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PROSPECTS FOR CONTINGENT VALUATION: LESSONS FROM THE SOUTH-EAST FORESTS¹

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The Contingent Valuation Method (CVM) has been strongly criticised in Australia following two prominent applications. The aims in this paper are to review these criticisms and to demonstrate how, through an application of the method, these potential problems were addressed. The results of the application — a valuation of the conservation benefits of the National Estate forests of south-eastern Australia — are presented. A key feature of the application was the use of focus group testing in the questionnaire design phase. Finally, an assessment is made of the future prospects for the use of the CVM in Australia.

Background

The development of techniques specifically designed to measure in dollar terms, non-marketed environmental benefits and costs, is proceeding. Most notable of these techniques is the contingent valuation method (CVM). Overseas, CVM has been applied extensively. This is particularly true in the USA (see Mitchell and Carson, 1989) and is quickly becoming the case in Europe (see Navrud, 1992) but not in Australia. In Australia, the technique achieved a level of prominence in its application to two highly controversial resource use decisions — the mining of Coronation Hill and the logging of forests on Fraser Island. The Resource Assessment Commission (RAC) undertook a major CVM study of the environmental costs of mining at Coronation Hill in the conservation zone adjacent to Kakadu National Park (Imber, Stevenson and Wilks, 1991). However, the results of that study appeared to have little impact on the eventual decision-making

¹ The authors acknowledge the assistance of the Resource Assessment Commission (RAC) in funding the research reported here. The views contained here are those of the authors and not necessarily those of the RAC. The comments provided by two anonymous referees are also acknowledged. Any errors remaining in the paper are the authors' responsibility.

process. It is not clear whether this apparent relegation was due to the prominence achieved by other costs of mining, notably the disruption to the culture of the Jawoyn people, or to the mistrust that the decision-makers held for the estimates of the costs of environmental damage which were generated using contingent valuation. Hundloe, McDonald, Blamey, Wilson and Carter (1990) used CVM to value the environmental benefits that would result from the banning of logging on Fraser Island. Their results were presented to the Fraser Island Commission of Inquiry and used in Bennett's (1991) economic analysis of alternative management options for the Island. It seems fair to conclude that, again, the results of the CVM study appeared to have been given a low weighting in the decision eventually taken by the Queensland Government to ban logging. However, it is difficult to determine whether perceived shortcomings of the technique played a role in the relegation of its results.

Sinden (1991) does not regard this lack of policy application as an indication of failure. Rather he argues that CVM has 'gone unrewarded for providing both substantial improvements in information and true values . . . the information demonstrates who benefits, exposes fallacious arguments about zero and infinite values and indicates the relative size of some benefits' (p. 16). Furthermore, he concludes that the challenge facing the CVM in Australia today is in 'interpretation, not estimation' (p. 18). Certainly there is a wide misunderstanding of the nature of the estimates from CVM. To some extent, this has arisen because of the way in which the Coronation Hill results were presented both to policy makers and the general public. The contingent nature of the estimates was not highlighted: indeed the estimate provided was given as the value of environmental damage resulting from mining. Clearly, no matter how sophisticated the econometric analysis of CVM data, the values derived are still a function of the situation at hand when the survey was conducted and the design of the survey instrument used. This is a fact which can easily be ignored by both practitioners and policy-makers in their search for a single, numerical solution to what are often difficult choices. Hence, Sinden commends CVM studies for providing order of magnitude estimates and he argues that policy-makers be convinced that this is useful information.

This task is not impossible, but it is not as simple as just convincing policy-makers to accept estimates from CVM as estimates of orders of magnitude. The reception given to the results from the Coronation Hill and Fraser Island studies suggested that the policy-makers were not convinced that these CVM studies generated estimates of a reasonable order of magnitude. The benefit-cost equation for Coronation Hill was \$82m mining benefit and \$5876m environmental cost. A strikingly similar equation was obtained by the analysis of forestry on Fraser Island. Neither the RAC Commissioners nor the members of the Fraser Island Commission of Inquiry could believe that such contentious issues, where each side had fought so closely for their particular

interests, could be characterised by benefit-cost ratios which were so decisive. Doubt was cast on the CVM estimates by critics, including the lobbyists supporting the development options. The criticisms levelled were readily accepted by the policy advisors and decision makers as a source for what they saw to be 'unrealistic' benefit-cost ratios.

The Basis of Criticism

The critics of the CVM in the Coronation Hill case — notably ABARE (1991), Moran (1991) and Brunton (1991) — have used arguments which have been sufficiently strong to give rise to significant doubts in the minds of policy advisors and decision makers despite the specific rebuttal prepared by Carson (1991). In the broadest of fashions, the major criticisms can be grouped under four headings: communication aspects, embedding effects, strategic bias and validation. This is not to say that only these criticisms were aired. Broader questions about people's ability and willingness to ascribe money values to non-marketed goods have also been raised (see ABARE, 1991, Quiggin, 1991, and Blamey and Common 1993).

It is not the aim in this paper to address these broader issues specifically; however, it is conceivable that they are linked with difficulties associated with communication aspects of CVM questionnaires. Whether respondents realise it or not, there is almost inevitably a trade-off of some sort in the provision of non-market goods and services. Communicating this trade-off to respondents, and discovering whether they are willing to accept it, is a critical aspect of CVM.

Communication Aspects

In any survey-based research tool the task of effectively communicating with respondents is faced. In the case of the CVM, the questionnaire must be designed to ensure that respondents understand the hypothetical circumstances upon which the valuation question is based. This is far from a trivial exercise and can place a limit on the applicability of the method. Both the Coronation Hill and Fraser Island studies were criticised on the grounds that respondents made their willingness-to-pay bids for goods which were very different from those intended for valuation by the researchers. For Coronation Hill, the critics' hypothesis was that respondents believed they were paying to preserve the whole of Kakadu National Park, not just the small area to be mined which lay outside the Park boundaries. Likewise, in the Fraser Island study, it was suggested that the preservation of the whole island, not just the environmental cost of logging was valued.

These criticisms find their basis in Simon's (1957) notion of bounded rationality; that is, people will behave rationally but only within the bounds of their level of understanding. It is crucial for practitioners of CVM to explore these boundaries thoroughly.

Embedding Effects

Kahneman and Knetsch (1992) brought into focus the prospect of CVM estimates being dependent on whether the good is evaluated on its own or as part of a more inclusive category. This so-called embedding effect is also referred to as whole-part bias or the framing effect and was a chief element of the criticisms directed at the RAC Coronation Hill study. Hence, it was argued that the Coronation Hill estimates were in fact the value of a far wider environmental good.

Smith (1992), in a comment on the Kahneman and Knetsch research, basically proposed that the effect demonstrated is one which should be expected by economists. The value of a good is dependent on the range of substitute and complementary goods available. Hence a CVM questionnaire which presents to respondents a whole array of goods and then seeks to value one, will necessarily give rise to different values than another CVM questionnaire which presents only the good being valued.

The implication of this is that the practitioners of CVM need to be aware of the 'commodity range' of goods respondents usually consider to be related to that which is being valued. That is, the context of the good must be appropriate. Again, this is no simple matter.

Strategic Bias

A long-standing concern regarding the accuracy of CVM estimates arises because of the potential for respondents to bias their answers to willingness-to-pay questions in an attempt to affect the outcome of the decision making process. Critics suggest that because there is no collection of real money, respondents who are 'pro-environment' will exaggerate their bids for environmental preservation so long as they believe that the survey will actually have an impact on policy or outcomes. So fundamental is this possibility, so easy is it for policy advisors and makers to understand, and so unconvincing (evidently) are the attempts of practitioners to defuse the criticism, that the 'funny money' argument has been a particularly strong limitation to CVM.

Practitioners of CVM have not been able to devise a satisfactory mechanism for overcoming strategic bias; just as no practical means of overcoming free-rider behaviour has been developed by public finance economists. The impetus for the development of a counter-free-rider mechanism provided by Groves and Ledyard (1977) and Smith (1980) has apparently waned for want of practicality. Hence, the debate over strategic bias has become one of degree and empirical evidence: whilst the incentive to behave strategically to CVM questions is undeniably present, the debate centres on whether respondents register the incentive and act upon it. CVM has developed along the lines of disguising the incentive for bias and relying on empirical evidence to show that estimates are accurate. The verification process is dealt with further in the following section, but first the effectiveness of the disguise of the bias incentive needs some further mention.

One way of attempting to disguise the strategic bias incentive is the use of the dichotomous choice version of the CVM. Rather than asking directly for a respondent's willingness to pay, in the dichotomous choice model a respondent is asked about their willingness-to-pay a pre-specified amount for the good in question. It also argued that this choice is easier for respondents to make than the conventional CVM willingness-to-pay decision. Clearly, the incentive to behave strategically is still present under the dichotomous choice model: an ardent environmentalist when asked if she or he is willing to pay a pre-specified amount for the preservation of an endangered species is still dealing with 'funny money' when answering 'yes'. However, it is hypothesised that the dichotomous choice model disguises this incentive by not requiring the specification by the respondent of an actual dollar value. The process of bidding is effectively taken one step away from the 'funny money'. The incentive may be even more disguised if the dichotomous choice is phrased in terms of a referendum type question: would you vote 'yes' to a proposal to preserve an endangered species if it were to cost you a pre-specified dollar sum. There are however some serious potential problems raised by the use of the dichotomous choice model. Firstly, there is a danger that the willingness-to-pay choice becomes trivialised by the simplicity of the question. Alternatively, the more the question is disguised, the greater is the potential for the pre-specified threshold value posed to a respondent to become lost in the other information presented.

There are other trade-offs involved in the use of the dichotomous choice model. The method requires a much larger sample size and hence is more expensive to implement. The econometric analyses required are more complex and time consuming to perform. For these analyses to be complete, the range of threshold values presented to respondents must be very carefully delineated to cover the range of possible willingness-to-pay bids. It is also possible that the threshold values chosen can create a particular form of starting point bias.

Validation

Without any specific anti-strategic bias mechanism, CVM has had to rely on validation exercises to 'prove' its ability to provide accurate estimates. In the USA there have been many studies designed to validate CVM estimates (see Mitchell and Carson 1989). In addition, states such as California frequently hold referenda that involve voting for or against higher taxes for schools, roads, parks, etc. Criticisms, including those raised in the context of the Australian debate, have been discussed at great depth and have been found to be not insurmountable. The so-called Arrow-Solow panel, established specifically by the US National Oceanic and Atmospheric Administration to pass judgement on CVM as a valuation technique for use in litigation, has found that when used in appropriate situations and with carefully designed surveys, CVM can provide reliable and relevant information

(see Arrow, Solow, Portney, Leamer, Radner and Schuman, 1993). In the Australian context the validation studies and theoretical defences of CVM appear to have carried little, if any, weight. There appears to be an implication that the limits of CVM are different in the Australian context to those evident at least in the USA.

The reasons for this are difficult to explain. Perhaps they are due to a unique Australian cynicism, or perhaps a comparative unfamiliarity of Australians with the type of questioning which CVM involves. For instance, Americans would appear to be much more familiar with the notion of paying for environmental goods than Australians. In twenty-two states of the USA Income Tax assessment forms include a question which asks tax payers if they are willing to pay an additional (voluntary) tax to be used for State Park projects. However, it remains the case that CVM has been used and defended successfully in countries such as Sweden where there is probably even less familiarity in the public mind with the user-pays principle and a greater ethic of public access than exists in Australia.²

Valuing Forest Conservation

With this backdrop of criticism, the RAC initiated its second CVM study. The RAC Forest and Timber Inquiry required an estimate of the conservation values of the areas of forests in south-east New South Wales and East Gippsland, Victoria, that had been listed by the Australian Heritage Commission as part of the Register of the National Estate. This study was to provide information relevant to potential decisions regarding the future of these forests in addition to providing the financial assessment of the wood and wood products from the areas that had been carried out by the RAC's Research Branch (Streeting and Hamilton, 1991). Both these studies were undertaken as demonstrations of techniques potentially suitable for use in extended cost-benefit analysis.

The questionnaire developed as the vehicle for the forest CVM was designed to give consideration to the criticism levelled at previous CVM studies. The design features developed can be considered under the same classifications used in the previous section.

Communication Aspects

The originally specified tasks of the forestry CVM study were to estimate the value of the National Estate forests in an unlogged state and to measure the environmental costs associated with a range of alternative silvicultural practices. The goal was to gain an understanding of the relationship between the intensity of logging activity and conservation values. The approach taken to these tasks was to design two questionnaires: the first to establish respondents'

² We are grateful to one of the anonymous referees for this observation.

willingness-to-pay for the conservation of the National Estate forests, and the second to measure respondents' willingness-to-pay for the introduction of a modified, lower impact silvicultural regime instead of the standard logging operation.

The basic format of each questionnaire involved the specification of two futures for forest management. The standard forestry management regime was common to both, the first using a conservation alternative and the second, a low impact silvicultural regime.

For the questionnaires to be effective, it was important that these scenarios be understood clearly by respondents. To ensure this, the RAC commissioned Reark Research Pty Ltd (Reark, 1991) to conduct a sequence of focus group sessions using drafts of the questionnaires. Focus group testing of questionnaires is a widely accepted technique in market research. It involves groups of eight to ten individuals, selected to create socio-economically representative groups, being exposed to a questionnaire and discussing, in depth, their reactions. A trained moderator directs the discussion and ensures that dominant individuals do not prevail. The principal role of a focus group is to ensure that the communication aims of the study are being met. The discussion of the questionnaire enables respondents' perceptions of the material presented to be drawn out and inconsistencies established. Focus groups have been used consistently in the USA as a component of CVM studies, while in Australia questionnaire pre-testing using individuals has been the established practice. The primary short-coming of this type of pre-testing is the inability to provide the detailed analysis of respondents' understanding that is important in the design of a questionnaire using CVM.

The focus group process is expensive, but when considered in terms of the overall cost of a CVM project, and the potential error in the estimations derived, it is cost-effective. For this project a series of eight focus groups were conducted on individuals drawn from the Sydney metropolitan area. A major result of the focus group testing was that no matter how 'simply' the low impact silvicultural regime information could be expressed in the questionnaire, the inherent complexity of the issues involved defied the comprehension of the majority of respondents. The decision was made to abort the use of the CVM in the assessment of alternative silvicultural regimes and to concentrate on the more polar case of standard logging versus conservation. The latter was shown in the focus group tests to be more readily understood.

In this way, the limits of the CVM were assessed. It is apparent that certain policy decisions involve complexities which are beyond the comprehension of most respondents. In a similar way, some decisions involve outcomes which are beyond the range of experience of most respondents. This unfamiliarity can also form a major limitation to the use of CVM. It is unlikely, for instance, that the CVM will play much of a role in estimating the value of the environmental consequences of

the greenhouse effect or the diminution of the ozone layer. Its prospects are much stronger in the context of decisions regarding the reservation of an area of local bush for a park or the control of effluents into a local stream. Recognition of this type of limitation is not new. Cummings, Brookshire and Shultze (1986) included respondent familiarity as one of their Reference Operating Conditions — a set of guidelines they devised to ensure relative accuracy of CVM estimates. However, CVM may be also applicable in the context of areas of national significance. For example, many Australians would have specific opinions and be able to assign values for the Great Barrier Reef, Ayers Rock (Uluru), Franklin River (SW Tasmania) and Fraser Island. An assessment of the appropriateness of CVM to any particular case could be undertaken at the focus group stage of the project. It is also likely that the areas attracting most attention and, hence, most likely to be candidates for CVM assessment, will continue to be areas of national or State significance such as Kakadu and various areas of native forest.

A feature of CVM is that the results obtained from its application are contingent upon the information provided to respondents. It is often the case in the application of CVM that respondents' knowledge of the issues involved is increased. Hence the respondents become an unrepresentative sample of the population. This is certainly a factor which must be recognized in the use of values generated by studies using the CVM for policy purposes.

Embedding Effects

In the focus group testing and during a pre-test of the questionnaire some experimentation was undertaken to establish the 'commodity range' of forest conservation. This involved the use of framing statements — statements in the questionnaire which provide a context for the willingness-to-pay question.

The first statement used in this experimental process was designed so that respondents would consider the prospect of future payments necessary to achieve other, environmentally related goals, such as carbon taxes, effluent disposal charges and higher food prices resulting from restrictions to agricultural practices. The response to this statement was completely counter intuitive. Whilst it was expected that bringing goods which were pre-supposed to be substitutes for forest conservation in a person's 'environment budget' to the attention of respondents would drive willingness-to-pay bids down, the reverse effect was observed. De-briefing of respondents showed that the framing statement increased the salience of general environmental concerns and the CVM question was seized upon by respondents as a vehicle to express their new found concerns. Iterations to the questionnaire were used to modify the framing strategy. Further testing of alternative framing statements led to the inclusion of a single sentence:

'There may also be other forests in Australia that you may wish to pay further money to have conserved'.

The success of this framing strategy is difficult to assess in a statistically rigorous fashion as the presence of embedding was not tested in the results of the questionnaire. The strategy did appear, however, to have the desired effect when tested in the focus groups.

Strategic Bias

The approach taken to the prospect of strategic bias was to provide respondents with a willingness-to-pay context which was as realistic and as individually relevant as possible. The dichotomous choice version of CVM was used in the form of a referendum question: respondents were asked to choose between two alternative forest futures where one of those futures, the conservation option, was associated with additional expenditure. Thus respondents were informed that if they chose the conservation option, they would incur additional expenses in the form of higher prices for timber products such as house frames and paper, and higher taxes. The payment mode was expanded to include higher prices as well as the more conventional tax vehicle in order to give a more immediate and personal impact. The additional expense associated with the conservation option was varied between \$2 and \$400 over eleven specific values to provide the basis for the estimation of the logit form of the relationship between the cost of conservation and the probability of respondents being willing to pay that cost.

Validation

No specific validation exercise was performed for the forest CVM. However, as an adjunct to the application of CVM, a travel-cost method (TCM) study was built into the questionnaire to determine the recreational benefits provided by the National Estate forests under consideration. Numerous studies have followed this pattern: concurrently measuring the so-called use and non-use values of conserved national areas. From these studies, a trend in the relative magnitudes of the use and non-use values has emerged. It is possible therefore to check for consistency between the results of this and previous studies.

Results

The first step in analysing the choices made by respondents to the forestry CVM questionnaire was the estimation of the cumulative logistic probability function:

$$(1) \quad P_i = f(Z_i) = f(B_1 + B_2 WTP_i) = \frac{1}{1 + e^{-Z_i}}$$

where P_i is the probability that the forest conservation option will be rejected by a respondent given knowledge of the additional expense associated with that option, WTP_i .

Five thousand respondent households were selected at random from the electoral rolls of New South Wales, Victoria and the Australian Capital Territory. The estimation was determined using the SYSTAT statistical package to obtain (t -statistics reported in brackets):

$$(2) \quad Z_i = 0.087 - 0.002 WTP_i \\ (0.72) \quad (-2.47) \\ \chi^2 = 6.25 \quad (1 \text{ degree of freedom}).$$

On the basis of this function, the median willingness to pay for the conservation of the National Estate forests is \$43.50 per household per annum. In other words, 50 per cent of the responding households were willing to pay at least \$43.50 to conserve the forests in question whilst 50 per cent were not. This value is determined by calculating the willingness-to-pay value along the logit function where the cumulative probability is equal to 0.5.

Calculating the mean willingness-to-pay proved more problematic. The mean is determined by integrating the logit function to find the area under the cumulative probability curve. For Equation 2, it is evident that the WTP coefficient is statistically significant at the 5 per cent level. However, it is clear that the additional cost burden presented by the conservation option proved to be a minor factor in swaying respondents' opinions. The implication of this is that the probability of choosing either option varied only slightly across the range of WTP values (\$2 to \$400) used in the questionnaire. In turn this meant that only a relatively small portion of the logit function formed the basis for the estimation of willingness to pay. Given that the rule of integration allowing the calculation of the mean value relates to the entire curve, it was concluded that the calculation of a mean value on the basis of the estimated segment would be statistically and mathematically inappropriate.

Given the relatively minor impact of the cost of the preservation option, a further analysis was undertaken to identify the primary causal factors determining respondents' choices. This involved introducing more independent variables into the logit estimation. The form of the model providing the best fit to the data proved to be:

$$(3) \quad Z_i = -1.18 - 0.002 WTP_i + 0.25 LOGINC_i - 0.03 AGE_i \\ (-0.9) \quad (-2.1) \quad (2.12) \quad (-4.25) \\ \chi^2 = 28.72 \quad (3 \text{ degrees of freedom}).$$

The significance of the income variable (LOGINC), which was transformed logarithmically, and the age variable (AGE) indicate that these variables play a strong role in explaining respondents' choices. As income rises, respondents are more likely to choose the conserva-

tion option and the older the respondent, the more likely he or she is to support the logging option. Other demographic variables such as sex and educational status were not statistically significant at the 5% level. It was also evident that there was a strong correlation between the logging/conservation choice and respondents' attitudes to other more general conservation issues.

An Assessment

The application of the Travel Cost Method carried out in conjunction with the CVM yielded a per visitor value of \$8.90 for the recreational benefits of the forests. The model formed from the response data to derive this result was:

$$(4) \quad V_i = 49.109 - 0.948 C_i \\ \quad \quad \quad (-4.368) \\ R^2 = 0.859$$

where V_i is the estimated annual visitation rate per thousand persons for a region, i ; and C_i is the average cost to an individual visiting the area from region i .

Given that the \$43.50 median value per household derived from the CVM approach can be converted, with some statistical reservations, to a per-person figure of approximately \$22, the ratio of recreation benefits to the total benefit of forest conservation is in the order of the 1:3 ratio evident in US studies (see Mitchell and Carson, 1990). This concordance with other studies may give some validity to the results. Of course, the usefulness of this type of validation approach depends upon the consistent accuracy/non-accuracy of earlier TCM/CVM comparisons. Despite this, it is clear that the estimation yielded by the CVM approach can be further queried.

For instance, there are at least two possible explanations for the results. At face value the results lead to the conclusion that the conservation value of the forests in question is very price inelastic, but is more responsive to other demographic factors. That is, respondents' preferences for the forests are not greatly affected by price, at least over the range of WTP values used in this study, but are affected by income and age. Of course, the converse is also true: no matter how inexpensive the conservation option, a high proportion of respondents would not choose it in preference to the logging option.

An alternative to this explanation is that the respondents simply 'voted' in the contingent valuation question, largely ignoring the willingness-to-pay value postulated, because it was only a hypothetical question and the dollar cost ascribed to the conservation option would never really have to be paid. The choices are thus almost entirely explained by factors such as age and income.

Elements of both explanations are probably involved. The statistical significance of the coefficient of the willingness-to-pay variable, even when other independent variables are introduced to the logit function,

indicates that the dollar value remained a factor determining the respondents' choice of options. However, it is also possible that the willingness-to-pay value given in each questionnaire became lost in the array of other information provided about the alternative options.

If the willingness-to-pay value did become lost in the questionnaire, rather than simply being unimportant in the determination of responses, it can be concluded that the monetary consequences of alternatives in dichotomous choice scenarios must be highlighted. A strategy to counteract strategic bias based on de-emphasising the dollar value may thus be counterproductive. Use of the referendum model may also encourage respondents to adopt a simpler pre-conceived, voting behavioural mode, largely ignoring the dollar values involved. This also raises the issue of effective communication, as it would appear that if the dollar value did become lost, then respondents may not have fully appreciated other elements of the information provided in the questionnaire. A trade-off is apparent, therefore, in the design of CVM questionnaires: a balance needs to be struck between the amount of information provided and the simplicity and conciseness required for respondents to understand and assimilate information. The focus group experiments demonstrated that such was the complexity of information regarding alternative silvicultural practices that the necessary simplicity and conciseness could not be achieved in a CVM questionnaire. The results of the CVM application suggest that the mix provided by the questionnaire may have favoured the provision of information at the expense of simplicity and conciseness. The balance is a difficult one to establish. By sacrificing the level of information to afford greater simplicity, the setting upon which respondents' values are contingent is different. There must then be a compromise between the decision maker's perception of the situation and that which is provided by the questionnaire. There is reason to conclude from this dilemma that the ability of CVM to give estimates which are completely in accord with the decision making situation at hand is limited.

A Way Forward

Perhaps the most important aspect of any way forward for CVM in Australia is a delineation and recognition of the limits of the technique. It is apparent that the technique has limitations and practitioners must be willing to accept them and to limit their use of the technique to applications within the boundaries. Even within the boundaries of reasonable applications, the status of the estimates obtained must be accepted and broadcast. Estimates are contingent: they will differ across different versions of the same questionnaire and across time. No CVM-generated estimate is definitive. But that is no different from any market based estimate which is contingent upon the conditions prevailing in the relevant market at the time of valuation. Of course, the difference between a contingent value and a market value is that under the latter, a budget constraint is enforced and actual preferences

are revealed. CVM can impose neither and its successful application depends on a successful initiation of both conditions. Sensitivity analyses are a useful adjunct to CVM estimates as a demonstration of the contingent nature of the values derived.

In designing further CVM questionnaires, it is of paramount importance that the communication aspects of the exercise are fully assessed. The most appropriate vehicle for this is the focus group. The complexity of the communication aspects of a CVM questionnaire requires the in-depth analysis afforded by focus groups. The alternative, simple pre-testing of a questionnaire, does not give the respondent the opportunity to discuss reactions with other respondents. It is in these discussions, under the guidance of a moderator in a focus group, that much information regarding question interpretation can be gleaned. But focus groups can achieve much more than just the fine tuning of the wording of the questionnaire. They can also be used to assess the 'commodity range' of the good so that an appropriate framing strategy can be developed. It is also important to use focus groups to gain an appreciation of any impact which the questionnaire has on the saliency of the subject matter. For instance, the framing strategy explored in an early draft of the RAC Forestry CVM questionnaire was found to increase the saliency of the environment at issues raised, to the extent that respondents radically adjusted their preferences. Furthermore, focus groups can be used to delineate an appropriate range for the threshold values used in a dichotomous choice CVM. For the RAC Forestry CVM, despite the use of focus groups in the development of the questionnaire, the range of threshold values used proved to be a limitation. In retrospect, the solution to this problem is the active involvement of the CVM practitioners in focus group sessions. Briefing specialist focus group operators proved insufficient to complete the array of complex tasks required of the process. Hence, after some initial familiarization with techniques, CVM practitioners must be willing either to assist in or to undertake the focus group process.

The first steps taken to use CVM in Australia as a tool of public decision making have been faltering ones. The technique is now the subject of considerable criticism and doubt. Before further strides can be made, a more robust case for CVM in the Australian context has to be established. Research into the use of the method will be vital in establishing this case. Experimentation with valuation techniques which have a close relationship with CVM is worthy of pursuit. The contingent ranking method (CRM), instead of using a direct willingness-to-pay question, involves respondents being asked to rank the good or service in question along with more readily valued items. It is possible that respondents will find this type of questioning easier to understand and to answer accurately. A trade-off in using the CRM could well be an increase in the length of the questionnaire required. However, if the additional length is used to enhance the respondents' appreciation of the commodity context of the good or service being

valued and of their budget constraint, the costs of switching to CRM may be offset. It would appear that the CRM is well suited to incorporating this type of information. These are all issues which deserve further investigation and may be found more suited to Australian conditions in the short term than CVM.

In the longer term, individuals may become more familiar with the concepts and issues involved in a CVM study as greater use of the user-pays principle is made by all levels of government in public policy making. Local validation exercises will also be required if decision makers are to gain confidence in the use of CVM.

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