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**CONTINGENT VALUATION:
A QUESTION OF VALIDITY**

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1. Introduction.

Since the early work of Davis (1963), Hammock and Brown (1974) and others, the Contingent Valuation Method (CV) has been used to estimate the economic value of a wide range of public and quasi-private goods. However despite a great deal of research, the technique remains controversial, with the accuracy of the associated estimates of total economic value (TEV) still being largely unknown.

The purpose of this paper is to reflect on the evolving state-of-the art in CV practice worldwide, and address the question of what constitutes a valid CV response. The paper proceeds as follows. Section 2 identifies several different candidate objectives of CV, and considers how different CV formats rate against each of these objectives. Section 3 briefly considers how CV fares with respect to principles of ecological sustainability, and contrasts CV with some alternate methods of providing input regarding environmental values to decision-makers. Section 4 discusses what the author believes to be the major impediment to successful application of CV in this country, namely the identification of a payment vehicle that is plausible at a national level. Some conclusions are finally drawn.

2. What are we trying to measure?

Mitchell and Carson (1989) define the *validity* of a measure as the "degree to which it measures the theoretical construct under investigation...In the CV context the theoretical construct is the maximum amount of money the respondents would actually pay for the public good if the appropriate market for that public good existed" (Mitchell and Carson, 1989, p190)². In considering the CV-relevant notion of validity, several possibilities arise, each relating to a different purpose of CV. These may be defined as follows:

² Psychologists and other social scientists often refer to specific types of validity. *Content validity* (or face validity), for example, involves the degree to which a measure reflects the construct of interest. That is, does it measure what it is intended to measure? In contrast, *construct validity* involves the degree to which the measure relates to other measures as predicted by theory (Mitchell and Carson, 1989). The term *theoretical validity* is used to refer to construct validity that involves looking at the relationships among measures of *different* constructs (e.g. WTP, price, income).

Market validity - Does the technique provide the basis for an unbiased estimate of WTP for the difference $q_1 - q_0$ in environmental services, as would be reflected by market purchases, if a market actually existed for these services? It is assumed here that this implies a voluntary market. Advertising would be needed to raise product awareness, and actual payments would depend crucially on the ease with which payments are to be made (Blamey 1994, 1995).

CBA Valuation Validity - Does the technique provide the basis for an unbiased estimate of TTV for the difference $q_1 - q_0$ in environmental services, as required for the purposes of CBA? Compulsory payments and provision of information may be justified here by appealing to merit good type arguments.

Program Valuation Validity - Does the technique provide an unbiased estimate of the value the public attaches (or would attach given the same information) to a given government policy or program? Similar to CBA valuation validity, but not just interested in $q_1 - q_0$, but also any other attributes of the program, including those pertaining to opportunity costs and the means by which the program is to be implemented.

Electoral Validity - Does the technique provide an unbiased estimate of the proportion of voters who would actually vote for the issue (good, policy or program) in question, were a referendum actually to be held? Information supplied to respondents would need to align as closely as possible to that which they would be exposed to in the build up to the actual election.

The past decade has seen a general movement away from the use of open-ended CV questions and voluntary trust fund formats, in favour of closed-ended questions and referendum formats. Instead of asking 'What is the maximum amount of money you would volunteer to obtain the environmental improvement $q_1 - q_0$?', the preferred format

now involves asking whether or not the individual would vote yes or no at a referendum in which it were proposed to provide the specified environmental services at an additional cost of \$c to each (adult) individual. Blamey et al (1995) argue that referenda C/V formats prime 'citizen voter' responses which involve a departure from the type of response that is sought for the purpose of CBA valuation validity.¹ Blamey (1995) argues that likely characteristics of C/V results that are more consistent with a voter interpretation than the desired 'consumer' interpretation include:

- (i) Respondents taking into account the opportunity costs associated with preservation;
- (ii) Respondents subordinating private interests such as use and option values in favour of collective interests;
- (iii) Respondents taking a range of procedural justice notions into account, when the object is to estimate the outcome-related notion of TEV², and
- (iv) Respondents sometimes having preferences of a seemingly lexicographic nature, motivated by either deontological ethics, rules of thumb or other decision rules and heuristics, sometimes coupled with the rational desire to express one's preferences and values. Section 4 discusses some of the latter possibilities in further detail.

It is also noted that the tendency to use median rather than mean estimates of WTP is more consistent with a voting interpretation of results than a CBA valuation interpretation. What constitutes a valid C/V question depends of course on what the purpose of CV is perceived to be. Consider how different CV formats perform against each of the above notions of validity. Table 1 summarises the findings. A first point to

¹ Blamey (1995) argues that 'citizens responses' might be distinguished from 'consumer responses' according to several dimensions, each of which presents a continuum of possibilities.

² Although this concern is weakened by the observation that behaviour is always contextual, and procedures constitute part of this context, a problem still remains when the procedures are an artifact of the CV scenario, and bear little resemblance to reality. Further, imagine a case in which responses are determined almost entirely by procedural concerns. Suppose that only 10 per-cent of the motive for each individual's response relates to the magnitude of context-free TEV. Would this constitute a useful C/V response, in terms of a consumer surplus TEV interpretation if covariates such as price were statistically significant? In dichotomous choice scenarios, procedural concerns tend to result in upward biases when manifested in the form of hypothetical (payment vehicle) biases, and downward biases when manifested in the form of protest responses. It can be argued that procedural concerns always involve a hypothetical or protest element. It is well known that these can present problems in CV studies.

note is that market validity is unlikely to ever be satisfied, the only exception being cases where ease of payment in the actual market is extremely high, as in small scale 'simulated-market' laboratory studies involving low priced goods of an essentially private nature. In the context of current state of the art CV practice, where political market models are employed, the notion of market validity is irrelevant.

Now consider CBA valuation validity. Only the trust fund and the first of the referendum formats are consistent here. Problems arise, however, when individuals bring their pre-existing beliefs and attitudes to the valuation situation, and the survey instrument does not result in the moulding required for a consumer surplus, TEV interpretation of results. Opportunity costs of preservation are likely to be an important influence in motivating an individual's response, for example. The trust fund format will be particularly prone to strategic and protest responses. Both formats require the identification and removal of protest and lexicographic responses. The more assumptions one is prepared to make, for example regarding the effective removal of protest and lexicographic responses, and the influence of beliefs concerning the opportunity costs of preservation, the more results can be interpreted as valid, in a consumer surplus TEV sense. The extent to which these assumptions are themselves valid is often difficult to ascertain. Some practitioners may prefer to avoid or minimise such assumptions, and employ an alternate, more valid design and / or interpretation of results.

Although program valuation validity is potentially satisfied for, or consistent with the use of, all but the second CV formats listed in Table 1, only one is likely to be viable in the usual valuation sense: the trust fund format is unlikely to be perceived as an appropriate social choice mechanism, and the redirection of public expenditure format does not provide the sort of valuation information that economists typically look for. The latter may however provide a useful alternate input to decision-making, and has the advantage of greatest content validity, as argued below. Use of the third CV format to obtain results that have program valuation validity requires the identification and

removal of protest and lexicographic responses, and the public to be convinced that additional taxes (or some variant thereof) are realistic, if true valuations are sought. In Australia, this presents a substantial challenge. This is discussed in Section 4.

Table 1. Validity of Various CV Question Formats.

Question format	Market Validity	CBA Valuation Validity	Program Valuation Validity	Electoral Validity
Voluntary Trust Fund	Consistent format, unlikely vast majority would actually get around to making the promised purchase (See above discussion regarding ease of payment) Would require question to be perceived to have no hidden motive such as environmental valuation Use mean WTP (or median as underestimate)	Consistent format; several 'citizen' considerations cause problems and protests, outliers and lexicographic responses must be removed.	Consistent format if voluntary market approach desired. Information regarding Opportunity costs to be supplied. Unlikely to be believed or seen as appropriate social choice mechanism. Some 'citizen' considerations cause problems. Protests, outliers and lexicographic responses to be removed	Inconsistent. Voluntary trust fund has little resemblance to a referendum
Referendum: additional tax, information focussing on environmental good	Inconsistent format	Consistent format, but some 'citizen' considerations cause problems (eg jobs, procedural notions) Protests, outliers and lexicographic responses must be removed.	Inconsistent format-information biased in favour of preservation outcome Protests, outliers and lexicographic responses to be removed.	Inconsistent format-in reality, individuals would take jobs into account, and build up to referendum would expose individuals to the pro-development case.
Referendum: additional tax, information balanced with respect to environmental good and opportunity costs.	Inconsistent format	Inconsistent format-unwanted reference to opportunity costs. Citizen considerations cause problems. Protests, outliers and lexicographic responses must be removed.	Consistent format-additional tax would have to be believed. Protests, outliers and lexicographic responses to be removed.	Consistent format-only informal votes need be removed.
Referendum: redirection of public expenditure, information balanced.	Inconsistent format.	Inconsistent format.	Consistent if willingness to redirect expenditure is considered an acceptable measure of value. Protests, outliers and lexicographic responses to be removed.	Consistent. Only informal votes need be removed.

Now consider the notion of electoral validity. Primary concern here lies not with the estimation of TEV or WTP, but rather with estimation of the proportion of voters who would actually vote for the program in question. An important distinction arises between the type of response that is consistent with electoral validity, and that which is consistent with program valuation validity. This is that the domain of acceptable motivations is significantly greater in the case of the former. This is because in reality, individuals actually vote in a variety of ways, and as long as a vote is not informal it is valid. This means that protest responses, outliers and lexicographic responses pose little or no threat to electoral validity. Censoring could be justified when responses reflect a failure of individuals to believe certain aspects of the scenario. This is because if an actual referendum was to be held, respondents would presumably believe that implementation of an additional tax would actually occur if the majority voted for it. Lindsey (1994) has observed that private and political market CV formats suggest different procedures for handling protest and outlier responses. In a CV study involving the control of storm water entering Chesapeake Bay, he found (p124) that:

Almost half (47%) explained their zero bids by responding that there is 'too much waste in government' or that they are 'opposed to all new taxes'...These responses ...provide no information about the true valuation nature of storm-water programs, but they do provide information about preferences for more government programs. Treatment of these as protest zeroes may be acceptable if the conceptual model is a private market. If the model is a referendum, however, there is little justification for censoring them.

Having undertaken further analysis regarding the sensitivity of WTP estimates to various methods and levels of censoring, Lindsey (1994, p127) concludes that "the analyst's frame of reference or conceptual model for analysis may dictate use of procedures that, when implemented, significantly affect estimates of WTP" (see also Jorgensen and Syme, 1995).

As Table 1 indicates, the last two referendum formats are the most consistent with electoral validity. When considered in conjunction with the fact that electoral validity requires the least attention paid to protest responses and outliers, it would appear that electoral validity is the notion of validity most applicable to the elicitation of citizen-voter preferences. It is important to note, however, that although electoral validity may represent the most realistic objective of valuation type questions, it is not a sufficient condition for CBA valuation validity. This means that achieving electoral validity may be little cause for celebration by the cost-benefit-analyst. Results may, for example, contain a high proportion of symbolic or value-expressive responses (Blamey and Common 1995), and still be valid from a true political market perspective⁵.

It appears that in contrast to writers such as Hanemann (1994,p33) who support the view that "decisions about what people value should be left up to them", motivations *do* matter in CV studies. This applies not only with respect to the objects of valuation, for example altruism toward *loggers*, but also the type of preference that is being expressed (eg absolutist, value-expressive, protest or other procedural). Unlike Hanemann (1994), Broome (1992) acknowledges that specific economic techniques require additional assumptions about human behaviour. Although motivations may matter little when one is exploring movements along a demand curve, for example the increase in demand for sausages associated with a 5% price fall in sausages, motivations are important when attempting to use CV to estimate TEV for inclusion in CBA. It is only when electoral validity is the objective, that motivations behind CV responses may matter little. Unfortunately, CBA valuation validity is likely to present a more elusive criterion.

⁵ This is not to say that value-expressive responses are a desirable feature of electoral preferences. The question of what constitutes a desirable vote is not considered here. The deliberation involved in the formation of voting preferences is not necessarily higher than in markets, even though the former may involve greater attention to ethical matters. According to Converse's (1964, 1970) Black and White model of political attitudes, individuals do not have coherent or stable preferences about major political issues. This model can be contrast with others such as Inglehart's (1990) Latent Attitude Model, which claims that practically everyone has relatively stable underlying preferences that shape their responses to important political questions, but that any given survey question measures those preferences imperfectly.

Electoral validity is consistent with an alternate interpretation and use of CV results, which may provide a most useful input to decision-making, but which does not seek to estimate consumer surplus, instead treating the exercise as a sophisticated opinion poll, yielding pseudo-referendum information. Bid values could be selected to reflect different estimates of the actual opportunity costs of preservation. Individuals have to ask themselves whether preservation is worth at least this much. The question would not down play the jobs at stake or other economic benefits associated with development. No attempt would be made to estimate mean or median WTP. Rather, individuals would be asked to vote on the actual costs at stake, preferably reduced to the individual level, when this is likely to prove plausible to respondents. In other cases, questions could be framed in terms of a reallocation of public expenditure. Several 'bid' values could be employed, corresponding to high, low and best estimates of the expected costs of preservation. In the case of a study employing a tax increase payment vehicle, results would be presented in a table such as the following.

		Estimate of Preservation (Opportunity) Cost [*]		
		Minimum (\$10/yr)	Most Likely (\$15/yr)	Maximum (\$20/yr)
Environmental Impact Scenario	High Impact	55%	45%	40%
	Low Impact	45%	40%	35%

^{**} entries refer to percentage of respondents favouring preservation.

Although not providing estimates of WTP for inclusion within CBA, this procedure would ultimately not be that different, in terms of the information it provides to decision-makers. Interpretation of results would be in terms of the degree of public support for or against the project in question, when individuals are aware of the development benefits actually at stake. This may, in fact, be a most useful way to provide information to the political process. Again, in comparison to the first approach, at least we have a better idea of what we are getting. Results are not used to estimate the value of just a small subset of program attributes, but rather the whole program, as it is actually proposed.

Identifying appropriate social choice mechanisms ultimately requires subjective assessments. Whether one thinks a questionnaire involving a redirection of public expenditure question with an objective of electoral validity provides a better aid to decision-making than an additional tax referendum question with information focussing on the environmental amenity, and an objective of CBA valuation validity, depends in part on one's methodological precommitments.

3. Sustainability and CV

Motivations behind CV responses can also be important from a sustainability perspective, and a commitment to ecological sustainability may have important implications for how one designs and interprets CV studies. Surprisingly, however, references to sustainability in the major CV journals are few and far between. Some of the implications for CV, of a commitment to principles of ecological sustainability, are briefly considered in this section. The discussion is structured around some of the key principles of sustainability.

Holistic ~~Systemic~~ Approach to Decision-Making

From a sustainability perspective, it is important that decisions be based on a holistic and systemic approach to decision-making. This raises concerns regarding the appropriateness of single-issue valuation exercises, since providing respondents with information pertaining to only one environmental issue has the effect of raising the individual's awareness of that issue, and hence relative WTP, compared to other issues. From a sustainability perspective, one might expect the relative values attached to two different environmental goods to reflect their relative service value to society, and not the order in which (hypothetical) payments occur.

Rather than targeting a single issue and directing WTP in favour of this issue at the expense of other issues (which the individual may be unaware of), a better balance of information, and one that would appear to rest better with sustainability considerations, is to target a range of key environmental or sustainability issues that are on government agendas.

This is consistent with the framework of Hoehn and Randall (1987) which advocates the adoption of that level of embedding which is relevant to the policy-agenda of the time. Although this appears to be the majority stance of environmental economists on the matter, few instances exist where it has been used to justify multiple levels of embedding (top-down disaggregation structures). Rather, it appears that single-issue valuations are typically justified on the grounds of being highest on a particular government department's policy agenda. Although the policy referendum model of Hoehn and Randall (1987) may provide the best guidance available with respect to choice of embedding level, and maximising face-validity, it is not clear that it tends to be properly operationalised. Rather than equating policy-relevant with funding-relevant for a particular government department, a more appropriate definition of policy in the environment sphere is government policy relating to the environment, or ecologically sustainability. One might thus argue that the appropriate definition of the composite good involves all environmental issues currently on government agendas, whether or not they have CV funding, and irrespective of which government department they are of interest to⁶. In practice, identifying the appropriate embedding design will be even more complex, since different levels of government will have to be considered, and some ambiguity may exist regarding what constitutes a policy. Blamey (1994) presents a hypothetical disaggregation structure that could have been used around the time of the Kakadu and Fraser Island CV studies.

⁶ In the context of a CV study involving forestry operations on Fraser Island, Australia, Blamey (1994, p178-79) asks "Is it fair to say that because Fraser Island was the most controversial and topical issue on the Queensland Government's environmental agenda at the time of the Fraser Island CV study, it is satisfactory for preservation values of the Island to be evaluated alone? Or should all of the nation's major environmental issues be embedded together, irrespective of which government and which department thereof is responsible for researching the issue? A further question is should environmental problems that are not currently on government decision making agendas necessarily be excluded...? These are important questions since the answers may influence WTP estimates by a significant magnitude."

Although disaggregation structures appear to align more closely with sustainability principles, problems tend to arise in identifying partitions in the valuation tree that satisfy economic requirements of weak separability. Ecological interdependencies can cause goods in different branches to be substitutes in the production of environmental services, and psychological factors (including attitude expressive and warm glow desires) can result in substitution in consumption. The anticipation of separability problems should not exclude the possibility of disaggregation structures, however, since the benefits from a more appropriate initial framing of the CV question may outweigh the loss in accuracy arising from separability violations. Extensive preliminary investigations may be required to minimise such violations.

A paradox arises when the sustainability 'validity' of single-issue valuation structures is considered. Although such structures are likely to involve the dumping of good cause budgets on a single good at the expense of other environmental goods, such dumping tends to maximise the estimated value of the valuation good and hence the likelihood of a pro-environmental outcome⁷. The common single-issue focus of CV questions may thus result in *sustainability by default*. In a typically large population where individuals are unlikely to ever be presented with more than one (or possibly two) CV questionnaires, good cause dumping will result in maximal WTP⁸. Because payment vehicles in CV questionnaires are typically hypothetical, respondents to any one questionnaire will be unaware of any past or future CV related payment commitments, and as a result, will tend to dump on whatever cause with which they are presented. WTP estimates are consequently very high, with the implication that most developments would be stopped on the basis of a CV-inclusive CBA. The consistency of warm glow good-cause motivations with a sustainability perspective has received less attention in the literature than one might have thought⁹.

Information and Deliberation

Common and Perrings (1992) argue that the pursuit of ecological sustainability may require overriding consumer sovereignty. A concern with the informational and deliberative aspects of consumer choice is common among ecological economists and others committed to sustainability. Norton (1986), for example, argues that species are to be valued not simply on the basis of consumer preferences, but in greater recognition of the processes which support them and humans, which are poorly understood. Sagoff (1988) argues that consumer sovereignty must be rejected unless more informed and

⁷ One does not have to dump the whole of one's environmental budget or good cause budget, but rather more than one would have 'dumped' on broader reflection regarding other environmental issues.

⁸ Even if individuals were sampled again for a second CV study, they would probably know that the payments implied in the previous questionnaires had not come about.

⁹ Rather, discussions appear to have been dominated by a concern with the consistency of such motivations with economic theory.

deliberated citizen preferences can be obtained, although he does not suggest how such preferences might best be elicited.

If we are willing to sacrifice representativeness, and select a small sample of individuals for special education and guidance, more informed and deliberated preferences would almost certainly be forthcoming. In contrast to the elicitation of isolated individual preferences, an alternate approach is to use small groups, and emphasise reasoning and deliberation in a communicative manner, as alluded to by Sagoff (1988). Burgess et al (1988) have used small groups to explore environmental values, observing that "People talking to one another in their own words, in their own ways, give much needed insight into a range of contemporary problems" (p324). Conversations set off other thoughts and exchanges, and participants come to take factors into account that they would have otherwise overlooked. When different stake-holders are present in the same group, each becomes more aware about the perspectives others are coming from, and mere familiarity can lead to cooperation or concessions. Indeed, learning and subsequent concessions and changes in values and preferences are crucially important if consensus is to be achieved.

Jacobs (1995) argues that the context of isolated valuations is not an appropriate way for respondents to understand and consider the ethical and public good nature of environmental problems. Rather, individuals "need to engage in *argument*, not valuation" (p7). A theory of *deliberative democracy* is advocated, in which "democratic public decision-making involves public debate, rather than the utilitarian aggregation of individual preferences" (p7). In the tradition of Habermas (1984), Jacobs (1995, p8) argues that a "shared communicative rationality should underpin the debating process". It is argued that such a process involves more than just the provision of extra information. Rather, the:

means by which information is conveyed.. affects the way it is received and judged, and the valuations that result. Indeed, one can say that it is processed *better* through live argument than through private reading. If this were not the case, one might ask why juries in trials are sent into the jury room to debate the evidence they have heard, and not simply asked to vote [perhaps in a secret ballot] immediately after all the evidence has been presented (p9).

Jacobs suggests that appropriate institutions for assisting social choice include focus group C/V studies, and 'citizen juries', the latter potentially involving paid jurors, the calling of witnesses and requests for further information, and which may take several weeks to complete. Although not committed to a deontological framework, such procedures would appear to have much in common with those that Sagoff (1988) would advocate. Although representativeness is clearly sacrificed when small groups are employed, over several replications one might expect some degree of convergence in group findings.

As with decision making based on expert panels, this approach clearly has certain advantages. The disadvantage, of course, is that it less democratic. Environmental decisions involve subjective assessments and some individual or group of individuals will always have to take the responsibility for such assessments. Taking them out of the hands of the public at large and into the hands of a select few is not *necessarily* going to result in decisions that better reflect the principles of sustainability.

Risk-Aversion and Intergenerational Equity

Blamey (1994, p 182) notes that "alternate methods to CV will not necessarily be more risk averse to catastrophic consequences associated with 'wrong' environmental decisions than CV itself, for which environmental values are [typically] elicited from an increasingly environmentally aware and risk-averse public". Indeed, one might suspect that in developed countries, individuals tend to respond to ignorance and uncertainty with a significant degree of risk-aversion. Estimates of WTP are, for example, typically high in relation to the switching value at which pro-development outcomes are suggested (ie. the per-capita equivalent of the expected net present value of the proposed development)¹⁰. A further point is that the non-decisiveness of CV responses may result in preferences that are dominated by ethical considerations (Brennan and Lomasky, 1994). Because individuals tend to have greater contact with natural areas and children, than timber mills, timber workers and loggers, altruism may be more likely to take the form of preserving the environment for current and future generations, than maintaining employment opportunities for those employed in the timber industry. High WTP estimates follow. Intragenerational equity becomes increasingly problematic as bid values become greater ^{than} at the true cost of preservation, ^{Actual} ~~however~~, costs are unlikely to be sufficiently large to present major inequity.

¹⁰ To some extent, this will be a consequence of the single-issue approach to valuation, as discussed above.

It appears that, in some respects, CV may not be as bad from a sustainability perspective as some might think. It at least provides some form of democratic safeguard that tends to suggest risk-averse outcomes. The burden is on CV researchers to ensure that survey instruments do as good a job as possible of conveying to respondents important inter-relationships involving economic and/or ecological systems. It is conceivable that the outcomes suggested on the basis of CV inclusive CBA's may actually be consistent with a safe minimum standard approach, or a decision rule in which natural areas are protected unless the opportunity costs are unacceptably high. Importantly, however, *there is no guarantee that this will occur*. Further discussion of CV and sustainability is clearly required.

4. The Australian Validity Challenge

The discussion in this section moves on from questions concerning the appropriateness of CV, and different constructs to be measured in CV studies, to consider what is arguably the major impediment to the successful use of CV in Australia, particularly when national samples are involved. It is assumed here that a compatible combination of CV format and validity criterion has been selected, this being a dichotomous-choice referendum CV question with an objective of program valuation validity. The major biases in this case are likely to involve strategic and hypothetical biases, and in particular, the occurrence of what I will refer to as *seemingly* lexicographic preferences. By this I mean responses that appear to be price insensitive (see, for example, Bennett and Carter, 1993, Blamey, 1995).

There are several reasons why a proportion of respondents might respond in a price-insensitive fashion in a CV question. One explanation is that such respondents failed to read or understand the information supplied in the questionnaire pertaining to the payment vehicle. Another is that respondents read and understood the payment information, but for some reason adopted a non-compensatory decision rule based on an unwillingness to trade off ethical (environmental) principles. A further explanation, and the one of concern here, is that respondents read and understood the payment

information supplied in the scenario, but for some reason discounted its importance. Of relevance here are strategic and hypothetical biases. A useful framework for considering these biases is the model of decisiveness and attitude-expression presented by Blamey (1994) and Blamey and Common (1995).

4.1 Decisiveness Model of Attitude Expression

The basic argument is that respondents will often gain utility from the act of expressing their environmental attitudes and values, which when coupled with a perceived non-decisiveness of questionnaire responses, can result in upward biases in CV derived estimates of value.

Let h^i represent i 's perceived probability that i will be decisive within the results of the referendum CV question, let s^i represent the respondent's perceived probability of the survey result being decisive, and let $h^{i*} = h^i s^i$. The individual may have a general pro-environment or pro-development attitude, or orientation, expression of either of which generates returns, L_A^i and L_B^i . With B representing the higher level of environmental quality, i will vote for B over A if

$$h^{i*} \cdot O_A^i + L_A^i \leq h^{i*} \cdot (O_B^i - c) + L_B^i \quad (1)$$

where O_B^i is the net instrumental return from B . In the survey, choosing B costs \$ c , whereas A carries no cost. To simplify matters, assume O_A^i to be equal to zero¹¹, and write (1) as

$$-h^{i*} \cdot (O_B^i - c) \leq L_B^i - L_A^i \quad (2)$$

An important assumption of this model, as described by Blamey and Common (1995), is that O_B^i and c are discounted at the same rate. The model may, however, be broadened to allow for divergences among the decisiveness parameters for different types of

¹¹ This assumption is clearly unrealistic in the case of a program valuation CV study, but has little effect on the arguments made here.

outcomes. An example of such divergences is found in situations of strategic and implementation biases, which have been much discussed in the literature (see Mitchell and Carson, 1989). If individuals do not believe that the particular payment vehicle will be implemented, it is rational for them to simply express their preference, ignoring the bid value, and responding in a seemingly lexicographic manner. In the case of strategic bias, the payment vehicle may itself be believed, but the fact that it will necessarily cost the individual \$c is not. This is of course most likely to occur in voluntary payment formats which are not incentive compatible.

Individuals with pro-environment value orientation may be particularly likely to assess how realistic the payment vehicle is, since they have the most to gain by identifying a weakness. Indeed, cognitive dissonance (Festinger, 1957) may cause individuals to modify their beliefs regarding the decisiveness parameters. The implication is that *even if individuals would normally have no reason to think they are non-decisive*, they may modify beliefs in this direction. The drive to reduce dissonance may, for example, cause respondents to become more pessimistic about the likelihood that funds will be earmarked for environmental protection. Alternatively, respondents might adopt the belief that 'the government never listens to us anyway'. The desire to express attitudes may also cause some individuals to skip over payment information altogether. The point is that when environmental issues are the subject of considerable controversy, and public emotions (and potentially knowledge levels) are running high, convincing individuals that a payment vehicle is realistic, when in fact it may not be, may present a formidable, if not impossible, challenge. Here may lie a root of the apparent difficulties associated with the implementation of CV in countries such as Australia, where payment vehicles such as tax increases and trust funds are less believable than in countries such as the United States.

The value-expressive/decisiveness discounting model can be broadened to incorporate decisiveness and other parameters pertaining to implementation of payment, by

redefining the respondent's choice problem, such that a vote for Option B is favoured when:

$$NL_{B-A}^i \geq h^{i*} \cdot (EP - O_B^i) \quad (3)$$

where NL_{B-A}^i represents the net expressive returns associated with a vote in favour of B, EP represents the individual's expected payment associated with a pro-B outcome, and h^{i*} and O_B^i are as previously defined. Now $EP = f(p^{impl}, c, AP)$, which in the linear case reduces to $EP = p^{impl} \cdot (c - AP)$, and s^i can be redefined as $s^i = g(r, p^{impl}, c)$, where the following definitions apply:

r is an indicator of the perceived relative influence of the results of the CV question in the overall decision making process concerning A and B. This not only picks up non-decisiveness when instruments are perceived to have a genuine role in the decision-making process, but also non-decisiveness arising from any perceived implausibility of the scenario, such as would be the case if the survey is seen to be conducted solely for academic purposes. One can define the parameter r^1 as the perceived probability that the results of the survey are to have a real input to the policy decision, and the parameter r^2 as the perceived probability that the survey results will be decisive, conditional on $r^1 = 1$. We can then say that $r = b(r^1, r^2)$ which in some cases will reduce to $r = r^1 \cdot r^2$.

p^{impl} is the perceived probability that the payment vehicle would be implemented in the event of a decision favouring option B. In the case of a referendum format, this most commonly involves the likelihood that tax increases would actually be implemented¹². p^{impl} will be a function of the bid value (\$c), since implausible bid values can cause respondents to question the plausibility of the payment vehicle as a whole. As far as bid values are concerned, we would expect p^{impl} to be maximised when \$c is in the vicinity

¹² In the case of voluntary trust fund formats, p^{impl} may have to be redefined so as to take account of the fact that the trust fund is part of the decision making process, and not simply a means of collecting payment once a decision has been made in favour of option b.

of the true costs of preservation. Bid values that grossly exceed such costs are likely to be most problematical. The parameter s will thus also be a function of $\$c$.

AP is the proportion of $\$c$ that the individual expects he or she would avoid paying if the payment vehicle was to be implemented. In cases where the individual perceives that she can pay all ($\$c$) or nothing ($\0), this amounts to $p^{\text{avoid}} \cdot c$, where p^{avoid} is the perceived probability of avoidance. It is important to note that, depending on the object of valuation, there is commonly no payment vehicle that can be expected to impact all voters equally. Higher prices for wood products, for example, will impact those planning to build a house more than those who are not. The results of Bennett and Carter (1993) and Blamey (1995) indicate that respondents readily discount such a payment vehicle. Higher prices for petroleum products will have greater impact on individuals with oil heating and less fuel efficient vehicles than other individuals. Those without a vehicle, and without oil heating, can thus be expected to think that such costs will impact them less than the average. Increases in income taxes will impact those who are employed more than those who are unemployed, and increases in property taxes may affect house owners more than renters, unless all renters assume that such taxes will be immediately passed on to tenants.

It is not argued that all individuals will respond in accordance with the above decisiveness model. In reality, costs of strategising, acting immorally, or acting in contradiction to one's perceived civic duty, will reduce the extent to which individuals follow the model. The point remains, however, that decisiveness discounting will, in general, lead to upward biases in estimated WTP¹³. An examination of (3) illustrates how such biases can quickly arise when EP drops below $\$c$.

4.2 Empirical Evidence Regarding Payment Beliefs

Some empirical evidence pertaining to the plausibility of alternate payment vehicles in Australian CV studies is now considered. In order to investigate beliefs regarding the

¹³ Blamey and Common (1995) discuss the direction of the bias in more detail.

plausibility and perceived appropriateness of various payment vehicles in the context of Australian CV studies. Blamey (1995) included a series of questions in the 'Australian Forest Attitudes Survey'¹⁴ (AFAS). In order to gain insight into perceptions of who should pay for environmental management, a series of items were included in the AFAS survey, preceded by the following lead-in statement:

When decisions are made to protect the environment, who do you think should pay the associated costs. Please indicate the extent to which you agree or disagree with each of the following statements.

Table 2: Procedural Beliefs Relating to Payment Responsibility

Statement	Response (cell entries-row %)					N
	S Agree	Agree	Neither A or D	Disagree	S Disagree	
1 Where possible, those who visit wilderness areas should pay for the management of such areas through entrance fees	20.1	45.9	13.7	16.1	4.2	1648
2 Those who think conservation is important should pay most of the associated costs	4.4	12.3	24.5	46.8	12.0	1622
3 The cost of managing wilderness areas should be shared amongst all taxpayers	23.8	50.5	14.0	8.8	2.8	1640
4 The cost of compensating loggers for jobs lost when areas are preserved should be shared amongst all taxpayers	10.5	29.1	23.7	26.8	9.8	1625
5 The cost of cleaning up and rehabilitating the environment should be shared amongst all taxpayers	15.0	39.0	18.6	21.3	6.2	1626
6 The cost of cleaning up and rehabilitating the environment should be paid for by industry and consumers of the products being produced	28.9	47.5	16.2	6.3	1.0	1625
7 As a consumer of products such as paper, plastics and wood, I am in part responsible for some environmental impacts	18.1	63.6	13.2	3.9	1.2	1632
8 I am prepared to bear some of the costs of cleaning up and rehabilitating forests or waterways damaged by logging	10.7	38.0	25.3	19.0	6.9	1622
9 I am prepared to bear some of the costs of	10.7	45.1	25.4	14.2	4.7	1621

¹⁴ This involved a mail questionnaire sent to a stratified random sample of 3500 adult Australians registered on the Australian electoral roll. Non-respondents to the initial mailing were sent a reminder card, and non-respondents to this mailing were sent another copy of the questionnaire. The final response rate was 48 per-cent.

managing conservation reserves						
10 I am prepared to bear some of the costs of compensating loggers for jobs lost due to preservation decisions	45	22.3	25.9	32.5	33.8	1625

Results are presented above in Table 2. Results for the first item indicate that the majority of respondents (66 percent) are in favour of entrance-fees to national parks and other wilderness areas, when those fees are used to cover the costs of managing such areas.

Results for the second item in Table 2 indicate that the majority of respondents do not agree that most of the costs of conservation should be borne by those who think that conservation is important. Rather, and as indicated by the results to the third item, the costs associated with managing conservation areas should be *shared* amongst *all* taxpayers. Approximately three-quarters of respondents agreed with this notion of shared responsibility, a result that is consistent with those reported by Harris and Brown (1992).

The results for item 4 indicate that although respondents are generally willing to share the costs associated with managing conservation reserves, they are less willing to share costs associated with compensating loggers. With respect to the latter, respondents are fairly evenly divided in their attitudes, with 40 percent agreeing that such costs should be shared, and 37 percent disagreeing. Presumably, some respondents are not very sympathetic with the problems loggers face in the event of preservation outcomes.

Items 5 and 6 are concerned with who should bear the costs of cleaning up and rehabilitating the environment. Note that we are dealing here with areas that have already been degraded, in contrast to those that are currently preserved but under threat. As such, this is perhaps more relevant to ex post compensation than ex ante decision-making involving CBA. This change in the status quo has implications for who should pay the costs of environmental improvement. Results for item 6 indicate that 76.4 percent of respondents agree that the cost of cleaning up and rehabilitating the

environment should be paid for by industry and consumers of the products being produced. In other words, those responsible for environmental degradation should pay for rehabilitation. In cases where this is not possible, the results for item 5 indicate that the majority of respondents are prepared to share the costs.

Items 7 to 10 relate to personal acceptance of responsibility for both the cause of environmental problems and the treatment of such problems through payment. Responses to item 7 indicate that the majority of respondents (82 percent) agree that as consumers, they are in part responsible for some environmental problems. Item 8 results indicate that 49 percent of respondents are prepared to bear some of the costs of cleaning up and rehabilitating forests or waterways damaged by logging, and 26 percent disagree with such a notion. As expected on the basis of results for items 4 and 5, individuals are more willing to bear the costs of managing conservation areas than the costs of rehabilitating degraded environments. Individuals are even less willing to bear some of the costs associated with compensating loggers for jobs lost due to preservation decisions, with more respondents objecting to this notion than agreeing with it (46.3 percent compared with 27.8).

The results in Table 2 clearly have relevance to the type of market model and payment vehicle best suited to Australian CV studies. A referendum format will, *ceteris paribus*, be less objectionable than a voluntary trust fund format. This is consistent with the result that individuals think that conservation costs should be shared amongst all taxpayers, rather than paid for only by those who think conservation is important. Although most individuals are prepared to share management costs, they are less prepared to pay for the costs of compensating loggers, and indeed, more disagree with this idea than agree.

At this stage it might be concluded that, subject to contextual variations, a satisfactory (Australian) CV study might involve a referendum format with a tax-increase payment vehicle, and the tax revenue being ear-marked to cover management costs. The fact that

a majority may be willing to share such costs with other taxpayers does not, however, mean that *additional* taxes would be supported, since respondents may see *redirection* of current tax revenue as a more appropriate arrangement.

A further question was included within the AFAS questionnaire to shed light on precisely this possibility. The question, and the quite striking results, are presented below:

Protecting the environment can involve costs in a number of ways (management of parks, compensation to individuals previously having a right to the land, restoration costs etc.) Which is the most reasonable position for politicians to advocate? You may circle two numbers if you like.

Additional protection of the environment
through additional tax increases 17.4%

Additional protection of the environment
through redirecting taxes from other areas 62.3%

Protect the environment as well as
we can without additional expenditure 49.4%

Reduce expenditure on environmental preservation 3.0%

Percentages refer to the percentage of the entire sample of 1680 individuals who indicated each payment mechanism to be among the one or two most appropriate of those listed. Importantly, only 17.4 percent of respondents indicated that tax increases are among the most appropriate ways of paying for conservation costs. In contrast, 62.3 percent saw tax redirections as a most appropriate way of providing such funds, and 49.4 percent thought that no additional funds should be required. Presumably, current expenditure could be put to better use. It thus appears that although individuals are willing to share management costs with other taxpayers, this refers to the use of current tax revenues, and does not apply to the possibility of tax increases. This is a cause for

considerable concern, since for the purposes of CV, as typically practiced, a tax increase is the only viable tax payment vehicle. On the other hand, these results suggest that questions involving public sector expenditure re-allocation, as discussed in Section 2, may have promise.

5. Conclusions

The question of what is it that we are trying to measure with CV questionnaires was discussed in Sections 2 and 3. It is argued that recent developments in the state-of-the-art CV practice have involved a shifting of the target, the consequences of which have not fully been addressed in the literature. Similarly, there has been little discussion in the literature of how CV relates to principles of sustainability. It is hoped that this paper might facilitate further discussion of such matters.

Section 4 of the paper involves a discussion of what the author believes to be the major impediment to successful application of CV in Australia, namely identification of a plausible payment vehicle that satisfies the requirements of CV. Payment vehicles involving tax increases are seen by Australians as far less appropriate than redirections of public expenditure. This strengthens the case for more 'citizen' orientated questions such as that suggested in Section 2. The requirements of economic theory as it relates to CV are in direct conflict with the need to maximise the validity of the results.

The empirical evidence cited in Section 4 relates mainly to evaluative attitudes; that is, attitudes regarding the appropriateness of different procedures. Although one would expect a correlation between cognitive and evaluative beliefs in this context, the above discussion would have benefited from a consideration of both types of measures. We need to measure beliefs regarding how individuals think payment *would* be made, not just how it *should* be made. Further research is clearly required into the plausibility and appropriateness of different payment vehicles in different contexts, involving different environmental goods, in different regions, with associated variations in the beliefs, attitudes and values of the populations in question.

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