lower amount than a stated WTA. In such cases the respondent would be regarded as acting strategically in order to influence the aggregate bid outcome. Economists tend to look actively for strategic behaviour and like to explain many varying motives as merely strategic. In practice, such strategic play in response to a short one-off survey is uncommon. For example, an extensive review of CVM studies in the health-care literature found no instances of strategic bias (Klose, 1999). Indeed, CVM practitioners often make reference to strategic behaviour without citing any empirical case studies and merely take its existence as given; instead, they talk of the implications and concentrate upon alternative ‘incentive compatible’ bid designs (eg Carson et al, 2001; Hanley and Shogren, 2005).

Treatment of classification groups

The recommended solution to unit nonresponse is to impute a value by weighting the sample. Some assume that unit nonresponse is a design issue but, having failed to achieve good design, the researcher can infer missing results.

“The best solution is to minimize nonresponse in the first place, by designing a data collection process which encourages high participation rates for all groups. This aside the researcher must rely on what she [sic] knows about the population and the sample, and on what she [sic] knows or can assume about the response process, in order to infer something about the characteristics of the non-respondents” (Hanemann and Kanninen, 1999, page 404).

If the nonrespondents are randomly spread throughout the population the sample results should be unaffected, but if they are correlated with factors which correlate with WTP/WTA then results will be affected. If, say, older males refuse to fill in the survey and these are random refusals within the group of older males, then a weighting may be employed. However, refusals seem unlikely to be random within either the general population or classes. Indeed, the key problem with unit nonresponse is a lack of data on the respondents and their motivations.

Item nonresponse has gained the most attention with respect to WTP questions, but can affect any other factor and often occurs for income questions. The sensitivity of questions is also highly culturally specific—for example, women revealing their age, and men admitting they have no education or cannot read and write. This means that condemning a survey as poor can be erroneous, because of, say, a low correlation of bids with income where income data are highly unreliable, because in some societies people never tell strangers their actual income. Where there is item nonresponse the result is self-evident in reduced sample size but perhaps more worrying and difficult to recognise is the giving of false information due to social norms—for example, women stating a lower than actual age, and people reducing their stated over actual income.

Bid item nonresponse is of particular concern due to the obvious potential impact on aggregated results (typically median bids are less than mean bids due to left-hand truncation of the distribution—that is, a large frequency of zero bids). Systematic differences between respondents and nonrespondents will bias aggregated WTP/WTA results. Hanemann and Kanninen (1999) again offer some less than helpful advice followed by strong warnings concerning their recommendation to impute values for nonrespondents:

“The only way to prevent this bias is to collect a complete sample at the start. Short of this, the most common practical remedy for item non-response is imputation Imputation is a dangerous art As indicated, the imputation procedure chosen is based upon the instincts of the survey researcher about the behaviour of non-respondents. The validity of the imputations is not verifiable unless actual responses are eventually obtained from non-respondents Unfortunately, in the case of non-response, the researcher is unable to verify assumptions” (pages 405–406). The use of the payment in principle question has been justified as avoiding “social-desirability bias” and ameliorating the implication that all respondents are expected to pay for a good thing (Green and Tunstall, 1999, page 244). This is seen by some as conforming to the ‘conservative’ design principles of the NOAA panel (Bateman et al, 1999, page 517)—that is, avoiding aspects which might increase the valuation of an environmental change. However, no work has been done on testing for differences between refusals in principle from zero bids. Analysts’ treatment of these classes varies depending upon the format of the CVM question. For open-ended questions the two categories may be lumped together on the assumption that they all represent zero bids, while conventional analyses of dichotomous choice omit refusal to pay in principle (Bateman et al, 1999).

The treatment of ‘protest bids’ is clearly problematic. Their omission from the mean calculation can be undertaken on a large scale. For example, Kenyon and Hanley (2005) conducted a stratified sample of nine towns’ results in 336 responses to their CVM survey; of these, 29% were classified as protest bids and were removed from the dataset and any further analysis. Even more dramatically, Meyerhoff (2005) excluded 56% of his CVM sample as protestors on the basis of follow-up questions “because they do not represent true economic values” (page 56). Less draconian reduction of the sample can still bias results, for example, the 8–12% used across samples by Desvouges et al (1993). Jorgensen et al (1999) state that:

“From a psychometric viewpoint, the exclusion of responses necessary to meet such assumptions creates serious concerns about the lack of theoretical validity of the CV method. One must feel suspicious of a methodology if, before or after questioning, rules are made for omitting responses” (page 137).

They note the problematic practice of removing protest zeros while leaving identically motivated positive bids. Jorgensen and Syme (2000) point out that where protest responses are a reaction to the act of paying they are unlikely to be removed by changing CVM survey design. They go on to show evidence for protests being related to WTP, via attitudes, and to demographic factors such as income. They note that standard censoring of protest responses in their study would bias the sample towards those favouring environmental public goods and with higher incomes.

Treatment of outliers is also of concern due to lack of motivational research and thus inadequate justification behind extreme bids being regarded as unwarranted and then censored. However, the lack of evidence and motivational research has not prevented truncation of bid distributions on the basis of a randomly selected distance from the mean or some percentage of bid relative to income. For example, Schkade and Payne (1994, page 96) screened their nonzero WTP responses for outliers and were

happy that there were none on the basis that no respondent was prepared to pay more than 25% of their income—that is, paying up to a quarter of one's income for one environmental change seemed reasonable to them. Boyle et al (1996) used the same exclusion threshold plus any amount equal to or greater than US\$10 000 plus regression diagnostics. The choice of these threshold criteria is totally arbitrary.

Informal procedures and inconsistency

Desvousges et al (1987) note that “using largely informal procedures, analysts have screened contingent valuation data sets to eliminate protest bids and to identify/delete influential observations” (page 252) and later that “Nearly all analyses of contingent valuation surveys have used some judgmental procedure to eliminate some bids from the full sample of responses” (page 255). Boyle et al (1996) state that “most contingent valuation studies employing open-ended questions generally do some censoring of response data by removing protest zeros, trimming high observations and statistically searching for outliers” (page 386). Indeed, leading practitioners are found to recommend various data-censoring practices but mostly with highly arbitrary justifications. As Boyle and Bergstrom (1999) note: “The fundamental concern remains; no established theoretical or established protocols exist for excluding responses” (page 198).

Thus, there are a wide range of potential practices from which the analyst can choose.

As part of a ‘best practice standard’, Mitchell and Carson (1989) suggest that in evaluating a CVM study the reviewer should ask the following questions:

“What procedures were used to identify and handle outliers and protest responses?

Is sufficient information provided about the cases dropped to permit a judgement about the validity of the procedure?” (page 302).

Unfortunately, defining the meaning of ‘sufficient information’ has remained problematic. For example, the suggestion of Hanemann (cited in Schkade and Payne, 1994) is:

“that respondents should be debriefed after they have valued a good to identify different motives. The researcher would then consider dropping those people who have the ‘wrong motives’ from the sample” (page 106).

What exactly constitutes a ‘wrong motive’ is left unspecified.

Detailing the way in which data have been treated and deleted should allow an independent reviewer to obtain identical results after following the procedure described, given the same dataset prior to manipulation. However, the provision of such detail is extremely rare, and several inconsistencies in current practice can be identified which affect the reliability and validity of results. More specifically, there appear to be three main inconsistencies underlying current data-manipulation practice: varying the type and extent of manipulation, using different classification systems for the same bids, and employing inconsistent motive rationales to determine data treatment.

The first inconsistency arises when one analyst (analyst A) simply engages in data manipulation to a greater or lesser extent than another (analyst B). Analyst A might choose to avoid data manipulation completely while analyst B applied both removal and imputation of responses; or analyst A might choose to impute for item nonresponse and to remove outliers while analyst B chooses to impute for item nonresponse but to keep outliers. Such differences in practice are important because, for example, outliers may be defined as comprising from less than 10% to over 50% of the bids, depending on the information content of the contingent market and whether the bid format is WTP or WTA (Edwards and Anderson, 1987). Obviously, the variation in potential results from the same data will be large.

Second, an individual bid can be classified in more than one way. That is, the same bid can potentially be placed into one of several classifications. Inconsistency will then arise due to the differential treatment of bid groups during the analysis of data.

Outliers, for example, may be defined as being a different standard deviation from the mean by different analysts. Thus, a bid may be regarded either as an outlier, and removed, or as a valid bid. Another example is bid classification as a protest zero. One practice is to treat the protest zero as a final classification group and then to remove bids in that group from the analysis (Freeman, 1986; Hanley, 1989). However, Mitchell and Carson (1989, page 268) further classify protest zeros as item nonresponse, together with ‘don’t knows’, ‘refusals’, and responses that fail to meet a standard of minimal consistency. Some researchers would then impute positive values for item nonresponse while others may treat them as zero bids. Thus, the same response by an individual may either be removed from analysis (under the first classification scheme) or have some value attributed to it by the analyst (under the second approach).

The third inconsistency concerns differences in the rationale underlying the classification of bids. The problem here relates back to the lack of explicit conceptualisation as to what makes a valid bid or protest. For example, Hanemann (1994) is happy to use debriefing questions to

“identify whether subjects were inattentive or unfocussed and offered hasty or ill-considered responses, and these can be discarded if desired” (page 28).

However, a few sentences later he criticises others for rejecting CVM survey results that are failing to reflect economic preferences and asks the key questions:

“But, what are ‘true economic preference’? If a subject responds thoughtfully to a question about voting to raise taxes for a public good, by what criterion is that not a valid preference?” (page 28).

Similarly, Carson and Groves (2007) talk much of truthful preferences and express a belief in a “true WTP” in order to justify incentive compatible design. This is defined as follows:

“question formats are incentive compatible, in the sense that a truthful response to the actual question asked constitutes an optimal strategy for the agent” (page 184).

So there is then an assumption that respondents go around optimising things and conform to the economists’ model of human psychology, otherwise they will presumably show the wrong motives and be classified as ‘untruthful’ and ‘irrational’. Yet the authors themselves seem to be at least slightly aware of the blinkered vision of humanity this offers. As Carson and Groves (2007) seem to lament in a later remark,

“there are norms that seem to totally or partially override considerations of rationality/self-interest, which is why many individuals would return a lost wallet” (page 205).

Presumably an orthodox economist would not, so beware!

There has been a slowly increasing awareness of the importance of psychological processes relating to how respondents interpret survey questions and relating to their decision-making processes leading to a stated bid value (Spash, 2006). This has meant realising that social psychology regards preferences of the sort being addressed in the CVM survey as constructed. Orthodox economists conducting CVM studies claim their only concern is whether preferences are stable regardless of how they are reached. However, as has been shown, they are still ready to reject respondents’ stated preferences on the basis that they have the ‘wrong motives’ or appear inadequately ‘thoughtful’, and spend much time concerned with getting ‘truthful preferences’ using incentive-compatible designs. There is then a contradiction within the mainstream economic position of claiming no concern for personal motivation in how individuals rank, make orderings, or maximise welfare (eg Becker, 1993, page 386) and the practice found in the design and conduct of CVM surveys, where motivation is central to classification and analysis of data.

Conclusions

Economists need to start becoming far more realistic as to how decisions are reached both at the individual and societal levels. In conducting and reflecting upon this review of economic practice in contingent valuation of the environment, over the last quarter century, the role of a restricted world view on the part of the expert analysts becomes self-evident. Orthodox economists have become evangelical in their eagerness to convert all to their specific market model of political economy. However, markets may be totally inappropriate methods of social organisation with respect to many environmental issues and their management. Thus, to find respondents rejecting an approach which imposes hypothetical market trading is hardly surprising. What may be more surprising are the attempts by economists to explain away empirical evidence and to develop technical guidelines to remove fundamental methodological issues. Thus, for example, rejection of WTA formats is a rather blatant attempt to avoid issues concerning compensation, property rights, ethics, and loss aversion.

Existing research reveals an interesting array of information about individuals' attitudes and beliefs, which often challenges the economic analysts' narrow psychological model. This is particularly problematic for orthodox economists who find respondents expressing concerns which contradict their theoretical preconceptions. Thus, attention has been paid to the protest zero bidders because they diminish the democratic credibility of the process. An explanation that they are acting 'strategically' is theoretically convenient. Less easy to explain and given far less attention are the contradictory motives of positive bidders. Once having admitted that motives are important to determining whether a respondent's bid is 'valid' and how it should be 'treated', the door is opened to a range of questions from cognitive psychology to applied philosophy. The classification of large proportions of respondents as acting outside the model of economically rational behaviour is one result. However, rather than seeing this as data to be 'lost', this 'irrational' behaviour is some of the most interesting in terms of insights into what motivates individuals.

The implications run on two levels. While CVM practitioners seem ready to accept some data classification and analysis on a motivational basis, there is no consensus as to the grounds for doing so. There are concerns as to how economic analysts should treat data which they manipulate and a pretence that all preferences are equal due to consumer sovereignty. The danger is that wide variations in practice, without clear explanation and sensitivity analysis, will continue to allow results to be changed by many orders of magnitude. More fundamentally, even with a standard approach to data treatment and open explanation, the message from respondents is that current economic theory is an incorrect interpretation of their behaviour. Thus, expanding upon the economic interpretation to include a wider range of motives to act is required.

There is then a fundamental methodological divergence between the approach of CVM practitioners who try to find evidence in support of their a priori model in the neoclassical economic tradition, and those who allow the data to inform them as to the possible variety of human motivation and behaviour. If there is a future for the CVM, and stated preference methods in general, then this lies in developing empirical investigation into plural environmental values. In contrast, much existing CVM work appears to be an exercise in producing the one 'true' price given by 'true' preferences.

Orthodox economic assumptions of how humans operate as rational fully informed utility-maximising agents with well-formed preferences confront a reality of fallible complex social beings with plural values and mixed motives. Rather than pay attention to these motives as they impact upon respondents' stated WTP and WTA, the contention of this paper is that many CVM economists have engaged themselves in the design

of an institutional process to make respondents conform to a narrow behavioural and market model. This means removing protestors, classifying people as strategic players, ignoring nonutilitarian ethics, using sticks and carrots under 'incentive compatible' design, and generally manipulating data and approaches to get the desired results. Those results are increasingly in danger of becoming the production of an acceptable number which supports predetermined goals for a funding agent or government agency. Breaking the cycle is necessary if economists are ever going to join those attempting to offer insights into the relationship between human well-being and the environment.

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