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CITIZENS, CONSUMERS AND CONTINGENT VALUATION: AN INVESTIGATION INTO RESPONDENT BEHAVIOUR

by

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A thesis submitted for the degree of Doctor of Philosophy of the Australian National University
DECLARATION

This thesis is the original work of the author, and has never been submitted for a degree or diploma in any university, except where cited in the text.

Russell K Blamey
19 July 1995
THANKS AND ACKNOWLEDGEMENTS

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DEDICATION

I dedicate this thesis to my parents
Lola and Norm Blamey.
ABSTRACT

In the wake of controversial recent Australian applications of Contingent Valuation, widespread future use of the technique as an input to environmental decision making in this country is by no means certain. The thesis involves a comprehensive critique of CV, and an analysis of the Coronation Hill and south-east forests CV studies undertaken by the Australian Resource Assessment Commission. Results raise questions concerning the way in which individuals respond to CV questions involving public goods, and in particular, whether individuals respond in a manner that is consistent with the cost benefit analysis use of results. This leads into a critique of 'rational economic man', focussing on notions of multiple selves, and institutionally-dependent behaviour. It is argued that Sagoff's (1988) consumer-citizen distinction provides a useful point of departure for discussions of such matters in the CV context. The distinction between citizen and consumer CV responses is explored in detail, and a framework presented with which to view the expression of citizen CV responses. Likely characteristics of CV results that are more consistent with a citizen-voter interpretation than a CV-consumer interpretation include: (i) respondents acting altruistically toward other members of the current generation who stand to benefit from a preservation outcome; (ii) respondents taking into account the opportunity costs associated with preservation; (iii) respondents subordinating private interests (such as use values) in favour of collective interests; (iv) respondents taking a range of procedural justice notions into account when formulating responses; and (v) respondents having preferences of a lexicographic nature, motivated by either deontological ethics, rules of thumb or other simplifying decision heuristics, or the utilitarian desire to express one's preferences and values.

In order to test how citizen considerations relate to, and are primed by, different CV scenarios, a mail survey was conducted among a random sample of adult Australians. Results indicate that although more consistent with respondent beliefs, responses to referendum scenarios reflect citizen considerations to a greater extent than do trust fund scenarios. A scenario designed to reduce the influence of some citizen considerations in referendum scenarios met with only minimal success.

The use of structural equation modelling to model the structure of citizen CV responses is explored, and a model of symbolic CV responses is presented, and subjected to some initial empirical investigation. It is argued that the highly symbolic nature of most environmental issues often activates the need for individuals to express
their attitudes and values, which when coupled with a perceived non-decisiveness of individual questionnaire responses, can result in value-expressive considerations dominating CV responses at the expense of the desired outcome-appraisal economic tradeoffs. In terms of non-decisiveness, CV questionnaires resemble electoral preferences more than market preferences, and the assumption of behavioural neutrality across such institutions may not be valid. The implications for some topical issues in CV are also explored. Final comments focus on the broader social choice and sustainability implications of the consumer-citizen divergence.
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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

In order to permit comprehensive cost-benefit analyses, or CBA's, economists have devised a range of methods to enable non-market benefits to be estimated. This thesis focusses on one such technique, contingent valuation (CV). Although applications of CV are becoming increasingly common throughout the world, the technique remains controversial in both public and academic fora. In the wake of two highly publicised applications of CV by the Australian Resource Assessment Commission, RAC, the technique appears to be in a critical state in Australia. Following its costly but state of the art CV studies, the RAC concluded that the "use of contingent valuation is still in the formative stages in the context of Australian case studies and policy applications.... The Inquiry has concluded that because contingent valuation is still in an experimental phase of development its results must be interpreted with caution" (RAC, 1992, pU17). Consequently, the RAC (1992) called for more research into the use of CV in the Australian context.

This thesis is a response to this request. Although the thesis has been stimulated by recent Australian experiences, the findings of the thesis are not limited to Australian applications of CV.

The main objective of the thesis is to examine the claim that individuals respond to CV studies involving public goods (and hence existence values) as citizens rather than consumers, and that this has implications for the CBA use of CV results. As such, the focus is on the estimation of non-use values for the purpose of CBA, rather than damage assessment. The thesis draws on several disciplines other than economics, most notably, psychology, political science, and philosophy. It could be said that a secondary objective of the thesis is to integrate the economic model of respondent behaviour with some fundamental principles of such disciplines.

The approach is not to outline highly specific hypotheses at the outset and then proceed to systematically test them. Rather, a comprehensive examination of the consumer-citizen distinction is made, with each chapter building on previous chapters. The complex nature of the consumer-citizen distinction becomes increasingly clear as the thesis progresses. The clarification of the consumer-citizen distinction in earlier chapters permits several hypotheses to be formulated and tested in later chapters.
The thesis is structured as follows. Chapter 2 provides the necessary background regarding the general application of CV and current topical issues. Chapter 3 involves a review of literature challenging the notion of a unified rational economic man, and introduces Sagoff's (1988) consumer-citizen distinction. Chapter 4 explores this initial consumer-citizen distinction in an econometric re-analysis of the RAC Kakadu and south-east-forests CV studies. Having found considerable initial support for this distinction in Chapter 4, Chapter 5 then proceeds to discuss the distinction in detail, and to lay the foundations for an extended model of CV respondent behaviour. Chapter 6 introduces the case study to be used to empirically explore consumer-citizen distinctions in more detail. Chapter 7 presents results pertaining to CV-relevant ethical beliefs, and Chapter 8 explores how the consumer-citizen distinction varies across different CV response formats. Chapter 9 illustrates how structural equation modelling may present a useful way of exploring the structure of citizen preferences, and Chapter 10 presents a model of value-expressive citizen responses. Without repeating the conclusions contained in most chapters, Chapter 11 draws together some of the findings of earlier chapters, and addresses itself to broader questions pertaining to the purpose of CV.
CHAPTER 2

BACKGROUND

2.1 INTRODUCTION

This chapter provides a brief overview of environmental valuation, focusing on CV. It begins in Section 2.2 by noting the need for environmental valuation in cost-benefit analyses of environmentally damaging projects. Section 2.3 then provides a brief overview of categories of total economic (environmental) value, and the valuation methods commonly employed to estimate various components of total economic value. Section 2.4 introduces the basic CV model, and overviews some recent developments and current controversies.

2.2 COST-BENEFIT-ANALYSIS AND ENVIRONMENTAL VALUATION

Cost-Benefit-Analysis, or CBA, applies the basic idea of weighing up pro’s and con’s to social decision-making, endeavouring to inform decision-makers regarding the socially preferred course of action. Although the welfare theoretic foundations of CBA go back a long way in the history of economics (for example to Ricardo 1817, Pigou, 1912, Dupuit 1844, and Marshall 1920), the practice of CBA appears to have originated with the introduction of the Flood Control Act in the US in 1936. This was several years prior to the influential welfare-theoretic work of Kaldor (1939) and Hicks (1939). Other notable landmarks include the ‘Green Book’ of rules for comparing costs and benefits produced by the US Federal Inter-Agency River Basin Committee 1950, and the publication in 1958 of several works regarding water resource development in the US (Eckstein, 1958, Krutilla and Eckstein, 1958, McKean, 1958) (Pearce, 1983).

The basic assumption of CBA is that individual preferences should count (Dasgupta and Pearce, 1972), and as such, CBA assumes an individualistic Bergson Social Welfare Function, SWF, with entries $U_i$: Social Welfare $= f(U_1, U_2, ..., U_N)$. For any one individual $i$, CBA assumes that if $U_i(a) > U_i(b)$, then state $a$ will be preferred to state $b$ by that individual, or in abbreviated form $aPb$. Although demand theory relies on ordinal utility in this way, the need in CBA to aggregate preferences raises the issue of whether ordinal preferences are sufficient for the purposes of aggregation. Should weak preferences be given the same weight as strong preferences in the aggregation procedures? A strong case clearly exists for endeavouring to measure preference intensity, and willingness to pay (WTP), and sometimes willingness to
accept compensation (WTA), is the economist's response. An individual's WTP for state a in preference to state b is thus the measure of preference used in CBA aggregation. WTP does not fully reflect intensity of preference, however, since willingness to pay is bound by income and preference intensity is not. WTP does not allow for differences in the marginal utility of income (Dasgupta and Pearce, 1972). CBA thus operates on the basis of one-dollar-one-vote, and as such, is open to criticism on ethical grounds. This is in contrast to the political vote where all individuals' preferences count equally. As Pearce (1983, p3) states:

*CBA makes no claim to produce morally correct decisions ... CBA is an input, an 'aid', an 'ingredient' of decision-making. It does not supplant political judgement.*

CBA can now be defined as a procedure for (i) measuring the gains and losses to individuals, using money as the measuring rod of those gains and losses; and (ii) aggregating the money valuations of the gains and losses of individuals and expressing them as a net social gain or loss (Pearce, 1983, p3). An environmentally damaging project then passes the cost benefit analysis test if net aggregate benefits exceed net aggregate costs, that is, if $B - C - EC > 0$, where $B$ is net aggregate benefits, $C$ is net aggregate costs excluding environmental costs, and $EC$ is aggregate environmental costs. For the purposes of this thesis, interest lies in how households/individuals relate to the natural environment, rather than productive uses of environmental assets.

### 2.3 ENVIRONMENTAL VALUATION

In order to conduct comprehensive CBA's of environmentally threatening social projects, practitioners clearly require some method of establishing the dollar value (WTP) of the expected environmental costs. Because environmental services tend to exhibit non-rivalness in consumption and non-excludability (characteristic of public goods), no markets typically exist in which environmental services can be bought and sold, and the goods are consequently unpriced. To this end, economists have devised a range of economic valuation techniques to be used to establish 'prices' or WTP for the goods in question. Table 2.1 lists the main techniques available, and briefly explains how they might be applied in the context of valuing wetlands. Hufschmidt et al (1983) summarise the techniques in more detail. Indirect approaches such as the travel cost method (TCM) and the hedonic price technique involve recovering estimates from the observed behaviour of individuals in regard to marketed commodities. Direct approaches such as CV involve directly asking individuals about their WTP/WTA. CV derived valuations are contingent in the sense
that they are a function of the information provided in the questionnaire concerning the area in question.

The basic strategy for valuation is as follows. Let $x$ be a vector of ordinary marketed commodities, and $q$ a vector of environmental conditions. Then assume that for the affected individuals the utility function $U(x,q)$ exists. It is then possible to use the standard apparatus of demand theory to establish the existence of monetary measures - consumer surplus, compensating variation, equivalent variation etc (see Appendix A) - of the utility implications of variations in the vector $q$: see also Johansson (1987) and Mitchell and Carson (1989). The research problem for implementation of this approach to social decision making is then the estimation of the sizes of the appropriate monetary measures for affected individuals and their aggregation to obtain total willingness to pay, WTP, or willingness to accept, WTA, measures from which environmental cost, EC, can be computed. The problem has been brought within the ambit of consumer demand theory by virtue of the assumption that $U(x,q)$ exists.

Figure 2.1 illustrates the consumption benefits measure associated with a change in environmental quality that economists are trying to estimate with valuation methods. Since the actual price for public goods is typically zero, consumer surplus will equal the entire area under the Hicksian demand curve, between the two levels of environmental quality in question. Appendix A summaries the derivation of Hicksian and Marshalian demand curves, Hicksian welfare measures, and the differences between such measures. In Figure 2.1, individuals are willing to pay a total of $a$ to obtain an increase in environmental quality from $q_0$ to $q_1$ (compensating surplus). Individuals value the environmental quality difference $q_1 - q_0$ at this amount.

It is conventional to sub-divide EC, or total economic value (TEV), into four classes of benefit, or value, to individuals:

- **Use Value**, UV, arises from the individual’s planned use of the area, for recreation for example.
- **Existence Value**, EV, arises from knowledge that the area exists and will continue to exist, independently of any actual or prospective use by the individual.
- **Option Value**, OV, relates to willingness to pay to guarantee availability for future use by the individual.
TABLE 2.1 SUMMARY OF ECONOMIC VALUATION TECHNIQUES

**Physical Linkage Methods:**
In order to establish the fisheries productivity of wetlands, a system of equations is estimated in which the wetland resource is treated as an input to production of fish that have well defined market prices. The surplus changes corresponding to increments or decrements in wetland acreage or quality can then be estimated.

**Travel Cost Method:**
In estimating the consumer benefits attributable to actual use of wetlands for recreation, a demand curve for the resource in question is estimated by regressing actual visitation rates for different geographic distance zones on explanatory variables including travel costs.

By examining how demand is expected to respond to the imposition of various hypothetical entry fees, the net benefits to consumers can be estimated.

**Contingent Valuation:**
Survey questions are used to directly elicit peoples' preferences for goods such as wetlands or higher fish catches. These preferences are expressed in monetary terms and can include non-use as well as actual-use values. Estimates of total willingness to pay or consumer surplus only, are thereby obtained.

**Hedonic Price Method:**
The good for which market values are observed is assumed to be a function of a number of characteristics of that good and its environment. Information concerning the (marginal) implicit price of changes in one of the characteristics can be obtained by examining the coefficients of a regression equation in which the characteristics are regressed on observed market price. The marginal implicit price of wetlands in wetland dependent canal estates can thus be estimated by seeing how canal frontage adds to property value. This approach is probably most applicable in establishing the proportion of wetland development benefits that may be considered wetland dependent. This method can be used to indirectly estimate a demand curve and hence consumer surplus benefits for a particular good.

**Opportunity Cost Approach:**
No estimate of preservation benefits is made but rather concern is with measuring what has to be given up for the sake of preservation. Decision-makers must then decide if preservation of the natural resource is worth at least this amount.

**Alternative Cost Approach:**
This approach argues that the estimated value of wetlands in providing a particular service is equal to the cost of the next best way of producing the same service.

**Replacement Cost Approach:**
Similar to the alternative cost approach but instead of assigning values according to the cost of alternate methods of producing a wetland derived service (e.g. fish farms rather than natural wetlands), this approach values wetlands according to the cost of replacing the wetland in question with a new area of wetland that provides the same services as the original.

**Energy Analysis:**
This involves converting the primary productivity of a wetlands area to a dollar measure of value by multiplying the calories of energy resulting from primary production of the area by a dollar value per calorie. The latter figure is obtained by dividing gross national product by the national energy consumption index, obtaining average GNP produced per unit of energy use.

(Adapted from Blamey, 1992).
FIGURE 2.1 SURPLUS MEASURES FOR A CHANGE IN ENVIRONMENTAL QUALITY

- Quasi-option value, QOV, relates to willingness to pay to avoid an irreversible commitment to development now, given the expectation of future growth in knowledge relevant to the implications of development.

Then,

\[ EC = TEV = UV + EV + OV + QOV = UV + NUV \]

where NUV stands for Non Use Value: the practical difficulties of separating NUV into its three component parts are widely recognised (see Pearce et al, 1989). Note that OV and QOV arise on the basis of incomplete knowledge of future conditions, whereas UV and EV can arise independently of any uncertainty. Krutilla (1967) and
Weisbrod (1964) introduced the idea of non-use values, the latter in terms of option price and the former in terms of existence value. This is typically assumed to imply some kind of altruism, although Loomis (1988) has challenged this, arguing that individuals may have non-altruistic reasons for valuing environmental goods that they have no intention of actually visiting.

EV is itself sometimes sub-divided on the basis of the object of the altruism: see, for example, Randall (1986), where a philanthropic motive relating to contemporaries is distinguished from a bequest motive relating to future generations. In so far as CV respondents are concerned about the life support functions of the assets/services that they are asked about, any WTP arising would presumably be regarded as a component of EV on the basis that it would mainly involve an instrumental altruism. Randall (1986, p85) considers ‘intrinsic’ altruism, where “the individual human cares about the well-being of nonhuman components of the ecosystem”.

Some authors have challenged the desirability of including altruistically motivated WTP in cost-benefit-analyses. Milgrom (1993), for example, argues that WTP associated with altruism toward members of the current generation results in double-counting, since, when mean or median WTP is aggregated to the relevant population, the benefits accruing to all non-sampled but currently living individuals will already have been accounted for to some extent, through the altruistic considerations of sampled individuals. Thus if $20 out of my total WTP of $120 arises from altruism toward my neighbour (I want to preserve the option for him or her to visit the area in the future), and my neighbours true WTP is say $80, then aggregated over the two of us, total WTP is $200. If developmental benefits are estimated to be worth $190, a cost-benefit result suggests preservation is the preferred outcome. It is apparent, however, that the development could proceed and compensate my neighbour to the amount of $80, and I to the amount of $100, to leave us, and the developer no worse-off than prior to the proposal. Following a utility-related conception of altruism, I would only have to be compensated $100 to be no worse off, since I now have no reason to be concerned for my compensated neighbour. Altruism can thus result in violation of the compensation principle of CBA. It is noted that Collard (1978) considered the economic efficiency implications of altruism in competitive markets, and found that only when altruism is utility-related (ie implying a utility function of the form \( U_i[u_i(x_i), u_j(x_j)] \), are the conditions for competitive market equilibrium satisfied. This is known as the non-twisting theorem. Problems arise when altruism is commodity-related (ie implying a utility function of the form \( u_i(x_i, x_j) \), which Collard perceives to be more common. Competitive markets would appear to involve different altruism conditions than CBA.
Some authors have questioned the desirability of allowing values based on ethical concerns to be incorporated within cost-benefit-analyses or damage assessments. Diamond and Hausman (1993, p11), for example, argue that “Just as ethical values concerning income distribution are a basis for government programs to help the poor, but are not a standard part of damage measurement, ethical concerns for the environment are relevant for legislation, but do not fit well in the logical structure of compensatory damages”. Others such as Hanemann (1994) see no problem if WTP reflects ethical considerations.

CV is the only valuation technique which, in principle, can address the estimation of all four of the above classes of benefit/value separately. It is noted that of these classes of value, existence value is particularly, but not solely, relevant to sustainability questions. The major reason for this is that the sustainability problem is seen as being essentially about problems of intergenerational equity arising from current impacts on the natural environment. It relates to the state of the environment to be passed on to future others. Of the four classes distinguished above, only existence value aligns directly with this concern. Use and option value relate to use by a current individual. Quasi option value clearly does have some relevance to intergenerational equity. It is noted that existence-value will also capture the intra-generational altruistic concerns discussed by Milgrom (1993).

2.4 INTRODUCTION TO CV

2.4.1 The Basic CV Model

The basic CV questionnaire involves essentially three parts. First, the good being valued is described in detail, along with the hypothetical circumstance under which it is made available to the respondent. The objective here is to present the respondent with what is in effect a hypothetical market. Second, question(s) are included to establish information pertaining to the respondent’s willingness to pay for the goods provided in the hypothetical market. Third, questions are included that seek to establish the respondent’s income, age, and sex, and any other socioeconomic, attitudinal or belief information. This information can be used as independent variables in regression models where WTP responses are the dependent variable. Such regressions are referred to as valuation functions. Parameter estimates that accord with the a priori expectations of economic theory are assumed to provide partial evidence for the validity of the WTP result, and high goodness of fit indices such as R-square values given an indication of reliability (Mitchell and Carson, 1989).
Contingent valuation studies are targeted at estimating the mean or median value of $A$, such that:

$$U'(q_0, x, y^0) = U'(q_1, x, y^0 - A).$$

where $U'(.)$ represents individual $i$'s utility or satisfaction level corresponding to an initial income of $y^0$, consumption of initial or final levels of the environmental good in question, $q_0$ and $q_1$ respectively, and all other goods $x$. The dollar value $A$ is thus the loss in income which combined with a specified level of environmental improvement ($q_1 - q_0$), will leave the individual at the same utility level as prior to the improvement and without the loss of $A$. The amount $A$ thus represents a dollar measure of the utility increase induced by a change from $q_0$ to $q_1$. For further discussion, see Appendix A.

2.4.2 CV Formats

CV questions can be presented to respondents in several fundamentally different ways. Generally speaking, four main types of format can be identified, as shown in Table 2.1 below.

**TABLE 2.1 COMMON CV FORMATS**

<table>
<thead>
<tr>
<th>Elicitation</th>
<th>Institution behind CV Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-ended</td>
<td>Market</td>
</tr>
<tr>
<td></td>
<td>Referendum vote</td>
</tr>
<tr>
<td>Open-ended</td>
<td>I</td>
</tr>
<tr>
<td>Dichotomous-choice</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>IV</td>
</tr>
</tbody>
</table>

CV questions were traditionally of Type I. Market formats involve explicitly trying to simulate a real life market for the good in question. Questions thus involve a direct tradeoff between $q$ and $y$. Open-ended market questions often involve a hypothetical trust fund and a question of the form: “What is the maximum you are willing to pay into a trust fund to be used to preserve area X?”.

1 The vector of other goods $x$ will be omitted from utility function representations of this form in subsequent chapters, since it adds little to such discussions.
The Dichotomous Choice Format

Following the lead of Bishop and Heberlein (1979), the last decade has seen a general move away from open-ended questions, in favour of dichotomous-choice, take-it-or-leave-it questions. For reasons of greater respondent familiarity (and face validity) and greater robustness of results to strategic behaviour, it is now considered preferable to present individuals with a single given cost of preservation, or bid value, ($c), and to ask them a question such as the following; "Are you willing to pay $c each year in order to ensure preservation of the area in question?". The decision facing the respondent is assumed to be whether $U'(q_0, y^0) \geq U'(q_1, y^0-c')$, where $c'$ is the preservation cost presented to the individual, and $y^0$, $q_0$ and $q_1$ are as defined previously.

With the dichotomous-choice CV elicitation format (DCCV), a number of different subsamples are used, with each subsample being presented with an identical questionnaire in all respects except the $c$ figure, which is different in each case. An estimate of mean WTP across the entire sample is usually then made by logistically regressing the dichotomous yes/no CV response on $c$, income, age and other relevant variables, and using numerical integration to calculate the area above the $Pr(NO|c)$ versus $c$ curve, calculated using the mean values of the other independent variables (see Appendix B for further details). An estimate of median WTP is obtained by determining (numerically or analytically) the value of $c$ that would give $Pr(NO|c) = 0.5$. Non-parametric methods also exist (see, for example Kristrom, 1990a, summarised in Appendix B). A double-bounded referendum format is also now quite popular, which involves presenting individuals with a second bid value after they have responded to the first. If their initial response was yes, a higher bid value is selected, and individuals are asked if they would pay this higher amount. If instead the initial response was no, a lower bid value is presented at the second stage. This approach can be viewed as a descendant of the iterative bidding approach (see

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2 An additional 'iterative bidding' approach has gone out of favour. This approach involves asking a series of dichotomous choice questions, where the $c$ presented to the respondent at any stage is varied by the interviewer in response to previous responses to different $c$ figures. It is hoped that convergence on a single dollar figure will result. The main problems with this technique involve starting point biases and the tendency for the respondent to feel compelled to say 'yes' at some stage. A payment interval approach, whereby individuals are given a range of possible intervals within which their maximum WTP might lie, has also gone out of favour due to the tendency to circle middle response categories.

footnote 2 in this section), that is presumably less prone to starting point biases, since it involves only one follow-up question.

The Referendum Approach

As Mitchell and Carson (1989, p92-93) state in their reference text on contingent valuation, “despite its strong theoretical appeal to economists, there are persuasive grounds for questioning the appropriateness of this type of consumer goods model for CV studies”. Firstly, in contrast to private goods actually sold in markets, individuals are likely to have less understanding, familiarity and prior choice experience with regard to public environmental goods. Secondly, market behaviour is not always a good indicator of people’s true desires (gambling and smoking are cited as examples). Thirdly, the market model is seen to downplay the ‘public-regardingness’ behind existence values.

Mitchell & Carson (1989) expressed the view that for goods with which respondents have little familiarity the appropriate model for CV is referendum voting rather than the market model. They state (p 296) that the view that meaningful valuation requires previously “well-exercised” preferences is based on an inappropriate market model. In our view, the appropriate model for CV surveys of pure public goods -goods that citizens are least likely to have direct experience in valuing - is the referendum, by which citizens make binding decisions about the provision of public goods.

Mitchell and Carson (1989) thus advocate use of a referendum CV format (see also Hoehn and Randall, 1987). In the case of a dichotomous-choice referendum question, a typical question involves asking: “If a referendum were held tomorrow, would you vote in favour of preservation (rather than development), given that it would involve a personal cost of $c?” In contrast, an open-ended referendum question might ask “How much would the proposed tax have to cost you before you would vote no at a referendum?”

Mitchell and Carson (1989, p296) argue that “instead of falling short of the relevant market model, well-conducted CV studies offer significant improvements over actual referenda as a means of measuring consumer preferences”. In comparison with actual referenda, the source of the improvements is believed to be two-fold. Firstly, CV surveys are considered to be capable of eliciting more informed decisions than actual referenda, and secondly, CV surveys are considered to be based on a more

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4 Chapter 4 describes a CV study involving this approach.
representative set of responses than most referenda. It is noted that the second point clearly does not apply in Australia where voting (or at least attending the polling station) is compulsory. In fact the reverse will actually apply if mail surveys are used since these introduce the same type of response biases that Mitchell and Carson (1989) talk about in relation to voluntary voting.

2.5 DEVELOPMENTS IN CV

2.5.1 A Brief History

Although Ciriacy-Wantrup (1947, 1952) appears to be the first to suggest the use of interviews to measure the value of environmental goods, Davis (1963a,b) was the first to estimate willingness to pay using a CV (iterative-bidding) approach, the application concerning benefits associated with use of a recreation site in the Maine Woods. Davis (1964) was also the first to conduct simple validity and reliability tests, such as estimation of a valuation function and comparison with results from a travel cost study. In attempting to estimate air pollution benefits, Ridker (1967) was probably the first to attempt to estimate non-use values using CV.

The 1970’s saw a number of important CV studies following these leads, with studies such as Hammack and Brown (1974) and Randall et al (1974) raising the profile of the technique, the latter being published in the first volume of the Journal of Environmental Economics and Management. The past twenty years has seen many developments in the theoretical and applied side of CV, many of which have probably been published in Land Economics or the above journal. As noted in the next section, developments have also occurred in the uses to which CV studies are put.

In addition to incremental advances in CV research and practice, the past decade has witnessed two notable attempts to assess the state of the art of CV. The first involved an assessment of the strengths and weaknesses of CV by Cummings, Brookshire and Shulze, which was to form the basis for discussion by these and other experts at an “Assessment Conference” held in Palo Alto, California in 1984. The initial assessment, along with the comments of the contributors and commentators, was subsequently published two years later- Cummings et al (1986).

In their initial assessment, Cummings et al (1986) defined “reference operating conditions” which they regard as necessary if an individual CV response is to be accurate within 50% of the true value of WTP. The four conditions initially advanced were:
1. Subjects must understand (be familiar with) the commodity to be valued;

2. Subjects must have had (or be allowed to obtain) prior valuation and choice experience with respect to consumption levels of the commodity;

3. There must be little uncertainty;

4. WTP, not WTA, measures are elicited.

Clearly, it would be unlikely that these conditions are generally satisfied in respect of existence value "commodities". Peterson (1992a, p194) notes that there appears to be a drift

toward a conclusion that CV works where it is not needed (for example, to measure the value of private goods), but is flawed and useless for measuring those values for which it may be the only hope (for example, such extreme public goods as existence value or subsistence use of natural resources).

Three years after the Cummings et al (1986) study, in what has now become the CV practitioner’s standard reference, Mitchell and Carson published a book containing a comprehensive summary of current CV research and a critical appraisal of the method. In their conclusion, Mitchell and Carson pose (p 295) the question: “can CV surveys actually measure values that are sufficiently reliable and valid for use in benefit estimation?”. They note (p296) an “emerging consensus ... that CV studies are able to measure meaningful values for ‘familiar’ goods such as local recreational amenities”: “meaningful” is not quantified. In regard to “less familiar goods, such as air quality improvements ...”, it is recognised that “we cannot test the accuracy of CV surveys against a criterion”. Mitchell and Carson (1989) express sympathy with those who are sceptical about CV in these contexts, and respond by advocating the referendum format, introduced previously.

2.5.2 CV in Damage Assessment

Although CV was originally developed for the purpose of providing estimates of values for use in CBA’s, and most research has subsequently followed in this tradition, a second distinct purpose for CV has recently emerged in the USA via developments in the legal system there. According to the final rule released by the U.S. Department of Interior in 1986, CV is to be regarded as an acceptable method for measuring damages under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (the CERCLA Superfund).
In 1989 an appeals court ruled against the argument that CV estimates should not be accorded rebuttable presumption. The argument was advanced by the state of Ohio in litigation between it and the United States Department of the Interior, DOI, concerning damages recoverable by government trustees for harmed natural resources. The court ruled that:

*Option and existence values may represent 'passive use' but they nonetheless reflect utility derived by humans from a resource, and thus, prima facie, ought to be included in a damage settlement. We find DOI's promulgation of CV methodology reasonable and consistent with congressional intent, and therefore worthy of deference (quoted in Peterson, 1992b, p34).*

CV is seen, that is, as an admissible method for determining actual compensation payments to be made, on account of option and existence values, where actual damage has occurred. While this purpose for CV introduces some issues not arising in its CBA role, it does presuppose the same foundational assumption that U(x,q) exists, as it is clearly envisaged that actual compensation in monetary terms is appropriate. This also implies, as with CBA, that “consumer sovereignty” is an acceptable normative principle. Peterson (1992b) reports that work was initiated to establish CV estimates of the damage associated with the Exxon Valdez oil spill in Alaska, but was not completed due to an out-of-court settlement between Exxon and the trustees representing the public interest. Exxon also sponsored its own research which was presented at a conference in April 1992 and subsequently published as a monograph the year later (Hausman, 1993). The research was conducted by eminent individuals specialising in economics, econometrics, public finance, psychology, market research and litigation. Of particular relevance to the thesis, are the findings of several Exxon-sponsored CV studies and a psychological (verbal-protocol) probing of CV response motivations. These studies were specifically designed to investigate the consistency of CV responses with economic theory relating to preferences. Having considered the findings, it is concluded that “the CV method does not measure an economic value that conforms with economic preference concepts. Thus, we also conclude that it is not appropriate to include CV measures of stated willingness to pay (WTP) in either benefit cost analysis or compensatory damage measurement” (Diamond and Hausman, 1993). Some of this research is discussed later in this chapter, and in subsequent chapters. Peterson (1992b) notes that a productive outcome of the Exxon Valdez accident is the many questions raised by the damage assessment. Portney (1994) provides a useful discussion of issues relating to the Exxon study.

Also in April 1992, the National Oceanic and Atmospheric Administration (NOAA, 1993) of the US Department of Commerce established a ‘Nobel laureate’ panel to
evaluate the use of CV in estimating nonuse values. In March 1993 the NOAA presented for comment a report containing the proposed rule-making. Its findings will be discussed in the following sections.

2.5.3 Current Controversies in CV

Mitchell and Carson (1989, p236-7) list and discuss more than twenty different potential response effect biases in CV studies. It is not the intention to review or discuss all of these biases here. Rather, the focus is on those issues held to be most compelling by the NOAA (1993) panel, and also some other issues held to be particularly relevant to the recent Australian experiences discussed in this thesis.

It is important to note that the methodological position of Friedman (1953), often adopted in economics, is untenable here. According to this position, the direct testing of assumptions is unnecessary so long as predictions based upon them are confirmed. Whatever the merits of this position generally, in the context of CV and existence values it faces the difficulty that there is not, and cannot be, independent data on existence values against which to validate CV “predictions” relevant to CBA or compensation. Blarney and Common (1992) review approaches used by environmental economists to assessing the reliability of CV studies, and argue that all are deficient in important respects.

In addition to discussing the problems associated with validating CV responses, the NOAA panel identifies the six most compelling problems arising with CV studies. These are now discussed.

(i) **Determining the extent of the market for the purposes of aggregation**

In order to provide an estimate of TEV for inclusion within cost-benefit-analyses or damage assessments, the estimate of mean or median WTP obtained from the sample is typically aggregated over the population seen to be relevant. For environmental goods that are to a significant extent public in nature, the relevant population may be assumed to be all individuals for whom WTP is greater than zero. It is in the nature of existence values that positive values exist for individuals living a considerable distance from the good in question. Individuals living in Western Australia can thus have positive existence values for Kakadu National Park, just as individuals living near the park may. Indeed, there is no a priori reason to expect that existence values for goods such as Kakadu or The Grand Canyon will not cross national boundaries in addition to State boundaries. If someone presented me with a plausible scenario, I would certainly be willing to pay at least a dollar or two to help preserve the Grand
Canyon. As the boundaries defining the relevant population are shifted outward in this manner, the resulting estimates of aggregated WTP can clearly escalate quickly. It is not inconceivable that Americans would be willing to pay an average of $1 each to help preserve Kakadu or the Great Barrier Reef. This alone would add approximately $100 million dollars to Australian WTP, and would itself be greater than the benefits from many projects. Such implications have formed the basis of criticisms of CV. The claim is that one could potentially justify any amount of preservation by altering the relevant population accordingly. Although this may be true to a large extent, the problem is more a practical matter than a problem with economic theory. In practice, one must draw the line somewhere, and typically it is drawn at the local, state or national boundaries. Such decisions must be viewed as conservative, all other factors aside, since at least some individuals beyond any practically defined boundary will have positive WTP. Given that inappropriate choice of market boundaries will typically produce conservative estimates of total WTP, the strength of this criticism is to some extent weakened. This thesis focuses on the accuracy of estimated measures of central tendency rather than aggregated WTP.

(ii) Implausibility of responses

A further criticism of CV is that the numbers arising from CV studies are too high to be believable (Moran, 1991). When based on the above extent of market argument, this is of limited concern as mentioned above. A more justified argument concerns the plausibility of estimated mean and median WTP. The implausibility argument must ultimately rely on more specific claims, some of which this thesis is concerned. The biases listed by Mitchell and Carson (1989) are also relevant here, and as noted above, are not discussed individually here.

(iii) Information provision and acceptance.

If CV studies are to provide valid responses, respondents must be presented with information pertaining to the (i) initial resource allocation situation (including property rights, for example), (ii) the nature of the specific good being valued (its geographical extent, expected impacts on species, waterways etc), (iii) the relevant prices of other goods (in cases where the specified change in the public good will significantly effect the prices of other goods), (iv) conditions for provision of the good and payments for it, and (v) the nature of the WTP amount desired (Mitchell and Carson, 1989).

Not only must this information all be clearly presented to respondents, but they must understand it, and accept it as reasonable. Satisfying these requirements for the entire
sample is typically impossible, since representative samples of the population tend to involve individuals from a wide diversity of backgrounds, with different levels of comprehension and beliefs. Indeed, even the same individual can come at the same problem from different perspectives at different points in time (Charon, 1992). People of higher education and/or intelligence tend to assimilate more information than those with lower educations and IQ’s, and indeed, the former will often demand more information. Individuals from higher socioeconomic classes are also likely to be more in favour of environmental protection than those classes who tend to be more focussed on satisfaction of immediate material needs.

Individuals from higher socioeconomic groups tend to follow environmental issues more closely, thereby having a greater understanding of the complexities of environmental decision-making, and hence the limited nature of information provided in questionnaires. Such individuals are perhaps also more likely to know the true property rights applying to the good in question, or the most realistic manner in which preservation costs may actually be covered. This can cause certain aspects of the scenario to be rejected as unrealistic, when CV researchers have to sacrifice face validity in order to create a suitable hypothetical valuation situation. The point here is simply that no CV scenario will appear plausible to all individuals, except in some cases where samples are highly selective. It is thus typically impossible to completely satisfy the conditions of comprehension and acceptance of information. CV researchers can only hope to minimise the problems arising. Given that a small percentage of inaccurate responses can produce estimates of the mean (and to a lesser extent the median) that differ significantly, the problems arising can be of some concern. CV researchers must not underestimate the significance of information-related problems.

(iv) Inconsistency with rational choice

Given that CV practitioners cannot (generally) directly test outcomes by comparing results with actual market purchases, attention turns to the extent to which CV preferences are consistent with an economic notion of rational choice.

5 Individuals may, for example, reject additional-tax payment vehicles on the basis that in reality, such an arrangement may be unlikely. Of course, CV scenarios must be designed, ceteris paribus, so as to attempt to maximise face-validity.

6 As the NOAA (1993, p4605) states, “… even when CV surveys provide detailed and accurate information about the effects of the program being valued, respondents must accept that information in making their (hypothetical) choices. If instead respondents rely on a set of heuristics ... in effect they will be answering a different question from that being asked; thus, the resulting values that are elicited will not reliably measure willingness to pay”.

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Rationality is often seen to imply consistency, which may take several forms. First, preferences that satisfy axioms of consumer theory such as transitivity and continuity are consistent in a certain, albeit weak, sense. Second, according to the theory of revealed preference, rational behaviour requires that satisfying a preference makes the individual better off. Although welfare and environmental economics typically permits a broad notion of self-interest, where prosocial acts are seen to be self-interested, other areas of economics such as public choice theory tend to use more narrow definitions, where preferences or actions are not rational when not in the individual's material self-interest. A third notion of rationality that is relevant in some contexts relates to the law of diminishing marginal returns. Here it is required that more of a good or service is better, as long as the individual is not satiated. In CV terms, this requires that more environmental preservation is preferred to less, and hence willingness to pay for incremental environmental improvements is positive, unless some form of satiation is reached. Although marginal WTP may be diminishing, "it is usually not reasonable to assume that it declines very abruptly" (NOAA, 1993, p4604). The NOAA panel note that this point assumes importance in view of empirical evidence relating to what is known as the embedding effect. This is discussed shortly.

(v) Absence of a Meaningful Budget Constraint

Central to the consumer choice model of microeconomics is the assumption that utility maximisation is budget constrained. The NOAA (1993, p4605) panel describe the CV relevant problem:

Even if respondents in CV surveys take seriously the hypothetical referendum (or other type of) questions being asked of them, they may respond without thinking carefully about how much disposable income they have available to allocate to all causes, public and private.

It is thus possible that on the spur of the moment, having been presented with information (possibly including photos) concerning a threatened environmental good or service, the individual may make a (promised) purchase, that upon better reflection regarding other budget demands he or she may not have made. Individuals may thus "fail to think of the possible multiplicity of environmental projects or policies they may be asked to support" (NOAA, 1993, p4605). One way that CV researchers have tackled this problem is to remind respondents of competing budget demands in a statement prior to the valuation question. In the case of the Kakadu CV study described below in Chapter 4, for example, respondents were told to "Bear in mind that this is only one of many environmental issues which may cost you money". It is questionable how effective such a statement is in encouraging individuals to think
about competing demands on their budgets. It is unlikely that the effect of such a statement would come close to the effect of first asking for WTP for a more inclusive good, and then disaggregating to obtain an estimate of WTP for the good in question. This latter approach, known as sequence disaggregation, is discussed shortly in relation to the ‘embedding effect’. The NOAA (1993, p4605) panel noted that to “date, relatively few CV surveys have reminded respondents convincingly of the very real economic constraints within which spending decisions must be made”.

(vi) Warm Glow Effects

Drawing on the Exxon sponsored study of Diamond and Hausman (1993), the NOAA report noted that the bi-modal distribution of CV responses frequently encountered in studies of this nature is characteristic of individual voting. A proportion of individuals are willing to pay nothing for the specified environmental improvement, and a proportion of individuals are willing to pay a large amount. Apparently related to this is the claim that responses to CV questions “serve the same function as charitable contributions- not only to support the organization in question, but also to feel the ‘warm glow’ that attends donating to worthy causes…. If this is so, CV responses should not be taken as reliable estimates of true willingness to pay, but rather as indicative of approval for the environmental program in question” (NOAA, p4605).

Although Andreoni (1989,1990) explored the economic implications of donations to charity and public goods motivated by the desire for warm-glow, discussion of the possibility of warm-inner-glow driving CV responses was stimulated largely through the work of Kahneman and Knetsch (1992a) involving the ‘embedding effect’. In fact, of the above six categories, all but the first have direct bearing on the ‘embedding effect’. This is quite evident in the NOAA’s discussion of these points in Part II of their report. Part III of the NOAA report discusses three key issues in the design of CV instruments, including the embedding effect. Consequently, the rest of this section deals with the embedding effect, the focus being an overview of the main studies involved.

2.5.4 Embedding, Aggregation and Disaggregation

The embedding phenomena arises “when the same good is assigned a lower value if WTP for it is inferred from WTP for a more inclusive good rather than if the particular good is evaluated on its own” (Kahneman and Knetsch, 1992a, p58). It is closely related to amenity-misspecification biases such as part-whole biases (Mitchell and Carson, 1989). Two types of embedding may be defined. Perfect embedding
occurs when the “same WTP is observed for nested commodities” (Kahneman and Knetsch, 1992b, p91). This would be the case if, for example, the WTP for preservation of 50% of forests in a specified area is the same as that for 100% of the forests. Regular embedding involves the WTP for a commodity differing when valued alone compared to when a more inclusive commodity is first valued, and then the portion attributable to the commodity of interest is elicited. In the above forest example, suppose the mean WTP for 50% preservation (call this Area A, and let Area B be the residual 50% of forests) is $100 when evaluated alone. Suppose also that had WTP for 100% preservation (Areas A and B combined) instead been elicited, the mean WTP would have been $120. Now if in the latter case respondents had been subsequently asked to state the proportion of the $120 that is attributable to A, regular embedding would imply that the resultant mean WTP for area A would be significantly less than $100, say $60. The question arises as to the true value of area A. Is it $60 or $100?

The embedding-type phenomena has been recognised for at least a decade. Schulze et al (1983) found that WTP of Chicago residents for improvements in visibility in the Grand Canyon was $90. One year later, Tolley and Randall (1983, 1985) found the equivalent value to be $16, when respondents had first been asked to assess WTP for improved visibility in Chicago and for increased visibility in the United States east of Mississippi. WTP for the same good was three times higher when valued first rather than third. Because question order is essentially arbitrary, such effects raise questions about the validity of CV derived values (Kahneman and Knetsch, 1992a). This is an example of what has also been referred to as the sequence aggregation problem, whereby WTP for a given good differs depending on where it is located in a sequence of WTP valuations. Kahneman (1986) reported that the proportion of respondents willing to pay various amounts of money to clean up lakes is ‘strikingly similar’ for the Haliburton region of Ontario, the Muskoka region of Ontario, and all of Ontario. In assessing the preservation values of the endangered bald eagle and wild turkey in New England, Stevens et al (1991) found that when valued together, total WTP was estimated to be $9/year but when valued separately it added to $33/year ($21/year and $12/year respectively).

In a controversial paper, Kahneman and Knetsch (1992a) reported results of an embedding nature and proposed and tested a hypothesis to explain the phenomena. The commodity of primary interest was the increased availability of equipment and trained personnel for rescue operations in disasters. Three samples of adults were interviewed by phone in the greater Vancouver region of Canada. One sample was simply asked WTP for increased availability of rescue equipment and personnel.
Another sample was asked WTP regarding the more inclusive service category of improved disaster preparedness, with a subsequent allocation to improved rescue equipment and personnel. The third sample involved a second level of embedding: respondents were first asked WTP regarding environmental services in general, with a subsequent allocation from this to improved disaster preparedness, of which a portion had in turn to be allocated to improved rescue equipment and personnel. This experimental design is an example of what has been referred to as top-down disaggregation or sequential disaggregation, involving a sequence of valuations in which each successive valuation relates to a subset of the goods or services valued in the previous valuation, and requires a proportion of the previously expressed WTP to be allocated to it (Diamond and Hausman, 1993). Results indicated than mean WTP for rescue equipment was $122.64 when evaluated alone, $74.65 when evaluated at one level of embedding, and $14.12 when evaluated at two levels of embedding. The corresponding median estimates are $25, $16, and $1 respectively. These differences are significantly different in most cases. Results also indicated that WTP responses to the first question presented to respondents in each sample did not differ significantly across the three samples, for both the mean and median. If such results cannot be explained by economic theory, a problem arises. As Kahneman and Knetsch (1992a, p59) state:

... if the value of a given landmark is much larger when it is evaluated on its own than when it is evaluated as part of a more inclusive package of public goods, which measure is the correct one? The discussions of the problem in the literature provide no agreed principles that would define the proper level of aggregation for the evaluation of a specific good. In the absence of such principles, the results become arbitrary. This criticism could be fatal. In terms of economic theory, the obvious explanation for embedding effects and order effects is in terms of substitution and income effects. To account for the result in the above hypothetical forest preservation example using the substitution effect, areas A and B would have to be perfect substitutes for one another, satiation requiring consumption of only one. An order effect thus exists since although the two substitutes (areas A and B) are valued equally, only the one that is consumed first will be assigned any value. To account for the perfect embedding result according to the

7 According to Kahneman and Knetsch (1992a, p59), although "the notions of substitution and satiation may apply to some environmental goods, they do not readily extend to existence values for beautiful sites, historical landmarks, or endangered species. If it is found that WTP to save all threatened historical landmarks in a region is not much higher than WTP to save any single landmark, this can hardly be because each individual landmark provides as much utility as the whole set. Indeed, the uniqueness of the valued goods is the essence of existence value, as this notion has been discussed since Krutilla."
income effect, the less inclusive good (say area A) would have to produce a WTP that is a very large proportion of total wealth⁸. A commonly cited example here is that an individual’s WTP to prevent the loss of one limb may not differ significantly to his or her WTP to prevent the loss of two limbs. The amount the individual would be willing to pay to prevent the loss of the first limb would leave no income available for prevention of the second. It would appear that values calculated for environmental goods using CV studies are rarely, if ever, likely to be high enough for this factor to play a major role. In contrast to perfect embedding, regular embedding and other aggregations and disaggregation approaches require less dramatic income and substitution effects to provide economic interpretations. This is because diminishing marginal utility can often explain the results, in contrast to perfect embedding, where zero marginal utility is required.

In the event that income and substitution effects cannot account for phenomena such as those outlined above, the consumer choice problem as outlined in Appendix A, and forming the basis of consumer theory, would not appear to be appropriate for understanding what respondents are doing. It is little surprise then, that economists have endeavoured to explain results pertaining to the Grand Canyon, Ontario and Rescue-operations studies within this framework. Smith (1992), for example, argues that vague commodity specifications and a failure to adhere to accepted CV procedures is responsible for the results of Kahneman and Knetsch (1992a). Given the manner in which respondents may have perceived the goods in question and their differences, Smith argues that the results may be quite consistent with the operation of income and substitution effects. Harrison (1992) has also criticised the Kahneman and Knetsch (1992a) study, in a similar vein to that of Smith (1992). Kahneman and Knetsch (1992b) and Nickerson (1993) have responded to these critiques⁹. They conclude:

> our results suggest that the likelihood of observing embedding effects is high, especially when the respondents have had no relevant market experience. In our view, the evidence appears sufficiently strong to impart on users of CVM, the burden of demonstrating that their estimate

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⁸ This explanation implies that individuals are aware of their budget constraint, and hence the problems outlined in (v) above do not apply.

⁹ Kahneman and Knetsch (1992b, p90-91) state: “Smith acknowledges the importance of the embedding issue, but does not deal with it and devotes his article entirely to an unusually close scrutiny of the study itself. The reasoning appears to be that if sufficient doubts can be raised about this particular demonstration, the urgency of the issue will be somehow diminished.... We ... are surprised by the extraordinary burden of proof that Smith would impose on a study that is critical of the CVM: the method is apparently to be judged innocent unless found guilty beyond any reasonable doubt, and the entire burden of removing all doubt lies on our study”.
of the value of a good is immune to manipulations by embedding. In the absence of such a demonstration of robustness, any assessment based on CVM should remain suspect (p93).

The Kahneman and Knetsch (1992a) paper focussed a good deal of attention on the embedding phenomena. Several subsequent studies have attempted to investigate the embedding effect, of which three were sponsored by Exxon and presented at the Exxon/Cambridge conference.

The simplest experimental design concerning embedding was that of Desvousges et al (1993), who sought to test the ‘fundamental economic principle’ that ‘rational consumers prefer more of a good or service to less’ (p92). In accordance with the use of CV for valuing nonuse damages, the good being valued was preservation of birds which would otherwise die in uncovered ponds containing by-products from oil and gas operations. The scenario described a regulation that would require wire-net covers over the ponds to protect the birds. Three treatments were employed in which each of three samples were presented with questionnaires that were identical in all respects except for the number of migratory-waterfowl deaths prevented: 2000, 20,000, and 200,000. Interviews were conducted in shopping malls in the Atlanta metropolitan region, with representativeness and aggregation to, the broader population not being sought; the objective was purely to conduct an experimental test relating to the theoretical validity of CV in the damage assessment context. Extensive pre-testing was held to indicate that respondents understood the commodity descriptions. Nonparametric tests of differences in the open-ended WTP distributions across treatments suggested perfect embedding; that is, the WTP distributions were no different when 2000 birds were at stake, compared to when 20,000 or 200,000 were at stake, and tests of differences in the mean WTP estimates revealed no differences. All treatments gave the same results. These, and other results10, lead Desvousges et al (1993, p114) to conclude that given “the current state of the art, we do not think that CV provides either valid or reliable estimates of nonuse damages”.

A classic example of the effects of sequential or top-down disaggregation comes from the study conducted by Kemp and Maxwell (1993), also sponsored by Exxon. By

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10 A separate experiment using a dichotomous choice CV question suggested that WTP for prevention of the effects of large oil spills was no different to that for small oil spills. In testing convergent validity, Desvousges et al (1993) also found that different CV formats (open-ended versus dichotomous-choice) produce different estimates of WTP, and in a test of reliability of the dichotomous-choice results, it was found that “different plausible, defensible functional forms and bid structures can create substantial variability WTP estimates” (p111) from the same dataset. A further worrisome result is that in the dichotomous-choice case, 34% of respondents presented with a $1000 payment figure said they would pay it, compared with 3% of respondents giving WTP figures of $1000 or more in the open-ended case.
using a disaggregation procedure, it was believed that respondents would have a greater "awareness of budget constraints in the sense of considering a much wider range of possibilities for the household's valuation of public goods" (p224). The commodity of primary interest was minimisation of the risk of oil spills off the coast of Alaska for the next ten years. The disaggregation treatment involved first estimating WTP for a range of social programs, and then sequentially breaking it down into more specific categories until finally, WTP for the commodity of primary interest is isolated. The results of this treatment can then be compared with the results of the other treatment (both once-off payments) in which only WTP for the specific commodity of primary interest is requested. Shopping mall interviews were again employed. Beginning with the disaggregation treatment, results indicated $595 mean WTP for 'social concerns', $106 of which was allocated to 'environmental programs', of which $14.10 was allocated to the 'protection of wilderness areas and wildlife'. Of this, $5.20 was allocated to 'human-caused problems', of which $1.12 was allocated to marine oil-spills. Of the $1.12, 29 cents was allocated to minimisation of the risk of marine oil-spills in Atlanta. The 95% confidence interval for this final estimate is [8 cents, 50 cents]. In comparison, the treatment involving the single CV question regarding minimisation of the risk of marine oil-spills in Atlanta produced a mean WTP of $85, with a confidence interval of [$41-$129]. This point estimate of the mean is thus 290 times that of the disaggregated equivalent. This is a striking result, which according to Kemp and Maxwell casts considerable doubt on the utility associated with use of single-focus CV questions. Although they don't claim that the disaggregated estimate of WTP is accurate, they do claim that it is likely to be more realistic, given the greater attention it brings to the wider budgetary context, than the single focus approach. In a further Exxon sponsored paper, Diamond et al (1993) specifically set out to test whether income and substitution effects can explain the anomalies associated with sequence aggregation. In order to test the substitution effect, several treatments were employed, each with a common scenario except for the given status of substitute sites, which was systematically varied across scenarios. The rationale here is that "a person should value an area more highly when one of its substitutes is opened up to development, because fewer undeveloped areas will then exist" (p46). Accordingly, in seeking to elicit WTP information regarding the Washakie Wilderness (WW) in Western Wyoming, one sample of individuals were told that seven other areas were being commercially developed, and the other was told that eight other areas were

11 In the discussion following the Kemp and Maxwell conference presentation, Richard Carson suggested some areas in which this study should not be considered state-of-the-art.
being so developed. Stated WTP was found not to vary significantly across the two treatments. Given that the two scenarios differ only in terms of one substitute site, it can be concluded that no large substitution effects are apparent. This procedure was also conducted for the Bob Marshall Wilderness (BMW) in Montana. This time, one treatment involved development in seven substitute sites and the other in nine. Although not statistically significant, mean WTP was 25% higher in the sample where more substitutes exist, a result opposite to that expected on the basis of substitution effects.

These results lead Diamond et al (1993) to conclude that the CV responses were not consistent with economic preferences. They clearly favour a warm glow interpretation of CV responses: "The findings are also suggestive of our alternative hypothesis: answers reflect a 'warm glow' associated with showing support for the environment. When the 'value' of preserving two areas is obtained by summing the answers from two surveys, the resulting 'value' incorporates two 'warm glows'. Thus, this 'value' will exceed the 'value' obtained from asking about the two areas jointly, which incorporates only one 'warm glow'."\(^\text{12}\) It should be noted that Diamond et al (1993) conducted interviews by telephone, and used open-ended CV questions. The use of warm glow as an explanation for the embedding effect has much in common with Kahneman and Knetsch's (1992a) purchase of moral satisfaction hypothesis, in which "the public good is a means to an end - the consumption is the sense of moral satisfaction associated with the contribution". As with the rest of their study, the manner in which Kahneman and Knetsch (1992a) proceeded to test their moral satisfaction hypotheses\(^\text{13}\), and the results and subsequent conclusions drawn, have been much criticised. Smith (1992) and Harrison (1992) again argue that the study was flawed in several respects, and that the results could be explained in terms of economic theory. More will be said about the moral satisfaction hypothesis in Chapter 10.

\(^\text{12}\) The authors also noted that results such as perfect embedding, where WTP does not vary with inclusiveness, can lead to the anomalous outcome where "it is not worthwhile to develop a single area, but it is worthwhile to develop all 57 areas"\(^\text{(p62)}.\)

\(^\text{13}\) To investigate the phenomenon, Kahneman and Knetsch (1992a) conducted an experiment involving extensive phone surveying of the Vancouver public. The intention was to test the following two specific hypotheses:

(i) that differences in WTP for various causes can be predicted from independent assessments of the moral satisfaction associated with these causes; and

(ii) that moral satisfaction exhibits an embedding effect in which the moral satisfaction associated with contributions to an inclusive cause extends with little loss to any significant subset of that cause.
One further test of the embedding hypothesis, and one that was not Exxon sponsored, is that of Loomis et al (1992), who investigated geographical embedding with respect to the preservation values for the South East forests of Australia. Embedding was evaluated by comparing differences in mean WTP for three sub-samples, each being presented with a different geographical area (size) of forests. No statistically significant embedding was evident from comparisons between the two smaller geographical areas. Embedding between the two top levels was evident in open-ended responses, however, although the magnitude of the effect was only about 25 percent between aggregation levels. This occurrence of embedding was attributed more to diminishing marginal utility than to any other reasons, such as the 'moral satisfaction’ hypothesis advanced by Kahneman and Knetsch.

Whether or not the effect on WTP of embedding and sequential aggregation and disaggregation CV valuation structures can be explained in terms of economic theory, CV practitioners must still decide on the appropriate structure for a given application of CV. Appendix H discusses some of the issues involved, and offers some suggestions regarding how this might best be tackled from a sustainability perspective.

2.6 CONCLUSIONS

The main purpose of this chapter has been to provide background to the issues discussed in the thesis, and as such, few conclusions are apparent. A couple of points are however worth highlighting.

- CV is now being used for purposes other than CBA such as damage assessment and assessing willingness to pay for various public programs.

- The dichotomous choice and double-bounded referendum formats are now the preferred CV formats.

- The main controversies in CV seem to relate, in one way or another, to the sensitivity of CV results to various aspects of the CV scenario, most notably price (bid value) and the scope of the environmental good in question. Studies where CV results appear to be relatively insensitive to such features raise the question of whether CV results can be regarded as generating useful information for input to CBA and/or compensation assessment. Some researchers believe that CV is not very accurate, but still useful, and others believe that respondents are not giving meaningful answers in terms of the economic model of consumer behaviour, and so the results are not useful. Is it
the case, for example, that at least for some individuals, $U(x, q)$ simply does not exist? A question that arises is whether results that would appear to be of questionable validity are an artefact of the particular survey instrument, or something more fundamental involving the assumptions of current CV methodology.

More research is clearly required concerning the effect of embedding and sequential valuation structures on WTP estimates. Of particular importance are identification of the motivations driving these effects, and the identification of the appropriate valuation structure for use in a given CV study. Appendix H discusses the latter, drawing attention to how Hoehn and Randall’s (1987) policy-referendum model might best be implemented from a perspective of ecological sustainability.
CHAPTER 3

CHALLENGING THE ECONOMIC THEORY
OF INDIVIDUAL BEHAVIOUR

3.1 INTRODUCTION

The focus in this chapter is on various challenges that have been made to the economic (consumer behaviour) foundations of contingent valuation, as it applies to CBA. Such criticisms come from a diverse range of disciplines and perspectives, including economics itself, psychology, sociology and philosophy. Particular attention is given to those relevant to the main thrust of the thesis.

One ‘discipline’ that has a long history in criticising various aspects of neoclassical economics, including the notion of rational economic man, is that of the so called institutional economists. The chapter begins in Section 3.2 by contrasting institutional and mainstream neoclassical economics, and locating the thesis with respect to the different institutionalist approaches. Section 3.3 discusses the nature of individual preferences, focussing on contextual influences. Section 3.3.1 considers the limitations of consumer sovereignty and introduces the notion that cognition and behaviour are context-specific. Section 3.3.2 discusses public choice theory as the economist’s attempt to explain political behaviour using the notion of rational economic man. Section 3.3.3 discusses the idea of a multiple self conception of the individual, and Section 3.3.4 considers how individual choice in the market is qualitatively different to individual choice when voting. Section 3.3.5 considers the importance of values and ideology in influencing behaviour, and Sagoff’s (1988) consumer-citizen distinction is introduced in Section 3.3.6. Section 3.4 contains the chapter conclusions.

3.2 INSTITUTIONAL ECONOMICS

Ayres (1965, pxi) noted that “even today there is no clearly defined body of principles on which institutionalists are generally agreed and by which they are known. But if there is anything all institutionalists have in common it is a dissatisfaction with ‘orthodox’ price theory”. In identifying three different approaches to institutional economics, Gruchy (1990) notes that this miscellaneous or ‘distaste for mainstream economics’ approach lacks theoretical cohesiveness, not operating within any generally accepted analytical framework.
The second approach to which Gruchy (1990) refers is the thematic approach, in which research concentrates on well-established themes such as the role of government, the importance of technology, the value concept, the theory of social control, the impact of culture, and the role of institutions (Gruchy, 1990). Although this approach is seen to contain "considerable theoretical substance ... it lacks ... an overall framework for interpretation into which the basic themes of institutional economics can be fitted in a general unity" (Gruchy, 1990, p362).

The third approach provides such a paradigmatic framework, "substituting the evolutionary concept of process for the static concept of equilibrium" (Gruchy, 1990, p362), and focussing on the process of economic change over time. In comparing the philosophical foundations of neoclassical and institutional economics, Dugger (1992) argues that this emphasis on processes of change is crucial in understanding the differences. Once this distinction is made, certain methodological differences between institutional and neoclassical economics emerge. The neoclassists, for example, tend to focus on predictive models, and predictive realism, whereas institutionalists focus on pattern models and structural realism¹. As a consequence, things quickly become complex in institutional economics. We are no longer prepared to enter a few seemingly key variables into a predictive model and examine the resultant predictive performance. A second methodological difference is that where neoclassists take the individual (or firm) as the unit of analysis, institutionalists take institutions as the fundamental unit of analysis. According to the latter:

*Individual choices and freedom of action within a particular framework are very real and very important, but institutionalist's are more interested in explaining the evolution of institutions or of going concerns than they are in explaining isolated individual choice* (Dugger 1992, p67).

A third methodological difference between neoclassical economics and the thematic approach of institutional economics is that the former has subjectivism or methodological individualism as its psychological foundation, and the latter instead adopts a behaviourist perspective, in which a limited role for the analysis of individual preferences exists.

It is also worth noting the emergence of what has been labelled the 'new' institutionalist economics (Williamson, 1975). The new institutionalist economics tries to "forge a synthesis that complements rather than replaces received neoclassical

¹ A pattern model explains behaviour by placing it in its institutional and cultural context. Institutionalists attach great importance to the identification of a pattern or theoretical structure that is realistic (Dugger, 1992).
In doing so, it deviates from the ‘old’ or evolutionary institutional economics outlined above in several important respects. In the tradition of the classic liberalist approach to economics, for example, the new institutionalist argues that given an understanding of the changing and endogenous nature of individual wants and preferences, it is still useful “to assume, for the purposes of economic enquiry, that individuals and their preference functions should be taken as given” (Hodgson, 1993, p5, italics in original). The justification for this lies largely in the argument that one’s analysis must stop somewhere. According to the new institutionalists, once “institutions have emerged on the basis of individual behaviours, they are seen simply as providing external constraints, conventions or openings to individuals who are taken as given. It is assumed that individual actions lead to the formation of institutions, but institutions do not change individuals, other than supplying information or constraints. The possibility that individuals themselves may be shaped in some fundamental manner by social institutions is not considered” (Hodgson, 1993, p8).

Although concern in this thesis is not with any one approach to institutionalist economics, it does share many of the concerns expressed in the institutional economics literature. It is, for example, argued that individual preferences are shaped by institutions, which in turn are shaped by individuals. For the purposes of environmental valuation, preferences must however be taken as given, at least at the time at which they are expressed, and given the context in which they are formed and expressed. The approach then, is not to subscribe exclusively to any one institutionalist approach, but rather to adopt a selective attitude toward the discipline, drawing on contributions from the institutional economics literature that appear relevant to the arguments of the thesis. A further point is that criticisms appearing in the institutional economists literature are often similar to those arising in other fields. As far as the first approach of institutionalist economics is concerned, most criticisms of neoclassical economics could be seen as institutionalist. Indeed, given that critiquing neoclassical economics is a multidisciplinary problem, it is no surprise that the associated literature is found in a wide variety of journals. Gruchy (1972) argues

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2 Hodgson (1988, 1993) speaks of an infinite regress, in which individual preferences are partly explained by institutions and culture, which in turn are partly explained by individual preferences, which are explained by institutions and culture and so on, indefinitely. Ultimately, an arbitrary decision has to be drawn somewhere, and often, say the new institutionalists, the line may be drawn at individual preferences. As Hodgson (1993) notes, although the new institutionalist typically adopts the exogenous preferences premise of methodological individualism, she rejects the further premise of this doctrine, that “all social explanations should be of this or a similar type” (Hodgson, 1993, p7).
that institutionalists are characterised by their holistic or interdisciplinary approach. The discussion now turns to a review of some of the more relevant challenges to the theoretical basis of state-of-the-art CV methods. Contributions in institutional economics provide the starting point.

3.3 THE NATURE OF INDIVIDUAL PREFERENCES

Although institutional economists focus little on contingent valuation, much of their writing focuses on generic criticisms of rational economic man, many of which are relevant to CV. Of particular interest here is the body of literature dealing with the context-specific nature of cognition and behaviour. Such arguments typically arise when considering the limitations of rational economic man, and issues such as consumer sovereignty.

3.3.1 Consumer Surplus and Context-Specific Cognition and Behaviour

Much of the criticism directed at the economic theory of individual behaviour relates to the concept of consumer sovereignty as the foundational normative criterion. Sagoff (1988), for example, explicitly rejects consumer sovereignty in the area of 'hard' environmental decision making. Most economists accept it generally, and unreservedly, and the standard approach to environmental valuation is but one example of efforts to extend the domain of the technical apparatus developed on its basis. However, it has been questioned at the general level, a notable recent example being the work of Penz (1986). There are four main bases for his critique:

1. individuals may be inadequately informed as to the consequences for themselves of the alternatives they face
2. individuals may be insufficiently deliberative in assessing the consequences of alternative choices
3. individuals may lack self-knowledge in the sense that they cannot properly relate the consequences of alternative choices to their preferences
4. individuals' preferences may not reflect their true interests due to "preference shaping" arising from socialisation processes and advertising.

Such criticisms involve challenging the notion of 'rational economic man', in which humans are typically seen as utility maximizers, which according to Lionnel Robbins in his Essay on the Nature and Significance of Economic Science (1937), is equivalent to the assumption of consistency (transitivity, irreflexivity) in preference orderings
Galbraith (1958) is of course notable for his contributions relating to the fourth point; the 'dependence effect' referring to the influence of the supply side of the market on the demand side, and the 'demonstration effect' referring to the tendency of such influences to shift the benefits associated with consumer choices from buyers to sellers (Fusfeld, 1989).

An important criticism of the notion of rational economic man is the claim that the hypothesis is not falsifiable. It is for example, extremely difficult to show that any behaviour is non-maximizing, since one can easily respond with the suggestion that the individual in question must have been maximizing something else, of which the researcher is unaware. Although Robbins' consistency interpretation of rational economic man may at first appear more falsifiable, since in-transitive preferences would seem to be observable, it is impossible to reveal multiple preferences simultaneously, and hence it can usually be argued that seemingly intransitive preferences are the result of changing preferences or other non-observed phenomena.

Institutionalists are also quick to identify flaws in Friedman's (1953) statement that maximizing behaviour is likely to be common because it is the result of an evolutionary 'survival-of-the-fittest' process. It is, for example, still unclear what any maximization is in respect of, and more importantly, there is no obvious mechanism that permits maximizing behaviour to be passed on from one firm or individual to another, as genes are passed on from generation to generation in species evolution. Of course, as the above points suggest, the notion of maximizing behaviour is often criticised on the basis that it is simply not possible, given the limited knowledge, vast amounts of information to be collected and processed, the uncertainties involved, and the limited informational processing capacities of humans. Hence notions of 'bounded rationality' and 'satisficing', as emphasised by Herbert Simon (1955, 1956).

There is also a considerable body of experimental evidence arising from disciplines such as psychology in particular, that suggests individuals may frequently make seemingly non-rational choices. The phenomena of preference reversals is a case in point (Slovic and Lichtenstein, 1984). Accepting the non-falsifiability of the maximization hypothesis, Hodgson (1988, p91) argues that the combined weight of the evidence that is accumulating "can, and does, raise questions about its validity and leads to a search for theoretical alternatives". Falsifiability is not a necessary condition for paradigm change.

In contrast to the neoclassical rational economic man, who is assumed to make all rational utility calculations at the same level of consciousness, psychological evidence suggests that individuals tend to operate at multiple levels of consciousness, ranging
from unconscious instincts and reflexes, through habits and routines, to high deliberation and consciousness. Olshansky and Granbois, 1979) conclude that consumer purchasing behaviour is often not the result of deliberative decision-making³. Hindess (1984) argues that individuals employ different socially determined forms of calculation, each arising in different circumstances and having certain implications. Hodgson (1988, p113) comments that a “purposeful act to buy (or not buy) an expensive gift for a companion is not at the same level of purposefulness and rationality as the action of scratching ... one’s nose”.

A vast literature in cognitive and social psychology suggests that prior experiences and values influence perception. The ‘New Look’ in psychology, beginning with Jerome Bruner and colleagues in the 1940’s, showed value and need to be organising factors in perception (Bruner, 1983)⁴. Research in psychology also suggests that behaviour and perception are influenced by a range of contextual factors, such as the norms of other individuals and the norms of one’s group or other groups (Lippa, 1990).

Behaviour and perception are also influenced by institutions. In addition to providing organisational structures, institutions are also “normative patterns which define what are felt to be, in the given society, proper, legitimate, or expected modes of action or of social relationship” (Parsons, 1940, p190, italics in original). Institutions thus influence the values that influence perception, and at a given point in time, influence the degree to which various values are activated. Hodgson (1988, p133) notes that the “existence of rules and institutions ... [can] stress some behavioural propensities, as feelings of nationalism can be heightened by ceremonies and symbolic acts”. Veblen (1909, p245) stated that “Not only is the individual’s conduct hedged about and directed by his habitual relations to his fellows in the group, but these relations, being of an institutional character, vary as the institutional scene varies.” Parsons (1940, p197) stated that “it is precisely around social institutions that, to a very large extent, the content of self-interest is organized”. Goffman (1961, p168) stated that:

*The self ... can be seen as something that resides in the arrangements prevailing in a social system for its members. The self in this sense is not*

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³ Hodgson (1988, p107) notes that in the world of advertising, the “appeal is not predominantly to reason but to the subtle symbolic significance or ‘image’ of the product.... Researchers show that people who claim not to be influenced by such advertising techniques are nevertheless affected, and furthermore that they often ‘rationalize’ their choice after the event”.

⁴ In one experimental study, for example, subjects had to adjust a patch of light to match the size of various coins. Results suggested that more valuable coins were overestimated by greater extents, and that poorer children overestimated more than richer children (Bruner, 1983).
a property of the person to whom it is attributed, but dwells rather in the pattern of social control that is exerted in connection with the person by himself and those around him. This special kind of institutional arrangement does not so much support the self as constitute it.

(Old) Institutional economics, by adopting an evolutionary perspective, accepts that preferences are socially formed, reflecting, in part, the cultural and institutional frameworks in which they are formed or expressed, and the infinite regress of historically prior institution-individual interactions.

The significance of the above discussion which is emphasised here, is that a considerable body of literature supports the idea that cognition and behaviour are context specific, and that the same individual may have different cognitions and behaviours in different institutional contexts, even if the objects of choice are the same. An underlying, stable and long-run preference function may not exist. Rather, individuals may behave as if they have different utility functions in different contexts, raising the question of which is being employed in any given context, and which we would prefer to be employed, for the purposes of a given evaluation such as a CV exercise. It is conceivable that some individuals will use a utility function when formulating CV preferences that, for the purposes of CBA, may not be appropriate. Different scenarios, including the choice between a market based trust fund and referendum institutional arrangements, may produce different CV responses.

The problems of information and knowledge noted above are not avoided by allowing a notion of multiple utility functions, and like the question of deliberation, may require a different preference elicitation mechanism for improvements to be obtained. For present purposes, the notion of context-specific behaviour is explored further, focussing on market and political institutions.

3.3.2 Public Choice theory and the Paradox of Voting

Political science has studied man's behaviour in the public arena, economics has studied man in the marketplace. Political science has often assumed that political man pursues the public interest. Economics has assumed that all men pursue their private interests, and has modelled this behaviour with a logic unique among the social sciences.

As Fusfeld (1989, p361) states, the "theory of economic man does not necessarily ignore the socio-cultural environment, but simply considers it one of the parameters within which individual choices are made. We arrive at the nub of the problem. A reconstruction of the economic theory of individual behaviour requires an analysis that moves the socio-cultural environment out of the category of 'parameter' and into the center of analysis".

This may hold even if the incentive-structure is (somehow) held constant across the two scenarios.
But is this dichotomy valid? ... Could political man and economic man be one and the same? In the field of public choice, it is assumed that they are.

Public choice can be defined as the economic study of non-market decision making, or simply the application of economics to political science. The subject matter of public choice is the same as that of political science: the theory of the state, voting rules, voting behaviour, party politics, the bureaucracy, and so on. The methodology of public choice is that of economics, however. The basic behavioural postulate of public choice, as for economics, is that man is an egoistic, rational, utility maximizer.... The modern public choice literature employs the analytical tools of economics (Mueller, 1989, p1-2).

Of particular interest here is the public choice study of voting behaviour. According to the rational voter hypothesis, first advanced by Downs (1957), voters calculate the expected utility that would arise from each of the political parties (or policies in the case of a referendum) for which they can vote, and vote for the one that promises the highest expected utility. The paradox of voting arises when one considers the limited impact of a given vote. Indeed, an individual's vote will only have an effect on the electoral outcome (under a simple majority rule) when all other voters are tied, or when the individual’s preferred candidate/policy would lose by one vote if he/she did not vote. Given realistic assumptions regarding the probabilities involved, and the costs associated with voting, it can be shown that the expected benefits arising from one's preferred candidate would have to very large for the act of voting to be of net benefit (Mueller, 1989). It has, for example, been noted that the probability of making a decisive vote is often less than the probability of being run over by a car on route to, or on return from the polling booth (Mueller, 1989).

As Mueller (1989, p350) notes, if “voting cannot be explained as a rational, self-interested act, then it must either be irrational or not self interested”. Several attempts have been made to show how voter turnouts can be explained on the basis of a more elaborate, rational calculus. It has, for example, been suggested that individuals may receive benefits from the act of voting itself (Riker and Ordeshook, 1968, Tullock, 1967). Postulating a taste for civic duty, however, only “‘saves’ rational egoism by destroying its predictive content” (Mueller, 1989, p351). Indeed, one can always attempt to maintain ‘rationality’ by postulating some sort of taste (eg a taste for laziness, a taste for snobbery, a taste for risk-taking etc). A further suggestion views voting as an n-person game, in which each individual’s decision to vote or abstain depends on his or her expectations regarding other voters’ decisions on this matter (Ledyard, 1981, Palfrey and Rosenthal, 1983). The greater the proportion of voters expected to abstain, the more decisive the individual’s vote becomes. In terms of CV, voluntary trust fund formats can thus be expected to
involve a different incentive structure to formats involving compulsive payment (Mitchell and Carson, 1989). A third attempt to explain voter turnouts within a public choice framework is that of Ferejohn and Fiorina (1974), who suggest a minimax-regret solution in which the voter is seen to minimize the regret associated with various outcomes rather than calculating the actual payoffs associated with those outcomes.

Mueller (1989) notes how each of these attempts fail to adequately explain voter turnout. Having reviewed the evidence in support of the rational voter hypothesis, he concludes that the evidence linking voter turnout to the probability of decisiveness is 'weak'. He then suggests that the 'ethical voter hypothesis' may help explain voting behaviour, although it is of limited predictive value. According to this hypothesis (Goodin and Roberts, 1975, Margolis, 1982, Etzioni, 1986), voters are viewed as having two sets of preferences, an ethical set involving altruistic concerns, and a selfish or self-serving set:

In some situations—for example, the consumer in the marketplace—one uses one's selfish preferences to decide... In others, one employs one's ethical preferences. Voting is assumed to be one of those situations in which one's ethical preferences govern (Mueller, 1989, 361-2).

Two aspects of this quote are important, and given the high relevance to the thesis, worthy of further discussion; (i) the nature and appropriateness of the dual or multiple preference ordering approach, and (ii) the relationship between different institutional contexts (eg market vs. voting) and different preference orderings. Multiple preference orderings are considered in Section 3.3.3, and the notion of institution dependent behaviour in Section 3.3.4.

3.3.3 Multiple Preference Orderings

As Mueller (1989, p362) notes, the “Jekyll and Hyde view of man's nature has a long and distinguished ancestry”. Plato, for example, distinguished two categories of human motives, the passions and reason (Lutz and Lux, 1988). Several economists have taken similar positions in that the standard representation of the individual in terms of a single preference ordering is seen as inadequate. Arrow (1963, p18), for example, notes that there will, in general, be a difference between the “ordering of social states according to the direct consumption of the individual and the ordering when the individual adds his general standards of equity.... We may refer to the
former ordering as reflecting the *tastes* of the individual and the latter as reflecting his *values*” (emphasis in original).

Boulding (1969) has noted the relevance for observed human behaviour of what he calls the “heroic ethic”, to be distinguished from altruism which he considered to be more readily accommodated within the conventional economic view of an individual. Boulding regards recognition of this as necessary to explain (voluntary) military service, and some religious behaviour. In Boulding’s view:

*man requires both heroic and economic elements in his institutions, in his learning processes and in his decision making and the problem of maintaining them in proper balance and tension is one of the major problems of motivation, both of the individual person and of societies (Boulding, 1969, p10).*

In a similar fashion, Sen has commented that:

*purely economic man is indeed close to being a social moron. Economic theory has been much preoccupied with this rational fool decked out in the glory of his one all-purpose preference ordering ... we need a more elaborate structure (Sen, 1977, p336).*

In this paper, Sen refers to the work of Harsanyi (1955), where a distinction is made between an individual’s ethical and subjective preferences. Harsanyi, commenting on then emerging trends, notes that:

*our individual utility concept has come logically nearer to a social welfare concept. Owing to a greater awareness of the importance of external economies and diseconomies of consumption in our society, each individual’s utility function is now regarded as dependent not only on this particular individual’s economic (and noneconomic) conditions but also on the economic (and other) conditions of all other individuals in the community (Harsanyi, 1955, p315).*

He considers taking this further by viewing the individual as having an individual social welfare function, ISWF, as well as a utility function. In order to maintain a clear distinction here, Harsanyi requires the ISWF to express what the “individual prefers (or rather would prefer) on the basis of impersonal social considerations alone” and the utility function to “express what he actually prefers, whether on the basis of his personal interests or on any other basis” (1955, p 315). The first set of preferences are “ethical”, the second “subjective”. For Harsanyi, the ethical preferences

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7 Arrow (1963, p18) goes on to state that it “is the ordering according to values which takes into account all desires of the individual, including the highly important socialising desires, and which is primarily relevant for the achievement of a social maximum. The market mechanism, however, takes into account only the ordering according to tastes”.

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express what can only in a qualified sense be called his ‘preferences’: they will, by definition express what he prefers only in those possibly rare moments when he forces a special impartial and impersonal attitude upon himself (p 315).

It is argued that this impersonality requirement will be satisfied if preferences are expressed from behind, what would now be described as a Rawlsian, “veil of ignorance”.

In regard to the claim by Harsanyi that the ISWF self will only be manifest in “rare moments”, it is interesting to note the work of Maslow in the field of behavioural psychology. In Maslow (1954) it is suggested that human needs satisfaction proceeds from the material through the social to the moral. The last are also referred to as self-actualising needs, and it is argued that they are self-perpetuating so that there is in respect of them non-satiation. On this view self-actualisation, addressing moral needs, would await the satisfaction of the lower order needs, consistently with Harsanyi’s view of only rare references to the ISWF. However, in later work, Maslow (1968) modified this view somewhat. In this work self-actualisation is not

some far off distant goal at the end of a long series of steps, but is present as a possibility all the time, even when the lower needs are still operating (Lutz and Lux, 1988, p16).

There is a continuous interplay between lower and higher needs (Maslow) and ethical and subjective preferences (Harsanyi). It would not be expected that the boundaries involved in these distinctions would be the same for all individuals, given different experiences in terms of social conditioning as well as genetic endowments, nor constant over time for a given individual, given changing circumstances. This does not render the distinctions useless, of course. On the contrary:

the dual self conception is what economics needs in order to break out of its overly narrow and distorted image of what people are and how they operate (Lutz and Lux, 1988, p18).

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8 It is also worth noting the work of cognitive development theorists such as Kohlberg (1969) who argue that different individuals exhibit different types of moral character largely on the basis of being at different stages of cognitive development. Kohlberg proposes that individuals proceed sequentially through a series of six moral stages, the fifth involving a utilitarian notion of justice and the sixth a deontological notion where role-taking (empathy) permits universalised reciprocity, as with Kant’s categorical imperative. Many if not most individuals, however, are not expected to proceed past the fourth stage, in which moral behaviour is seen to be motivated by the desire to avoid guilt and blame associated with failure to abide by institutionalised rules. Different individuals will thus have different capabilities of experiencing the ‘rare moments’ to which Harsanyi refers. Some, are only capable of deciding whether or not to follow existing rules.
Etzioni (1988) also rejects the single “self” represented as a single set of preferences, which is the foundation of the standard economic approach to the understanding of human behaviour, and to normative prescription. He focuses on conflicts between a morally committed self and a pleasure maximising self, arguing that “people’s behaviour is systematically and significantly affected by moral factors that cannot be reduced to considerations of personal gain” (Etzioni, 1988, p22). It follows that there are for an individual (at least) two distinct sources of value. Etzioni characterises his approach as one of codetermination: “people do not seek to maximise their pleasure, but to balance the service of two major purposes - to advance their well-being and to act morally” (p 83).

Margolis (1982) develops a model of dual rational choice in which individuals are seen to pursue (i) self-interested activities (where altruism is not ruled out), and (ii) activities that benefit some larger collectivity of which they are part, independently of any personal benefits arising. The two are linked by an allocation rule based on equalisation of utilities at the margin. Margolis uses Darwinian survival considerations to place restrictions on the roles for self and group interests for individuals. Individuals who are purely group-interested would be vulnerable to the activities of self-interested individuals within their group. On the other hand, a group comprising solely self-interested individuals would be vulnerable to other groups where some group interest was the norm, with implications for individual members of the group.

Mueller (1989, p362) suggests that the

kind of ethical-selfish dichotomy presumed in the ethical theory of voting might be operationalized as a predictive theory by assuming that each individual maximizes an objective function of the following form:

$$O_i = U_i + \theta \sum_j U_j.$$  

A purely selfish voter would set $\theta = 0$; a fully altruistic voter would set $\theta = 1$, as in Harsanyi (1955). In either case, the individual is behaving rationally in the sense of maximizing an objective function.

The first-order conditions differ with different values of $\theta$, and a continuum may be envisaged, with $\theta$ falling anywhere between zero and one inclusive (Mueller, 1989). Establishing or predicting the value of $\theta$ quickly becomes the focus. On this, Mueller (1989, p362) states

How can one predict when an individual will behave selfishly and when ethically, or the degree to which one’s ethical preferences govern one’s actions, when ethical behaviour is not a simple either-or decision? To make these predictions, one needs to do more than merely posit the existence of ethical preferences; one needs a theory of how ethical
preferences are formed, what determines their strength, what triggers their use.

He goes on to suggest that a theory of learning is needed, drawing on the field of behavioural psychology.

The foregoing is a sample of the literature relating to the notion of dual or multiple self conceptions of humans. The 'weighted average' models of Mueller (1989) and Margolis (1982) are consistent with economic theory in that a specific overarching utility function is postulated. In contrast, the suggestions of Harsanyi (1955) do not involve an overarching utility function, unless one specifies a taste for 'rare moment' preferences. Although Sen (1977) does not advocate a dual preference structure, he clearly sees problems with the single preference function conception. It is not the author's intention to suggest whether or not a multiple preference function conception of rational economic 'man' is appropriate. Such an endeavour would be extremely difficult, since the neoclassical economist can always explain preferences of a seemingly multiple preference structure nature by postulating a new taste in a single preference structure. The notion of a single preference structure is close to being non-falsifiable.

It is noted that the existence of an overarching utility function implies a strategy for individual choice that is approximately compensatory and hence confronts the conflicts inherent in the choice situation (Hogarth, 1987). Cognitive psychologists have long observed the use by individuals of non-compensatory, or conflict avoiding, strategies for choice. An example of such decision-making is the lexicographic model, in which alternatives are compared on the most important dimension only, unless equal scores are obtained, in which case scores on the second most important dimension are considered, and so on until a decision is reached. Hogarth (1987)

9 In fact, Sen (1977) suggests a continuum rather than a dichotomy is a more appropriate way of viewing the ethical content of preferences. He suggests that the ethical component of preferences may be best represented as a moral meta-ranking of action sets. An action set is the set of alternate and mutually exclusive combinations of actions under consideration. A moral meta-ranking is a moral ranking of the set of possible rankings of the elements of the action set.

10 Individuals employing a linear compensatory model in decision-making, for example, calculate the value of an alternative as the sum of the weighted values for each of the dimensions of the alternative (Hogarth, 1987). Another compensatory model, the additive difference model, involves choosing among alternatives by comparing them on a dimension by dimension basis, and then aggregating the differences. A third model, the ideal point model, involves looking at deviations from the ideal alternative according to the various dimensions (Hogarth, 1987).

11 A second non-compensatory model is the conjunctive model, in which alternatives are eliminated when any of their dimensions fall below certain thresholds requirements (Hogarth, 1987). Other non-compensatory models are the disjunctive model and the elimination-by-aspects model. Refer to Hogarth for details.
notes that individuals have a tendency to employ non-compensatory choice strategies when the complexity of information increases (both in terms of number of dimensions, complexity of information for a given dimension, and number of alternatives) and time pressure increases. The "key to understanding people's choice behaviour lies in understanding how they have come to represent the choice task in their minds" (Hogarth, 1987, p83). Not only does the context of CV involve choices among complex multidimensional alternatives, often with a heavy time constraint, but the choice strategies employed can be manipulated by task variables such as question order and response mode. The use of political referendum formats may produce different representations of a situation than market-based trust fund formats.

Overall, it would appear that non-compensatory choice strategies are unlikely to be uncommon in the CV context, suggesting that *at the time of responding*, individuals may assign special status to some dimensions of their preference structure. It seems quite feasible then, that non-compensatory models may apply to choices among the various 'sub-utility functions', and indeed, focussing on just one such function is less cognitively demanding than employing a weighted average.\(^{12}\)

The main conclusion to be drawn here is that individuals may use different 'sub-utility' functions in different contexts, producing different preferences, depending on the physical and social environment at the time, and any internal psychological factors independent of external influences. The way in which individuals employ these sub-utility functions is unlikely to be completely random. Rather, individuals are likely to have a systematic disposition to employ certain utility functions in certain circumstances. Various stimuli in the sociophysical environment can prime or activate specific preference functions. Individuals at a fairly advanced level of moral development can thus be primed to act more in accordance with their ethical preferences than would otherwise be the case. If individuals can be primed to assign different weights to their various preference structures, the questions that arise are (i) which are they using in a different context, and (ii) which do we want them to be using in a given context such as a CV question. It seems quite feasible that ethical preferences will be more common in the sociopolitical domain than the domain of market purchases. If CV is assumed to be simulating a 'market', should respondents wear their 'market hats' or their 'sociopolitical hats'? Even if a mixture of the two, CV results will not reflect estimates of consumer surplus in the same sense that consumer surplus exists for the consumption of bread. The referendum and market-

\(^{12}\) A sub-utility function is assumed here to be one of the preference functions falling under the umbrella of the overarching utility function.
based CV formats discussed in the previous chapter may clearly generate different preferences and hence estimates of consumer surplus. We are talking here about institutionally-dependent behaviour, which is now considered in more detail.

### 3.3.4 Institution-Dependent Behaviour

In an important paper, Buchanan (1954) identifies six differences between individual choices in the market and individual choices when voting. Firstly, in the market the individual is decisive, since the “act of choosing and the consequences of choosing stand in a one-to-one correspondence”(Buchanan, 1954, p335)\(^{13}\). When voting, final outcomes depend on what other voters do, which introduces uncertainty to the voter calculus. Buchanan also notes that where the individual chooses for herself in the market, she may choose for a collectivity when voting. This raises the second difference between individual choice in voting and the market: voting tends to involve a greater sense or degree of participation in social decision-making. As a result, individuals may tend to “act in accordance with a different preference scale”(p336) when choosing for the group rather than self. The first reason identified for this draws on Arrow’s taste-value distinction referred to above: the individual’s “identification will tend to be broadened, and his ‘values’ will be more likely to influence his ordering of alternatives, whereas in market choice his ‘tastes’ may determine his decision” (Buchanan, 1954, p336).

A second factor identified by Buchanan is that in the market individuals do not assume all others in society to be making corresponding choices, whereas in the voting context, the individual assumes all or most other members of society are at that time making corresponding choices. Individuals may vote for certain proposals regarding social matters (such as restrictions on business) for which there would be little point in acting on in isolation. In this sense, voting is participatory, a bit like going to football match and cheering on one’s team, as opposed to watching it at home on television.

A third difference between choice in the market and voting is that when voting, responsibility for making a decision is divided amongst all members of society, whereas in the market it is uniquely concentrated on the individual. The implications of this are subject to debate however: “This difference tends to guarantee that a more precise and objective consideration of alternative costs takes place in the minds of individuals choosing in the market. This does not suggest, however, that the greater

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\(^{13}\) Consumption externalities would appear to be an exception here.
precision in the consideration of alternatives by individuals in the market implies that
the costs and benefits taken into account are necessarily the proper ones from the
social point of view" (Buchanan, 1954, p337). Spillover effects are cited as a case in
point, and it is noted that this division of responsibility provides a basis for Mise's
(1951) argument that individuals are 'less corruptible' in the market. As discussed in
Chapter 10, one can also argue the opposite. A fourth difference lies in the
observation that choices in voting tend to be more mutually exclusive than choices in
the market. In the latter case, individuals can generally select several goods, whereas
in the electoral context, selection of one candidate or policy usually precludes the
other. The relative 'indivisibility of the vote' is held to suggest that in the market,
individual choice can be more 'articulate' (p339). A fifth distinction is that in the
market, an individual's choice is never overruled, the individual is never a member of
a dissenting minority. This arises from the fact that voters tend to choose among
potential alternatives whereas individuals in the market choose among existing
alternatives. Buchanan uses the term coercion to refer to cases in which individuals
are compelled to accept outcomes contrary to voting preferences. The sixth and
final difference between individual choice in voting and in the market concerns the
one-dollar-one-vote aspect of market choices. Market choices are inequitable in
comparison with voter choices, where each individual can register the same strength
of preference, independent of income. The "inequities present in market choice are
inequalities in individual power and not in individual freedom" (Buchanan, 1954,
p340).

The above observations of Buchanan (1954) have considerable import for both the
positive 'political science' and normative 'comparative institutional evaluation'
strands of public choice theory (Brennan and Lomasky, 1993). It is the latter which

14 The latter will apply to some voting systems more than others.

15 Buchanan accepts that some degree of coercion may exist in markets, if, for example,
sufficient demand causes products to be removed from the market, but argues that such effects are
small in comparison, and don't apply at the initial purchase stage.

16 Note that this may not apply in some contexts, such as those posed by referendum CV
questions, where individuals must vote on issues affecting personal income.

17 The normative strand involves evaluating decision-making arising from different institutions,
asking questions such as 'What should government do? What activities should government pursue?
And equally, and no less crucially, what should government not do? What restrictions on
government action should be imposed?' (Brennan and Lomasky, 1993, p6). Political processes are
scrutinised on the same terms as market processes, and it is not simply assumed that government
intervention will correct for market failures. Governments themselves can fail (Brennan and
Lomasky 1993). The normative strand is opposed to benevolent despot models of government,
since it rejects the notion that politicians' motivations necessarily differ to anyone else's. This is
where the positive strand comes in. An important feature of this strand is its "aspiration to provide a
Buchanan (1954) seems to follow when exploring the implications of the six differences. He notes that the first (lower uncertainty), third (undivided responsibility), and fourth (choices more articulate) differences referred to above tend to be conducive to rationality in individual behaviour, and when the fifth (greater freedom) difference in favour of market choice is further added, market choice will often be seen as more rational. He notes (p341), however, that the “fact that market choice tends to embody greater rationality in individual behaviour than does voting choice does not suggest that market choice tends to produce greater social rationality”, the latter being defined as “that action which maximizes the achievement of certain postulated social goals”. It is noted that Dahl and Lindblom (1953) rejected the argument that individual choice is more rational on this basis.

Indeed, the second (greater sense of social participation) and sixth (fewer inequalities) differences outlined above support voter rather than market choice:

*Voting choice does provide individuals with a greater sense of participation in social decision-making, and, in this way, it may bring forth the 'best' in man and tend to make individuals take somewhat more account of the 'public interest'*. (Buchanan, 1954, p341).

Buchanan (1954, p342) concludes:

*If consistency in individual behaviour and individual freedom are highly regarded relative to other values, the market will tend to be favoured. If, on the other hand, the somewhat vague, even though meaningful, concept of 'social welfare' is the overriding consideration, voting choice may be preferred.*

Now consider the implications of Buchanan’s discussion for the positive strand of public choice theory. The differences in individual voting and market choice clearly imply *behavioural non-neutrality*, since individual choices and hence behaviour in markets may differ to that in voting. This is important for the thesis, since behavioural non-neutrality can manifest itself in several ways in CV studies. Firstly, it follows from the above comments of Buchanan that in situations of an ambiguous institutional nature, as is frequently the case with CV questions in questionnaires, individuals may adopt either a market or a voting perspective, or something in between, or indeed something else altogether. In the RAC south-east forest CV

*fully unified social theory, a theory of human behaviour in the entire range of institutions (of which markets and political processes are to be seen as particular cases)* (Brennan and Lomasky, 1993, p7).

Normative public choice theory thus relies crucially on the assumption of motivational neutrality, that motivations do not differ when expressed within different institutions. The positive strand is concerned, inter alia, with investigating the appropriateness of such assumptions, and is not necessarily tied to any notion of institutional neutrality.
study, to be discussed in detail in the next Chapter, the CV question involves asking ‘Which option would you prefer?’ Since this is not obviously based on either a market or a political institutional scenario, individuals cannot all be expected to respond in accordance with their market choice parameters. A second implication is that CV questions specifically designed around a market (e.g., trust fund) model can be expected to produce different responses to those designed around a referendum model. Although Mitchell and Carson (1989) argue that in the case of pure public goods, the latter will often be more appropriate, they do not appear to consider the possibility that responses forthcoming may deviate in some way from those that would be encountered in a true market. Indeed, it is common to assume that a notion of market validity is applicable to CV, whereby the associated estimates of WTP are assumed to be valid if they “provide values consistent with values from a market, if a market existed for the unpriced goods and services” (AGPS, 1995). If one accepts the notion of institutionally-dependent behaviour, one might expect that referendum CV questions are unlikely to satisfy the market validity requirement. Indeed, such questions do not represent a simulated market approach to environmental valuation, unless one is willing to view a referendum as a market.

The above six differences to which Buchanan refers can be used to illustrate the likely nature of differences between choice in real-life markets, choice in trust fund CV questions, and choice in referendum CV questions. Of most interest are the first two differences discussed above. In terms of decisiveness, it is noted that decisiveness is far higher in actual markets than either of the CV cases, where outcomes ultimately depend on what others do. The difference in perceived decisiveness of referendum and trust fund formats depends on the exact nature of the questions, individual perceptions about the amount of money that is actually required to secure preservation in the trust fund case, and any priming effects associated with use of terms such as ‘referendum’. The question of decisiveness is discussed in considerably more detail in Chapter 10. The significance of the second difference outlined by Buchanan is clearly seen in a comparison of referendum and trust fund formats. Individuals who believe that public goods should be handled according to an ethic of shared responsibility are more likely to pay money to preserve the environment if all others do too, rather than voluntarily donate to a trust fund and let others free-ride. It is well known that referendum dichotomous choice CV questions involve a different incentive structure to that of trust fund questions (see for example, Mitchell and Carson, 1989). What does not appear to have been addressed, however, is the extent to which the generally non-isolated nature of CV purchases (individuals are aware that a collective choice is involved) results in choices that are qualitatively different to choices in actual markets.
A question that follows from a comparison of individual choice in voting and the market is whether behavioural non-neutrality requires motivational non-neutrality. Do the different aspects of market and electoral contexts outlined above simply provide different domains within which the same motivational structure operates, or do these aspects actually alter the core motivations of the individuals involved. Although little can safely be inferred from Buchanan's discussion, his discussions of dual preference orderings etc suggests that motivational neutrality may not hold. The assumption of motivational neutrality is particularly important to the normative strand of public choice theory. For the purposes of the thesis, interest lies in the question of whether choices and hence behaviour are institution-dependent. Since motivational neutrality is a stronger requirement than behavioural neutrality, it may appear of little concern here. As discussed later, however, it may be possible to explain several problems that have plagued CV studies without having to assume motivational non-neutrality. This has the clear advantage of providing an argument that economists will be less inclined to reject.

At this point it is concluded that individual choice in markets may be qualitatively different to individual choices when voting, and it is not clear which most resembles CV responses. Different CV formats will compare differently. CV responses may not satisfy notions of market validity, and reference to CV as a simulated market valuation technique may not be appropriate. As Blamey (1994, p179) states:

Because CV is concerned with eliciting WTP by simulating the market for an unpriced good, it is pertinent to ask 'what type of market are we trying to simulate?'. This is an important consideration since different marketed goods have different market characteristics and in creating a hypothetical market within a CV scenario certain implicit and explicit assumptions concerning such market characteristics are made.

Indeed, the differences between market and electoral institutions, and the context of CV questions, are not limited to the characteristics of the choice situation to which Buchanan (1954) was concerned. Consider, for example, how some characteristics of the CV market translate to actual markets.

One important characteristic of the goods involved in CV markets is that they are often well marketed, targeting just one of many possible issues, receiving a good deal

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18 Buchanan’s (1954, p341) only specific reference to motivations seems a little ambiguous: “voting should perhaps be preferred to the market when individual motivation in choice is the attribute examined”.

19 The different strands of public choice theory have been outlined in a previous footnote in this Chapter.
of ‘advertising’ through the media, and being sold by experienced sales people (interviewers) that are equipped with the information, symbolic images and government endorsement required to make a sale, and who only partially mention the costs associated with a purchase (eg overlooking job losses to loggers). It is quite conceivable then, that the real-market equivalent of CV purchases is some form of impulse purchase. The extent to which such purchases should play a role in environmental decision-making can be debated.

A further characteristic of CV markets is ease of purchase. In assessing the validity of a CV study, reference is often made to whether actual payments would come close to stated intentions to pay, if people were actually requested to make such payments. It is important to realise that the extent to which actual payments will come close to stated intentions is crucially dependent on how easily actual payments would be made. Donations to causes such as charities may be made through various forms (eg door-to-door, television adds, newspaper adds, shopping centre collections). Each different form of collection is associated with a different ease and likelihood of payment. One sees numerous newspaper adds requesting donations to be sent in to support an underprivileged child. One is also likely to think that one would be (or is) willing to pay the amount requested, but the point is that one usually does not, due to forgetfulness, laziness or other reasons. Under such circumstances one can expect a statement of what people are WTP to be an overestimate of what people would actually pay it. The two will be closer when the ease of payment is extremely high such as may be the case in some past hypothetical-simulated market CV experiments.

The significance of this is that by making hypothetical payments in CV markets ultimately easy to make, an unfair advantage may be given to CV goods. It follows that caution should be exercised in making conclusions concerning the relative value of CV and other goods to society. It is quite conceivable that requiring CV respondents to actually make their donation at local environment centres could reduce actual payments to less than 10 percent of stated WTP. By giving CV goods a special advantage, characteristic of few real-life goods, purchases are maximized. Economists might respond by saying that individuals have no incentive to acquire information and make voluntary payment when public goods are involved. The environment thus deserves a type of merit good status. It is perhaps surprising then, that the information supplied to respondents in CV studies is so selective, focussing typically on only one side (preservation) of one issue.

20 Requiring them to express their intentions (in the form of CV responses) at local environment centres would similarly reduce estimates of WTP relevant to a true market interpretation.
Related to the ease-of-purchase characteristic is the degree of involvement associated with purchase. Low-involvement goods such as toilet paper, clothes pegs and soap involve few costs associated with search and information. In contrast, high involvement goods, such as cars, electrical goods, and some health foods, involve much higher information and search costs. It is not clear whether CV responses and voter responses are associated with high or low involvement. It will clearly depend on the individual and the issue in question. Barry (1970, p23, cited in Hodgson, 1988, p92) notes that: ‘It may well be that both the costs and ... benefits of voting are so low that it is simply not worth being ‘rational’ about it. Thus habit, self-expression, duty and other things have plenty of room to make themselves felt’. Hodgson (1988, p84) observes that the “psychological evidence suggests that people do not use all the evidence that is available to them, that they do not revise their probability estimates by as much as Bayesian expectations theorists assume, and that they use ‘rule of thumb’ and other measures to deal with risk and uncertainty’. Cognitive psychologists such as Hogarth (1987) have identified and listed a vast number of heuristics that individuals employ to reduce the cognitive demands of various judgements and choices.

3.3.5 The Importance of Values/Ideology

When individuals do not make the Bayesian updates referred to above, they will often use other heuristics, or simply fall back on more general value or attitude orientations. In their institutionalist critique of CV, Eberle and Hayden (1991, p676) argue, inter alia, that the failure of CV researchers to “distinguish among beliefs and tastes in a systems context prevents the CV approach from obtaining relevant data”. They argue that findings that beliefs overwhelm tastes in determining CV responses are “consistent with findings in social psychology, because beliefs and systems of beliefs (ideology) are the basic social criteria, and the determinants of attitudes and tastes” (p675). They note (p676) that “no matter what CV questions are asked or how the questions are specified, the answer is the same- it reflects (but does not measure) the beliefs at which the respondents have arrived. That is why demand functions for very different cleanup operations come out strikingly similar. The respondents are not considering the price”.

The results Eberle and Hayden (1991) refer to, are reported by Kahneman in Cummings et al (1986), and relate to a sixth reference operating condition that Kahneman recommends for adoption:

ROC#6: The use of CVM should be restricted to user values, rather than to ideological values.
Kahneman (1986, p190) suggests that:

we should exercise great caution in measuring option values and
reservation values, because the responses that are obtained in such
measurements are likely to heavily loaded with ideological content....
The key observation is that there are a class of problems in which
people's answers to preference questions seem quite insensitive to the
numbers that are mentioned in these questions. Indeed, people seem to
be ready with an answer before the relevant numbers are specified.... It
is reasonable to assume that the CVM, which is offered as a substitute
for the market, is not intended to measure ideological values—but it may
nonetheless be contaminated by such values.

Kahneman argues that ideological 'contamination' can result in 'symbolic demand',
which tends to exhibit what is now referred to as the embedding effect. Having
presented embedding type evidence in which the demand functions for three cleanup
operations (Muskaka, Haliburton, All of Ontario) are 'strikingly similar', Kahneman
(1986, p191-2) notes that:

People seem to answer ... as if they had been asked 'What do you want to
do about keeping fish in our lakes?' and 'How important is the issue to
you?'. The dollar number merely expresses the strength of the feeling
that is aroused by these questions. Because the questions all elicit
symbolic expressions of the same attitude, there is not much difference
between the numbers that are attached to a single region and to all of
Ontario.... I call this 'symbolic demand' because it is true of symbols
that quantity is sometimes irrelevant.

Unfortunately Kahneman (1986) and Eberle and Hayden (1991) do not offer an
explanation for the phenomena they speak of that is likely to be convincing to
economists. Chapters 5 and 9 of this thesis explore the structural relations involved
in the expression of CV responses in considerable detail, and Chapter 10 presents a
model that links symbolic demand to the institutional nature of CV questions. In the
institutionalist tradition, it is assumed that a focus on structural realism may lead to a
more encompassing model of respondent behaviour, which in turn may enhance
predictive realism.

3.3.6 A Consumer/Citizen Distinction

The work of Eberle and Hayden (1991) is unique in that it represents an
institutionalist critique specifically addressed at CVM. A further CVM specific work
that has much in common with the general thrust of this chapter is that of Sagoff
(1988).

Sagoff (1988) attacks the approach to environmental decision making based on
neoclassical economics, ie that involving pseudo market valuation and cost benefit
analysis. He argues that in regard to the making of "hard" decisions, which include
decisions about the environment, individuals act as “citizens” rather than “consumers”. The distinction is put as follows:

As a citizen, I am concerned with the public interest, rather than my own interest; with the good of the community rather than simply the well-being of my family... As a consumer ... I concern myself with personal or self-regarding wants and interests; I pursue the goals I have as an individual. I put aside the community-regarding values I take seriously as a citizen, and I look out for Number One instead” (Sagoff, 1988, p8).

In the citizen role the individual considers the benefits of a proposal to the nation as a whole. This involves consideration of sentimental, historical, ideological, cultural, aesthetic and ethical values. Thus, the “individual as a self-interested consumer opposes himself as a moral agent and concerned citizen” (p67). Sagoff refers to this consumer/citizen dichotomy as “the conflict within us”.

Sagoff sees environmental decision making problems as falling within the provenance of what he calls “social regulation” and therefore matters for citizens rather than consumers. Social regulation is to be guided by “ethical rationality” which emphasises the need for highly informed deliberation rather than choice on the basis of given, and likely poorly informed, preferences. It follows that in such contexts aggregated individual willingness to pay is an inappropriate measure of “worth”, and that decision making is to involve a process of political representation and majority voting. The role for economics is largely limited to that of cost effectiveness analysis, ie determining the least costly means to the accomplishment of goals set on the basis of ethical and moral arguments and emerging from the political process. Economics would have some role in goal setting in so far as the costs of alternative goals will have some implications for the desirability of those goals. In relation to the issues addressed here, it is Sagoff’s view that it is a “category mistake” to expect individuals to behave as consumers rather than citizens in regard to hard decisions such as environmental protection. The question is whether the observable needs of the political process for information on individuals’ views on environmental matters, over and above those capable of being expressed through the processes themselves, are properly addressed in the context of individuals as citizens or of individuals as consumers. The pseudo market valuation approach would appear to assume that the answer is “consumers”: Sagoff asserts that it is “citizens”.

An attractive feature of Sagoff’s (1988) consumer-citizen distinction is that it brings together the notions of a dual preference ordering and institution-dependent behaviour. Individuals wear their ‘citizen hats’ when expressing preferences regarding social matters, as in political elections or referenda. When in the market, however, they wear their ‘consumer hats’.
For present purposes, it is noted that citizen responses to CV questions would appear to involve deliberation over all issues deemed to be relevant to the issue in question, and are likely to draw on the respondent’s value-orientations. In this respect, value-orientations, especially those relating to environment-development tradeoffs, might be expected to have significant explanatory power. Since citizens pay particular attention to the ethical matters at stake, various notions of justice can also be expected to influence their CV response, not all of which may be desirable from a CVM perspective. At this stage it is noted that citizen preferences would appear to differ to consumer preferences in at least three ways:

(i) they involve a greater concern with ethical matters;

(ii) they involve responding in the public interest; and

(iii) they involve thinking about the opportunity costs of preservation.

There may be several consequences for the interpretation of CV studies if individuals respond as citizens rather than consumers. Firstly, citizen behaviour may account for a large proportion of non-responses if individuals refuse to be ‘pulled’ into a consumer role by the CV scenario. Some individuals may reject the whole notion of trading off dollars for the environment. Secondly, a percentage of actual responses to the CV question may be a product, wholly or partly, of citizen considerations. Such responses can be seen to fall into two sub-categories; those where the dollar figure supplied to respondents is actually considered by respondents, and those where it is not. The latter case may be referred to as lexicographic or ‘committed-yes’ responses, the occurrence of which can pose considerable problems for CV. An individual who has formulated prior beliefs on a particular environmental issue may make a yes or no response in this light and without regard for the magnitude of the payment figure. The former case may involve individuals formulating citizen preferences in favour of preservation or development, and trading the strength of this preference off with the dollar payment. These ‘cross-role’ considerations may result in biases in CV results, since studies in behavioural psychology show that individuals can exhibit a high degree of ‘stickiness’ in respect to their trading off of moral commitments (Etzioni, 1988). Individuals may thus express citizen preferences unless the costs to them of doing so are perceived to be ‘unacceptably high’. The exact nature of citizen preferences and CV responses, and how they deviate from consumer preferences and responses, is discussed in considerable detail in later chapters. In Chapter 4, attention turns to some notable recent Australian CV studies, drawing on the above initial discussion of Sagoff’s consumer-citizen distinction.
3.4 CONCLUSIONS

This chapter has drawn on a diverse array of literature relating to human behaviour, much of which falls within the broad disciplinary boundaries of institutional economics. The following conclusions are most apparent.

Individuals operate at different levels of consciousness, and take different factors into account, in different social contexts. Non-compensatory choice strategies are a natural way of reducing the cognitive demands of decision-making to a more manageable level, and as such, are likely to be common in the CV context. This suggests that at the time of responding, CV individuals may give trump status to some aspects of their preference structure. When trump status is assigned to the expression of one’s underlying environmental attitude, this may result in committed yes or no CV responses, or ‘symbolic demand’. Results may be subject to perfect or regular embedding as a result. Trump status can be assigned to various components of one’s utility function. Individuals may thus act as if they have one set of preferences in one context and another set in a different context, even when there are no apparent reasons (such as a different incentive structure) for the difference.

Different institutional contexts activate different components of individuals’ utility functions, producing different preferences. The individual in the context of social choice is likely to be qualitatively different to the individual in private choice, and not just for strategic or incentive-related reasons. The individual as citizen may differ to the individual as consumer.

Various stimuli in the sociophysical environment can prime or activate specific preference functions. If individuals can be primed to assign different weights to their various preference structures, the questions that arise are (i) which are they using in a different context, and (ii) which do we want them to be using in a given context. One might expect that referendum CV formats prime more citizen flavoured preferences than trust fund formats. If the resultant estimates of WTP are different, the question that arises is, which is appropriate for the purposes of CBA? Given that CVM was initially created for the purpose of simulating a market for an environmental good, one might expect the latter. It appears that the implications of some recent developments in CV formats have not been as fully thought through as one might hope. Although one might say that consumer motivations typically matter little in economics, it must be remembered that in the context of CV, economists directly influence respondent motivations via design of the survey instrument.

In reality, the contextual-dependence of preference structures will vary not only from one individual to the next, and one circumstance to the next, but also for a given
individual and circumstance at different points in time. An individual may never use the same preference structure twice.
CHAPTER 4

RECONSIDERING TWO AUSTRALIAN CV STUDIES

4.1 INTRODUCTION

In this chapter the results of two recent Australian CV studies are investigated. The first is the RAC’s CV study of the so called south-east forests of New South Wales and Victoria (RAC, 1992). The second is the RAC’s CV study of mining at Coronation Hill in Kakadu National Park in the Northern Territory (Imber et al., 1991). Of particular interest, is an investigation of the consumer-citizen distinction, to the extent possible with the available data. The initial discussion of citizen CV responses in Section 3.3.6 suggests that CV results containing a high proportion of such responses may be dominated by protest responses and/or price-insensitive expressions of citizen attitudes and values. First consider the south-east forests study.

4.2 THE SOUTH-EAST FORESTS STUDY

4.2.1 Background

Future management of the forests of south-eastern New South Wales, and East Gippsland in Victoria has been the focus of considerable debate over the last few years, and in 1990 the Resource Assessment Commission was requested to conduct an Inquiry into forest management. A major concern of the ‘Forest and Timber Inquiry’ was to investigate management options for the ‘South-East Forests’. One of several research projects undertaken by the Inquiry was a CV study directed and estimating preservation values for the South-East forests. Whilst the major aim of the study was to collect information relevant to the preservation value of all the forest areas in south-eastern Australia that are on the Register of the National Estate, preservation values were estimated under three different scenarios; setting 100 per cent of the National Estate forests aside for preservation, setting 50 per cent aside, and setting 10 per cent aside. Three sets of results, one corresponding to each of the three sub-samples are thus provided.

Within each of these sub-samples, and in accordance with the dichotomous choice format, a further 11 subsamples were employed to provide the required variation in the stated costs ($c) of preservation, which ranged from $2 per year to $400 per year. A mail survey was employed which was administered by a consultancy firm. Reminder cards were sent out ten days after initial dispatch, and a further copy of the
The questionnaire was sent out ten days after this. The final valid response rate was slightly over 50 percent. The dataset was also found to satisfy checks for representativeness, and also consistency with the results of one of the Inquiries previous attitudinal surveys. The questionnaire was also pre-tested with focus groups.

The final questionnaire, which began with a map of the region in question, was also designed to provide data for a travel cost study of recreation values. In addition to the CV relevant questions and general attitudinal and socioeconomic questions, information was collected on recreation statistics such as expenses, activities undertaken, time spent at location, and so forth.

The CV question itself began by asking respondents to look at the map again. This was followed with:

We are now going to ask you some questions about what you would like to see happen to the forests in the striped areas shown on the map.

The Resource Assessment Commission is considering two options (A and B) for the future use of the forests in the striped areas of the map: we would like to know which of these options you prefer.

Respondents were then presented with concise summaries, in point form, of both of the options. Option A, referred to as ‘Wood Production’, was described to involve setting aside half of the area in question to grow trees for wood and each year a different 2% of the wood producing area would be logged, and then allowed to regrow until the next logging. The wood producing areas were described as having younger trees on average, and a degree of habitat disturbance to some rare and endangered species. Option B, referred to as ‘Conservation Reserves’, would set the area aside from wood production, and consequently would involve some job losses.

The remainder of the CV question was as follows:

If you choose option B it could cost you $c each year.

This is because:

- with less wood being available the prices of timber products you buy, such as house frames and paper, could rise; and
- government charges you pay could be increased to pay for the conservation of the areas.

When you make your choice between Options A and B, keep in mind that there may also be other forests in Australia that you may wish to pay further money to have conserved. Which option to you prefer?"
Logit models were used in the regressions, with various different functional forms for the index function being investigated (Appendix B provides background to the statistical nature of dichotomous choice CV studies). The results for the original RAC specification are included in Table 4.1 below. Mean WTP was not calculated for any of the options, and the reported median yearly WTP figures were $43.50, $140.0, and $200 for the 100, 50 and 10 percent preservation options respectively. Note that median WTP increases as the size of the area concerned decreases, a result that might be referred to as 'super-embedding'.

### TABLE 4.1 RESULTS FOR RAC CONSUMER MODEL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>10% Preservation</th>
<th>50% Preservation</th>
<th>100% Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estim.</td>
<td>t-stat</td>
<td>Estim.</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.5227</td>
<td>-1.181</td>
<td>0.1533</td>
</tr>
<tr>
<td>$c$</td>
<td>-0.0006</td>
<td>-0.749</td>
<td>-0.0029</td>
</tr>
<tr>
<td>Log(Income)</td>
<td>0.2942</td>
<td>2.466&quot;</td>
<td>0.1325</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>-0.0293</td>
<td>-4.149&quot;</td>
<td>-0.0234</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>28.03</td>
<td></td>
<td>26.01</td>
</tr>
<tr>
<td>LogL</td>
<td>-255.3066</td>
<td></td>
<td>-251.7817</td>
</tr>
<tr>
<td>% correct predict.</td>
<td>63</td>
<td></td>
<td>61</td>
</tr>
</tbody>
</table>

* indicates statistical significance at 5 %, two-tailed test.

Although the signs of the coefficients were considered to be as expected, the non-significance of the WTP variable in the 10 per cent sample, and the lower than expected responsiveness of option choice to price in the other preservation scenarios, led the RAC to seriously question the validity of their results, and to essentially ignore them in reaching their conclusions. Time and other constraints prevented any subsequent analysis of the data by the RAC.
4.2.2 Methods for Econometric Re-Analysis

This section reports the methods employed in the econometric re-examination of the RAC data, in light of the hypothesis that respondents were behaving as citizens rather than consumers. The above RAC results concerning embedding and the marginal significance of the price variable certainly indicate that this is a possibility. Interest lies in testing whether citizen considerations played any significant role in the formulation of CV responses. For the purposes of this analysis, consumer responses are assumed to involve a high degree of price sensitivity, and sensitivity to the scope or characteristics of the good being valued. Consumer responses will thus be associated with statistically significant price and income coefficients, and a sensitivity to scope that is consistent with economic theory, and hence income and substitution effects. Although consumer responses are expected to exhibit some degree of embedding, due to diminishing marginal utility, extreme embedding results raise questions about the appropriateness of the economic model of individual behaviour in CV questions.

The procedure used to investigate the influence of citizen considerations is to test for the significance of selected key variables in explaining the likelihood of yes and no responses to the above CV question. Investigation of citizen influences is made possible through responses to citizen-type questions that were included in the original survey. These questions were designed to elicit preferences regarding what the individual believes is important for Australian society as a whole. These questions were included after the CV question, and were prefaced with the comment: ‘Now we would like to find out your opinion on a number of issues concerning the environment in general.’ The first citizen-type question was as follows:

Do you think Australia needs to concentrate more on protecting the environment, or more on developing the economy, or would you say we currently have a reasonable balance?

More on the environment ........................................ 1

More on the economy ........................................... 2

Reasonable balance ............................................ 3

This question is clearly concerned with eliciting what the individual believes to be good for society, and implies consideration of both sides of the economy-environment equation. It is not concerned just with forests, but rather all aspects of Australia’s economy and natural environment. As a result, the question can be taken to fall within the realm of the citizen rather than the consumer. The next question focussed more on the tradeoffs associated with environmental protection:
Which of the following statements comes closest to your own view?

Governments should do more to protect the environment, even if this sometimes leads to higher taxes for everyone ........................................ 1

Governments should keep taxes low, even if this sometimes means that they do less for the environment ....................................................... 2

Don’t know, haven’t thought much about it .............................................................. 3

This question also exhibits citizen characteristics, since it is the individual’s perception of what would be best on balance for society that is sought.

Given the availability of citizen and consumer data for each respondent, the question that arises is how best to statistically examine the relative importance of these variables. One approach is simply to include citizen dummy variables as independent variables in the logistic regression model and to observe the t-ratios of the estimated coefficients, along with any changes in the goodness of fit of the overall model. The estimated coefficient attached to a dummy variable is often referred to as the differential intercept coefficient because it indicates by how much the value of the intercept terms differ from one subset of the data (given by D=1) to another (given by D=0 in the case of a binary dummy) (Gujarati, 1988, p439). Simply adding citizen dummies to the above consumer model thus enables us to distinguish between the intercepts of the regressions that would be obtained by separately estimating the same specifications over different subsets of the data, and where all observations in any one subset have the same value of the dummy variable D. Clearly there will be as many regressions as there are levels of the dummy variable. Although this is a useful starting point, it does not allow us to differentiate between the slope coefficients of the separate relationships. In order to pick up the effect of key citizen dummy variables on the slope coefficients of the various sub-group regressions, these citizen dummies need to be included in an ‘interactive’ or ‘multiplicative’ form. This relaxes the assumption that ‘all other factors must be held constant’ when interpreting the additive dummy coefficients. Interactive terms are clearly of interest to us, since it is possible, for example, that citizens in favour of shifting the economy-environment balance more toward the economy, are more likely to respond ‘no’ to the CV question if they are older. Of interest is how the whole behavioural relationship
between the dependent and independent variables changes among the regressions for each of the subsamples.

Figure 4.1 illustrates this point with a simple example in which \(c\) is the only explanatory variable other than the citizen ‘balance’ variable previously described. Let \(Pr(Y)\) and \(Pr(N)\) be the probabilities for yes and no responses to the question on WTP for option B, and let \(f(x)\) be the index function. Then for the logit model

\[
Pr(N) = \left[1 + e^{f(x)}\right]^{-1}
\]

\[
Pr(Y) = e^{f(x)} \left[1 + e^{-f(x)}\right]^{-1}
\]

and defining Odds as \(Pr(N)/Pr(Y)\) we have:

\[
\text{Odds} = e^{f(x)}, \quad \text{and}
\]

\[
\ln(\text{Odds}) = f(x).
\]

Now, for purposes of illustration, if \(x\) is the bid value \(c\), let

\[
f(x) = a_0 + b_0c + a_1D + b_1Dc
\]

where \(D\) takes the value 1 for the response “more on economy” to the question regarding the balance between environmental protection and economic development, and the value 0 for the response “reasonable balance”. For present purposes, it is assumed that the hypothesis that responses are pure consumer responses requires that \(a_1 = 0\) and/or \(b_1 = 0\). An inability to reject \(a_1 = b_1 = 0\) would be consistent with pure consumer type responses. An inability to reject \(b_0 = b_1 = 0\) would be consistent with responses being dominated by committed voter (citizen) responses; that is, the probability of a yes is unaffected by \(c\).

Assume we are interested in whether the relationship between the log(odds) and \(c\) (in Figure 4.1) changes when we move from the subset of respondents who answered ‘reasonable balance’, \(D=0\), to the subset who answered ‘more on economy’, \(D=1\). Regression (i) shows how the relationship for log(odds) might look for ‘reasonable balance’ respondents. The relatively small intercept \(a_0\) indicates a relatively small lower tail in the estimated logit curve, and the reasonably steep slope suggests a good deal of price responsiveness. Such a relationship is typical of what one would hope to get in a CV study directed at obtaining pure consumer responses suitable for CBA. Now consider regressions (ii) and (iii) as possible candidates for the ‘more on economy’ subset’s relationship. An “ideal” CV result would correspond to neither of these two relationships, since preferred CV responses are assumed for present
purposes to be invariant with respect to citizen preferences. Regression (ii) differs from this ideal result in the intercept only, whereas (iii) differs in both slope and intercept, and hence neither $a_i$ nor $b_i$ are equal to zero. If the true relationship is (iii), making the assumption that the slope terms are unaffected by citizen 'balance' preferences is clearly inappropriate. Indeed, (iii) may be a distinct possibility. The higher intercept term compared with (i) suggests a higher degree of committed-yes responses, or responses that have taken into account the opportunity costs of preservation. The lower slope suggests a lesser degree of price responsiveness, a possible feature of citizen responses as previously noted. By testing whether the two regressions are significantly different, we can establish whether the relationship between the log(odds) and hence WTP is sensitive in any way to citizen preferences.

![Diagram](image_url)

**FIGURE 4.1 TESTING FOR DIFFERENCES IN REGRESSIONS**
Now consider calculation of median WTP corresponding to regressions (i) and (iii) in Figure 4.1. Median WTP is calculated by solving for $c$ when $Pr(NO) = 0.5$, which corresponds to the odds equalling unity and hence the log(odds) equalling zero. The estimated median WTP figures corresponding to regressions (i) and (iii) in Figure 4.1 are thus $M_1$ and $M_3$ respectively. Although in this example the difference between the two estimated medians is a function of both the intercept and slope differences, it is clear that the closer the slopes of two such regressions, the more sensitive the estimated median will be to small differences in the intercept. It is possible to imagine two regressions that are not significantly different, but for which the estimated medians differ greatly. This is possible if the slopes of the two regressions are both small but similar, and the differences in intercepts is not large enough to cause the regressions to be statistically different. Considerable caution should be exercised when comparing estimated medians in dichotomous-choice CV studies, since they can be very sensitive to relatively small differences in parameter values in the estimated regressions.

In the case of least squares regressions, there are basically two ways of testing for significant differences in two or more regressions. The first approach is the Chow test. This involves performing an F test using the restricted and unrestricted residual sums of squares and the relevant degrees of freedom. The unrestricted model is that which permits corresponding coefficients to vary among the different regressions. This involves running separate regressions for each subset and summing together the resulting residual sums of squares to obtain the unrestricted sums of squares for the whole sample. The restricted sums of squares is obtained directly from the regression with the same model specification, but estimated over the entire (pooled) sample. The second approach, which results in the same conclusions as the Chow test, is the 'dummy-variable method', discussed extensively in Gujarati (1970) and summarised in Gujarati (1988). This involves pooling the sample and estimating a single regression with both additive and multiplicative dummies for the key (citizen) variable that is believed to be responsible for the suspected difference in the regressions. As discussed above, the dummy variable corresponding to the balance variable would now be included in the regression, along with the multiplicative term created by multiplying this dummy by $Sc$. In the case where the initial ‘balance’ response has been coded into two separate binary dummies, both dummies would have to be included, along with all possible multiplicative terms containing these dummies. Testing for significant differences in regressions, corresponding to different ‘balance’ responses, then involves simply testing that both the differential intercept and the differential slope coefficients are statistically different.
In the case of non-linear regressions involving maximum likelihood estimation, the approach is essentially the same, except that instead of using an F-test on the restricted and unrestricted residual sums of squares, a likelihood ratio test is instead used, which requires the restricted and unrestricted log-likelihoods.

Differences in WTP corresponding to different percentages of National Estate south-east forest preservation can be tested using the same approach. By splitting the dataset into three subsamples, one corresponding to each of the three percentages of preservation, we can investigate whether the intercept and/or slope terms differ across the three associated regressions. If the estimated behavioural relationships between the dependent and the independent variables do not differ significantly, an embedding type result is apparent. As discussed in the illustrative example above, comparing estimated medians in dichotomous-choice CV studies is of limited use, especially when one suspects that the behavioural relationships involved may not differ very much.

Since the data cannot be pooled over these three subsamples unless the embedding result is supported, the analysis begins by first including citizen variables in the index function specification, and then testing the embedding hypothesis. The results presented in this chapter were obtained using the LIMDEP econometric software (Greene, 1992).

4.2.3 Results of Econometric Re-Analysis

The index functions employed by the RAC contained purely ‘consumer-type’ variables, namely age, log(income), and the stated cost of preservation $c. If respondents used only the desired consumer considerations in formulating their CV responses, then one would expect that including citizen variables in the above logistic regressions in addition to the consumer variables would not significantly improve the fit of the estimated models, and the estimated coefficients on the citizen variables would not be statistically significant. The first step in the analysis is thus to re-estimate the three logistic regressions from Table 4.1 with the addition of citizen dummy variables to the index function. Table 4.2 lists the variable definitions employed in this section, and Table 4.3 contains the results of the three re-estimations.

---

1 LIMDEP is an econometric software package specialising in limited-dependent variable models. Less specialist packages such as SPSS are also capable of running such models. SPSS is used in later chapters due to the broader coverage of statistic procedures that it offers. At the time this chapter was written, however, the author did not have access to the SPSS package.

2 The appropriateness of these assumptions is addressed later in this chapter.
plus the same model estimated over the pooled sample. In Table 4.3, the results refer to regressions where the WTP response variable \( c \) has been replaced by \( \log c \) and the dependent variable in the linear regression is \( \log(\text{odds}) \). With this specification, the coefficient of \( \log c \) is the elasticity of the odds of a no response, with respect to \( c \).

Table 4.4 contains results for when the consumer response model is estimated with this specification. Comparison of these results with Table 4.1 above indicates that the results reported by the RAC are not sensitive to this re-specification of the model.

Note also that if the dependent variable in the multiple linear regression is the log of the odds of a no response, the expected signs on price and income variables are the opposite of the normal case. However, in the tables presented in this chapter, all parameters estimates have been multiplied by -1, to assist the reader in interpreting the results. The results in Tables 4.1 and 4.3 to 4.5 thus correspond to a dependent variable in the linear regression equal to the log of the odds of a yes response.

Several important observations can be made concerning the results in Table 4.3. Firstly, the three sub-sample regressions have considerably higher explanatory power than their ‘consumer-only’ counterparts, shown in Table 4.1 (and Table 4.4). The chi-squared and log-likelihood values are clearly much higher, and likelihood ratio tests reject (at 95%) the null hypotheses that the unrestricted consumer-citizen (C-C) models offer no improvement over the corresponding restricted consumer models. Indeed, in all models at least two of the citizen variables are statistically significant, whereas \( \log c \) is only significant in the second model and \( \log(\text{income}) \) in the first.

The signs of the estimated coefficients in Table 4.3 are all as expected, with the exception of \( \log(\text{income}) \) in the second model which has an insignificant t-ratio. Increases in the stated cost of preservation, AGE, GOV2, BAL2 and LOGGING can all be expected to be associated with a higher probability of a ‘no’ response, and conversely for increases in income, GOV1, and BAL1.

In terms of predictive ability with respect to individual responses, the percentage of correct predictions increases from 63 percent in the consumer model (Table 4.1) to 78 percent in Table 4.3 in the case of 10 percent preservation. Other respective increases are from 61 percent to 76 percent in the case of 50 percent preservation, and from 62 percent to 74 percent in the 100 percent preservation case.
TABLE 4.2 DEFINITION OF VARIABLES USED IN ECONOMETRIC ANALYSIS

\( P_i \) = probability of the \( i \)th individual responding 'NO' to a particular preservation option.

\( y_i = \) actual response of \( i \)th individual to a particular preservation option (\( y_i = 1 \) if 'NO', 0 otherwise).

\( c_i = \) stated cost of particular preservation option in \( i \)th individuals questionnaire (\( c = 2,3,5,10,20,30,50,100,200,300 \) and 400).

\( \text{Income}_i = \) gross income earned last year by \( i \)th individual and his/her wife/husband/partner. Measured categorically with 8 ranges plus a don't know option.

\( \text{Age}_i = \) age of \( i \)th individual in years.

\( \text{GOV}_1_i = \) dummy taking on the value 1 if respondent believes governments should do more to protect the environment ...; 0 otherwise.

\( \text{GOV}_2_i = \) dummy taking on the value 1 if respondent believes governments should keep taxes low ...; 0 otherwise. The control response to this question was 'Don't know, haven't thought much about it'.

\( \text{PRES50}_i = \) dummy taking on the value 1 if the \( i \)th respondent received a 50% preservation questionnaire; 0 otherwise.

\( \text{PRES100}_i = \) dummy taking on the value 1 if the \( i \)th respondent received a 100% preservation questionnaire; 0 otherwise. The control is 10%

\( \text{BAL1}_i = \) dummy coded as 1 if respondent believes Australia needs to concentrate more on protecting the environment; 0 otherwise.

\( \text{BAL2}_i = \) dummy coded as 1 if respondent believes Australia needs to concentrate more on developing the economy; 0 otherwise. Control response option is 'currently have a reasonable balance'.

### TABLE 4.3 LOGISTIC REGRESSION RESULTS BY SCENARIO

<table>
<thead>
<tr>
<th>Parameter</th>
<th>10% Preservation</th>
<th>50% Preservation</th>
<th>100% Preservation</th>
<th>Pooled Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>t-stat</td>
<td>Estimate</td>
<td>t-stat</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.9213</td>
<td>-1.670</td>
<td>0.6032</td>
<td>0.351</td>
</tr>
<tr>
<td>log (Sc)</td>
<td>-0.0763</td>
<td>-0.971</td>
<td>-0.1885</td>
<td>-2.337*</td>
</tr>
<tr>
<td>log (income)</td>
<td>0.3486</td>
<td>2.205*</td>
<td>-0.0099</td>
<td>-0.063</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>-0.0249</td>
<td>-2.714*</td>
<td>-0.0275</td>
<td>-3.041*</td>
</tr>
<tr>
<td>Gov 1</td>
<td>0.9640</td>
<td>2.222*</td>
<td>1.7589</td>
<td>3.749*</td>
</tr>
<tr>
<td>Gov 2</td>
<td>-0.7976</td>
<td>-1.536</td>
<td>-0.1665</td>
<td>-0.296</td>
</tr>
<tr>
<td>Bal 1</td>
<td>1.6825</td>
<td>4.825*</td>
<td>1.2845</td>
<td>4.104*</td>
</tr>
<tr>
<td>Bal 2</td>
<td>-0.1773</td>
<td>-0.491</td>
<td>-0.2965</td>
<td>-0.776</td>
</tr>
</tbody>
</table>

Chi-Squared        | 141.52  | 130.25 | 118.00  | 376.65 |
Log L              | -165.7605 | -165.8223 | -164.0370 | -503.6705 |
% Correct Predictions | 78 (N = 343) | 76 (N = 335) | 74 (N = 322) | 77 (N = 1000) |

* indicates significantly different from 0, two-tailed test, at 5%

### TABLE 4.4 CONSUMER RESULTS WITH LOGC SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>10% Preservation</th>
<th>50% Preservation</th>
<th>100% Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>t-stat</td>
<td>Estimate</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.3844</td>
<td>-1.059</td>
<td>0.5714</td>
</tr>
<tr>
<td>Logc</td>
<td>-0.0540</td>
<td>-0.898</td>
<td>-0.2051</td>
</tr>
<tr>
<td>Log(Income)</td>
<td>0.2936</td>
<td>2.460*</td>
<td>0.1339</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>-0.0295</td>
<td>-4.172*</td>
<td>-0.0237</td>
</tr>
</tbody>
</table>

Chi-Square        | 28.28  | 24.95  | 26.18 |
LogL              | -255.1835 | -252.3096 | -243.8401 |
% correct predictions | 64  | 60  | 61 |
The fourth set of results presented in Table 4.3 is for the same model specification but estimated using the pooled dataset, as required for the Chow-type test. These results can be used to test the null hypothesis that the first three regressions are not significantly different, and hence that responses to the CV question are independent of the stated percentage of forest being preserved. This is a very important consideration since failure to reject this hypothesis implies the presence of some form of embedding effect.

The likelihood ratio statistic for testing the above 'embedding' hypothesis is LR=16.1, distributed over 16 df, which is less than the critical value of 26.3 at the 95 percent significance level, and 23.5 at the 90 percent level. The null hypothesis that the estimated logistic regressions for each of the three levels of preservation are the same thus cannot be rejected. A separate test using the dummy-variable approach could not reject the null hypothesis that the interaction terms are not jointly significant. This implies that the slopes of the three regressions are not statistically different, and hence that the marginal effects of the explanatory variables on the odds of a no response are independent of the amount of forest being preserved. Re-running the dummy variable model without the multiplicative interaction terms increases the degrees of freedom available for testing the significance of the intercept terms, but still fails to reveal a significant result (chi-square= 3.14 on 2 df).

Figures 4.2 and 4.3 illustrate the differences in the relationships between Pr(NO) and $c$, and Log(odds) and Log($c$) respectively, for each of the three subsamples. These figures were calculated using the mean values of all other variables in the regressions. All three relationships clearly exhibit a general lack of responsiveness of Pr(NO) to stated preservation cost. Figures 4.2 and 4.3 also indicate just how misleading a comparison of differences in the calculated medians would be. In Figure 4.2, it is clear that the calculated median WTP for 100% forest preservation would be extremely small and somewhere between 0 and 10 dollars. In the case of 50% preservation, calculated median WTP would be quite large and in the vicinity of $100 per year, and in the case of 10% preservation it would exceed $400 per year. These figures are largely meaningless since the three relationships are not significantly different. For this reason, they are not reported here.

These results indicate that the three datasets can be pooled without the need for both additive and multiplicative PRES50 and PRES100 dummy terms. The additive dummy terms are however included in subsequent regressions, all of which are estimated using the pooled dataset. This greatly increases the sample sizes available for further analysis.
FIGURE 4.2 LOGIT FUNCTION FOR THREE RAC TREATMENTS

FIGURE 4.3 LOG(ODDS) FUNCTION FOR THREE RAC TREATMENTS
Given that the pooled regression in Table 4.3 has now been shown to be valid, consider the relative impacts on the log(odds) of certain consumer and citizen variables. In particular, consider the increase in the stated cost of preservation that is required to have the same effect on the log(odds) as an increase in BAL1 from 0 (reasonable balance) to 1 (more on environment). The impacts on the log(odds) of a one unit increase in logc and BAL1 are 0.1112 and -1.2822 respectively. logc must thus increase by a factor of 11.53 to have the same impact on the log(odds) as a one unit increase in BAL1. An increase in BAL1 from 0 to 1 would thus only be offset by an increase in preservation costs by a factor of approximately 100,000! This is a striking result that illustrates the relative lack of responsiveness of the log(odds) to consumer variables compared with citizen variables.

Now consider the relative impacts of the consumer and citizen explanatory variables in more detail. In order to investigate the extent to which the log(odds), and hence willingness-to-pay, are sensitive to citizen preferences, the pooled dataset has been partitioned into three separate datasets corresponding to different responses to the ‘balance’ question. The C-C logit specification has been re-run for each of these subsamples, plus the original (pooled) dataset, and the results are presented in Table 4.5.

First, consider whether or not the three logistic regressions for the sub-samples are significantly different. The likelihood ratio statistic for testing the null hypothesis that such differences do not exist is 83.0, distributed over 16 degrees of freedom, which is greater than the critical values of 26.3 and 32.0 at the 95% and 99% significance levels respectively. This indicates that the behavioural relationship between the log(odds) and the independent variables listed in Table 4.5 changes significantly as we move from individuals with one common citizen preference to those with another. This is largely expected given the above results for the pooled C-C model.

We are also interested in how the estimated coefficients for the key consumer variables vary across the three regressions. Consider first the estimated coefficients of logc in the first three regressions of Table 4.5. It is apparent that this coefficient has the expected sign in all cases and that the magnitude of the estimated coefficients increases as one moves from ‘more on economy’ citizens through ‘reasonable balance’ citizens to those in favour of ‘more on environment’. This is as expected, given that these coefficients represent the elasticity of the odds of a no response to the CV question with respect to the stated cost of preservation, c. Although the estimated
**TABLE 4.5 LOGISTIC REGRESSION RESULTS BY BAL1 AND BAL2 RESPONSE**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>More on Environment (BAL1=1, BAL2=0)</th>
<th>More on Economy (BAL1=0, BAL2=1)</th>
<th>Reasonable Balance (BAL1=0, BAL2=0)</th>
<th>Pooled Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>t-stat</td>
<td>Estimate</td>
<td>t-stat</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.5503</td>
<td>-0.337</td>
<td>-1.4868</td>
<td>-0.773</td>
</tr>
<tr>
<td>log ($c$)</td>
<td>-0.1958</td>
<td>-2.393*</td>
<td>-0.0596</td>
<td>-0.651</td>
</tr>
<tr>
<td>log (income)</td>
<td>0.2672</td>
<td>1.774</td>
<td>0.3044</td>
<td>1.664</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>-0.0164</td>
<td>-1.785</td>
<td>-0.0438</td>
<td>-3.645*</td>
</tr>
<tr>
<td>Gov 1</td>
<td>1.2142</td>
<td>2.595*</td>
<td>0.3850</td>
<td>0.693</td>
</tr>
<tr>
<td>Gov 2</td>
<td>-0.7439</td>
<td>-0.727</td>
<td>-1.2311</td>
<td>-2.246*</td>
</tr>
<tr>
<td>Pres. 50</td>
<td>-0.3813</td>
<td>-1.062</td>
<td>0.0010</td>
<td>0.003</td>
</tr>
<tr>
<td>Pres. 100</td>
<td>-0.7092</td>
<td>-1.983*</td>
<td>-0.6183</td>
<td>-1.588</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>28.66 (N = 378)</td>
<td>53.10 (N = 269)</td>
<td>73.94 (N = 353)</td>
<td>309.79 (N = 1000)</td>
</tr>
<tr>
<td>Log L</td>
<td>-169.7208</td>
<td>-121.0424</td>
<td>-204.8327</td>
<td>-537.1014</td>
</tr>
<tr>
<td>% Correct Predictions</td>
<td>80</td>
<td>79</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>Actual % No.</td>
<td>19</td>
<td>76</td>
<td>56</td>
<td>48</td>
</tr>
</tbody>
</table>

* indicates significance at 95%, two-tailed test.

Coefficients suggest a greater price responsiveness when citizen preferences are more 'green', the log coefficients are not all statistically significant at the 95 percent significance level. Indeed, only respondents who believed in shifting the economy-environment balance more toward the environment were significantly responsive to price. The smallest t-ratio occurred for those respondents that believed the balance should be shifted more toward the economy. For the 'more on environment' subset of respondents, the elasticity of the odds with respect to changes in $c$ is 0.1958. This means that a 1 percent change in the stated preservation cost, results in a 0.1958 percent change in the odds of a 'no' response. This is more than three times that of the 'more on economy' respondents. Figures 4.4 and 4.5 illustrate just how unresponsive Pr(NO) and the associated log(odds) are to the given preservation costs, and how this contrasts greatly with the influence of citizen preferences. All of the relationships shown in these figures were calculated at the means of the other independent variables. Figure 4.5 suggests that the main source of the differences in the relationship between the log(odds) and consumer variables such as log$c$ is likely to lie with the intercepts, rather than the slopes.
FIGURE 4.4 SENSITIVITY OF LOGIT FUNCTION TO ENVIRONMENT/DEVELOPMENT ORIENTATION

FIGURE 4.5 SENSITIVITY OF LOG(ODDS) TO ENVIRONMENT/DEVELOPMENT ORIENTATION
Note that in Figure 4.4, for none of the graphs is an ordinate value of 0.5 actually attained. This means that median WTP cannot properly be calculated. For 'Reasonable Balance' respondents, extrapolation to Pr(NO)=0.5 would produce an extremely small estimate of the median. Following the same procedure for the 'more on environment' respondents would result in an enormous calculated median.

Concerning log(income), all signs are as expected but none of the coefficients are statistically significant. Since income constraints are a crucial assumption of the consumer model, we must consider why this is so. One possibility is that the stated costs of preservation were not a high enough proportion of income for differences in incomes to result in differences in the probabilities of 'no' responses, from individuals responding as consumers. Another possibility is that individuals did not respond according to the consumer model, and either (i) did not understand the question, (ii) deliberately gave misleading responses (strategic bias); or (iii) responded as citizens rather than consumers. Given the general lack of responsiveness of the odds ratio to changes in the stated costs of preservation discussed above, it is no surprise that the income variable is also less responsive than the consumer model would expect. If individuals are unresponsive to price, then it is likely that demand will be unresponsive to changes in income.

Age again has relatively high explanatory power, being statistically significant in the second and third regressions, and having the expected sign in all three. It is interesting to note that the age variable remains highly significant in two of the regressions, even after citizen attitudes regarding the environment are accounted for. If older individuals tend to be less 'green' and hence more likely to say 'no' to the CV question, this can be reflected in both consumer and citizen preferences. Indeed, the survey results indicate that older individuals are much less likely to respond 'more on environment' to the 'balance' question. The high significance of the age variable thus does not necessarily add any credibility to the claim that the majority of individuals responded to the CV question as consumers rather than citizens.

4.2.4 Discussion of South-East Forests Econometric Results

The main findings of the above analysis are now discussed.

The first major result is that the goodness of fit of the logit models is dramatically improved by adding citizen variables to the original consumer specification. Important consumer variables such as log(income) and logc are of marginal significance, and more times than not, they are not significant at all. In contrast, the citizen variables collectively improve the fit of the model substantially. A further
result is that the overall relationship between the log(odds) and the independent variables is significantly different for subsets of respondents with different responses to the citizen 'balance' question. The appropriate conclusion here appears to be that in the case of the RAC South-East Forest data, both consumer and citizen motivations appear to be involved in the CV responses, with citizen considerations being more important in terms of explaining the responses than consumer considerations.

The second major result is that the CV responses are invariant (95% significance level) to the area of National Estate forests being preserved; that is, respondents appear to value 10%, 50%, and 100% forest preservation equally. This is evidence of perfect geographical embedding.

Can this result be explained in terms of income and substitution effects? Values calculated for environmental goods using CV studies are rarely high enough for it to be plausible that income effects are playing a major role. The highest calculated median WTP reported in the South-East Forests study, for example, was $200 per household per year, which can hardly be argued to represent a very large proportion of respondents' wealth.

To explain the above embedding result in terms of substitution effects, respondent satiation would have to be achieved by just 10 percent forest preservation; any further preservation providing no additional utility to the consumer. To consider whether this is a reasonable explanation, it is useful to consider the nature of the values involved.

Individuals may value forests for several reasons, with each reason falling into one of the value categories listed in Chapter 2. In terms of use value, UV, the residual 90 percent of forests will offer no additional value if actual use of the forests can be restricted to the first 10 percent without any loss of value. This assumes that actual visitation, if anticipated, would not be affected through restrictions on nature walks or added congestion. The loss of the option to enjoy the residual 90 percent in its unlogged state must also be of no consequence to the individual. Further, the individual must consider the residual 90 percent to be of no scientific or educational value. This includes any benefits in the form of pharmaceutical developments that might result from study of the residual component, and for which the initial component could not offer. Although it is difficult to imagine that all use values for the residual component could collectively sum to zero, it is conceivable that faced with a budget constraint and many other goods available for consumption, individuals would not be WTP any additional amount of money for the residual component.
Now consider non-use values. Respondents are told that in the event of logging, “some rare and endangered species, both plants and animals, living in the forests may have their habitats disturbed”. Of concern here is whether respondents are likely to consider the residual 90 percent to be unique in some way compared with the initial 10 percent. This is difficult to address, since respondents in each of the three groups only received information concerning one logging scenario and the reference level of 100 percent preservation. The differences between different subsets of the forests were thus not explained to any respondents.

Overall, it difficult to accept that the residual 90 percent of the south-east forests is perceived by individuals to be of no significant additional value, and hence that satiation results from consumption of the first 10 percent. A result of diminishing, but not satiated, marginal utility at 10 percent preservation would seem more reasonable.

Having rejected the applicability of the satiation and wealth explanations to the SE forests study of the RAC, now consider whether the observed embedding effect can be attributed to shortcomings in the design, administration or subsequent analysis of the questionnaire. As noted in the previous chapter, Smith (1992) and Harrison (1992) have provided detailed criticisms of the important Kahneman and Knetsch (1992a) study.

Did respondents in the RAC study understand the inclusive commodities as the researchers intended? Or in the context of the south-east forests study: Was the percentage of logging under the Wood Production option made sufficiently clear to respondents? This information was conveyed to respondents with the use of a map. The map covered the relevant areas of NSW and Victoria, and potential conservation reserves were represented by striped regions. The size of the striped areas varied across the three questionnaires in accordance with the percentage of National Estate forests to be preserved under the conservation reserves option. The map was explained to people at the beginning of the questionnaire. Page 4 of the questionnaire presented the respondent with the two options from which they had to choose. Respondents were first asked to look at the map again. This was followed up by two separate sentences, both directing attention toward the striped areas on the map (sentences reproduced above). Respondents were then provided with a point form summary of each of the two options. In all three subsamples and hence questionnaires, the Wood Production scenario began with the following two points: (i) half of the striped area would consist of streamside reserves, wildlife corridors and other reserves for the protection of plants (including trees), animals, soils and streams. (ii) the remaining half of the striped area would be used to grow trees for
wood production. In contrast, the Conservation Reserves scenario began with (i) the striped areas would be placed in conservation reserves. These descriptions would appear to provide adequate focus on the striped areas on the map, and the size, layout and clarity of the maps appears to be quite acceptable.

Another possibility that should be considered is that the above information concerning the geographical area being valued was lost amongst the other information provided to respondents. This is of course difficult to test statistically. What can be said however is that the questionnaire underwent extensive pre-testing in the form of focus group studies, and the issue of the appropriate amount and type of information was a focus of these studies. Significant changes to the questionnaire were made as a result of the focus group findings. Unlike the Kahneman and Knetsch study, which did not report the use of focus groups, the RAC study involved a mail survey rather than a telephone survey. Mail surveys generally impose the least time constraints on respondents, thereby maximising the potential for information processing. Other aspects of the survey design and administration appear well conducted. The interested reader is referred to Appendix U of the RAC’s Final Report (RAC, 1992) for further details.

A question that arises is why the East Gippsland forest CV study of Loomis et al (1993), summarised briefly in Section 2.5.4, obtained greater price sensitivity and failed to find strong evidence of embedding, when compared to the RAC study. There are several reasons why this may have occurred. Firstly, the Loomis et al (1993) study was conducted amongst Victorian households only, and involved valuation of only Victorian forest. Overall, respondents will have had greater familiarity with the forests being valued than in the RAC study. Secondly, and related to the first point, is the fact that requiring only Victorian households to pay for forests in Victoria (as specifically mentioned in the scenario) is likely to have greater face validity than requiring all Australians to pay, including those in Western Australia and the Northern Territory. Respondents in the Loomis et al study may thus have taken the payment vehicle (and potentially the whole exercise) more seriously, even though a wider extent of the market may be more appropriate from a national CBA perspective. A third reason why respondents may have been more sensitive to scenario characteristics in the Loomis et al study is that the bid value was written by hand in the questionnaires, which were printed with a blank space after the dollar sign. This potentially changes the whole incentive structure associated with the CV question, since it implies that other respondents are being presented with different dollar costs. It follows that the figure any one individual receives is unlikely to be perceived to be the true cost of preservation. Individuals presented with large bid
values such as $750 per year are thus likely to think that others have received smaller bids, and see no reason why they should pay more than others. A no response would then result, with the tendency for such responses to increase with the bid value, producing a greater apparent price sensitivity. A fourth reason may relate to the use of a (non-voluntary) trust fund format by Loomis et al. Price sensitivity in trust fund formats is discussed in Chapter 8. The latter two explanations relate mainly to price sensitivity, although one might expect that individuals who take the payment vehicle more seriously will also be more sensitive to other aspects of the scenario, reducing the tendency for embedding results.

A final point regarding the findings in this section is that no consumer taste variables were included in the original RAC questionnaire, preventing an analysis of the differential effects of consumer and citizen taste variables. Although the inclusion of consumer taste variables in estimated logit models would have little bearing on results pertaining to price-insensitivity and embedding, it would allow an important question to be addressed. This concerns the argument that the statistical significance of the citizen variables used in this chapter is a consequence of these variables acting as a proxy for consumer taste variables. The second re-analysis does however permit this question to be addressed.

4.3 THE CORONATION HILL CV STUDY

This section investigates the results of a recent Australian CV study, that of the Resource Assessment Commission’s (RAC’s) study of preservation benefits in the Kakadu Conservation Zone. The purpose is to again investigate the citizen/consumer distinction, to the extent possible with the available data. The Kakadu CV data is well suited to such analysis since the questionnaire contained a rich set of attitudinal variables.

4.3.1 Background

The Kakadu Conservation Zone (KCZ) is an area of approximately 50 square kilometres, surrounded by the 20 000 square kilometres of Kakadu National Park. Most of the Park is registered on the World Heritage List. Although the KCZ is not part of the Park, it is part of the same ecosystem. The Park contains numerous waterfalls and escarpments, along with wetlands, wildlife, scenic vistas and Aboriginal archaeological sites. About a quarter of a million people visit the Park each year.

The Kakadu Conservation Zone Inquiry was the first Inquiry conducted by the Resources Assessment Commission (RAC). The terms of reference of the KCZ
Inquiry required the RAC to, among other things, assess the environmental and cultural values of the Zone and the impact of potential mining operations on those values and on the values of Kakadu National Park. For these reasons, along with an interest in testing "the usefulness of the contingent valuation method" (Imber et al, 1991, piii) for national resource allocation decisions, a CV study was undertaken.

Although subject to much criticism and debate, the design, administration and analysis of results of the CV study were judged by experts to be state-of-the-art\(^3\) \(^4\). A second publication, "Commentaries on the Resource Assessment Commission's Contingent Valuation Survey of the Kakadu Conservation Zone" (RAC, 1991), collects together some of the main critiques of the contingent valuation study\(^5\) along with responses to those critiques by Richard Carson (Carson, 1991).

**The CV Study**

The CV survey, administered by a market research company (AGB McNair), involved 2034 successful in-person interviews in the national sample, and a further 502 interviews obtained in the Northern Territory.

In order to deal with uncertainties regarding the likely impact of the proposed Coronation Hill mining operation, one of two scenarios was randomly assigned to each sample unit. The "major impact scenario" and the "minor impact scenario" differed in terms of both risk of occurrence (expressed in qualitative terms) and impact, the former representing the "worst case" scenario, and the latter representing the "best case scenario". Each scenario described four types of environmental impact: mine-related traffic, chemicals used to extract minerals, mine process water and waste rock material, and impact on wildlife.

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\(^3\) In his review of the KCZ CV study, Michael Hanemann, for example, concluded that "This is an exemplary study - outstanding for the care and thoughtfulness with which it was designed and executed" (Imber et al, 1991, p190).

\(^4\) Several special advisers on contingent valuation and survey design / administration were employed, including Richard Carson from the University of California. Carson was "contracted by the Commission to help ensure the theoretical and technical validity of the CV strategy" (Imber et al, 1991, p3) and also to assist with the analysis of the data.

\(^5\) One of the more noteworthy critiques of the Kakadu CV study was that of ABARE (1991), based largely on the work of Quiggin (1991). Quiggin (1991) focussed on the impartiality dimension outlined above, arguing that because the "dominant social norm ... calls for voters to choose in the best interests of 'the nation as a whole' rather than in their own self-interest", "the most common use of the referendum method, to calculate estimates of aggregate consumer surplus, involves a misrepresentation of the decision process", and that as a consequence some aspects of economic decision making concerning environmental matters "are best left to political and social choice processes". Quiggin (1991) attributes the resultant biases specifically to the 'referendum format'.
The study was the first in Australia to use a two-stage or double-bounded discrete-choice model in which a second bid value is presented to respondents, contingent on their responses at the first stage. This increases the amount of information obtained from each respondent, albeit at the risk of introducing further biases. The range of bid values was selected on the basis of results from pre-testing procedures. Four different sets of bid values were employed, which in conjunction with the two scenarios makes a total of eight sub-samples.

Several approaches were used to overcome the framing bias that leads to the problem of embedding. In addition to visual aids, and preliminary questions that encourage respondents to think about other pressing environmental matters, respondents were instructed prior to the CV question, to “Bear in mind that this in only one of many environmental issues which may cost you money”. A number of different strategies were used to address other commonly encountered forms of biases. Pre-testing in conjunction with follow-up interviewing was used to address some of these.

The CV part of the questionnaire began by presenting respondents with a considerable amount of background information, and information describing the relevant impact scenario. Respondents were, for example, told that:

The Resource Assessment Commission is looking at the question of whether mining should be allowed in this roughly 50 square kilometre zone outlined here on this map, or whether this zone should now be added to Kakadu National Park.... A proposal has been put to the Federal Government to mine for, platinum and palladium at Coronation Hill, here [interviewer indicates location on map] about 250 metres from the South Alligator River.

Having described in detail how the Coronation Hill mine would operate and what its effects might be (ie scenario description, including before and after photos of the region in question), respondents were then told:

From what I have just told you about mining in this zone, some people think that mining should be allowed while other people think the zone should be made part of Kakadu National Park....

Adding this zone to Kakadu National Park will cost you money in two ways. Firstly, the Government will miss out on revenue from the mining company if the mine does not go ahead. In addition, money will be needed to set up the zone as part of the Park, and manage it each year.

The specific discrete-choice question (stage 1) then followed:

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6 Sets of bid values were (i) $100, $250 (if yes to $100), $50 (if no to $100); (ii) $50, $100, $20; (iii) $20, $50, $5; and (iv) $5, $20, $2.
So you can see that adding this zone to the Park would affect your take home pay or the income that you personally have to live on. Would you be willing to have your income reduced by about $2 dollars a week, that's $100 per year, for the next ten years to add this area to Kakadu National Park rather than use it for mining?

Now consider the results of the study. The bi-modal nature of responses lead Imber et al (1991) to focus on parametric results, which in the two-stage discrete-choice case, requires the use of survival analysis. The bi-modal nature of the data, together with the known greater robustness of the median compared with mean, and the fact that median estimates are more consistent with the referendum CV format, lead the RAC to focus on the median WTP results.

The results for the national sample (the primary focus here) are presented in Table 4.6.

<table>
<thead>
<tr>
<th>Non-Parametric</th>
<th>Parametric (Weibull)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Impact Scenario</td>
<td>$123.80</td>
</tr>
<tr>
<td>Minor Impact Scenario</td>
<td>$52.80</td>
</tr>
</tbody>
</table>

The major and minor impact scenario results proved to be significantly different at the 95% confidence level, as expected. This suggests that responses were, in general, sensitive to the particular scenario included in the questionnaire (unlike the south east forest case).

The substantial size of the tails implied by the distribution of conditional acceptance probabilities suggests that components of total economic value, income and price are not the only variables driving responses. Carson (1991), for example, notes that the proportion of 'yes' responses varies from 79.2% in the major impact scenario at a cost of $2, down to 41.7% in the minor impact scenario at a cost of $250. This spread of 37.5% is described by Carson (1991) as 'enormous'. For the minor impact scenario alone, the conditional acceptance probabilities range from 68.6% ($2) down to 41.7% ($250), giving a spread of 26.9%. It is questionable whether such spreads

7 Despite the fact that mean is most consistent with CBA requirements.
are enormous. Although one can argue that the RAC was not attempting to estimate mean WTP and hence did not include bid values higher than $250 in their CV question, it is questionable whether 41.7% of the population would really be willing to pay more than this each year, for ten years. It is possible that some degree of yea-saying or strategic bias is occurring here.

Concerning the lower end of the range of bid values, it is unlikely that bid values less than two dollars (i.e., between $0 and $2) would have produced significantly more yes responses than at $2. Rather, it appears that respondents are taking factors other than pure preservation value into account when formulating their responses. The 31.4% of no responses in the minor impact scenario ($2) could thus represent a negative willingness to pay for preservation, or conversely, a positive willingness to pay for development. One could also interpret such findings as indicative of nea-saying. Similarly, the greatest possible percentage of yea-sayers, or committed-yes responses is 41.7% in the minor impact scenario.

Interest here is again in examining the overall impact of citizen variables on CV responses. This involves examining the determinants of WTP responses through estimation of a valuation function. The major motivation for the re-analysis is to build on the results presented in Section 4.2. Perhaps the major limitation of the results of the south east forests re-analysis is that although variables reflecting citizen concerns were found to be highly significant, the likelihood that these variables also captured consumer attitudes could not be empirically addressed, due to the lack of separate measures for such tastes.

In contrast, the Kakadu dataset contains both consumer and citizen variables. Although the relationship between the dichotomous yes/no response and other variables in the Kakadu study was investigated in several different ways by the RAC, the results of which provide a good deal of support for the hypothesis that citizen considerations are important determinants of CV responses, they do not provide a conclusive test of the importance of citizen considerations once consumer tastes are controlled for. The valuation function reported in Carson (1991), for example, contains neither the variable relating to option value, nor the variable relating to existence value, and citizen variables were only partially represented. Since an investigation into citizen motivations is best conducted (for present purposes) once consumer taste variables are controlled for, it is highly desirable that the full range of consumer (and citizen) variables are represented in the valuation function.

---

8 The former variable was missing from the dataset used at the time of the 1991 analysis.
A second reason for conducting further re-analysis is that, for the purposes of investigating how individuals actually responded to the CV question, in light of the consumer/citizen distinction, it is not desirable to drop the same observations from estimation as reported in Carson (1991). A perusal of the consistency check definitions employed in that study, reveals that more than 200 observations were dropped, based on checks involving income. Although it is important to perform such checks when attempting to estimate mean and median WTP for use in conjunction with a CBA, this is not desirable when we are purely interested in the determinants of how individuals actually responded. Given that citizen considerations may be related to yea-saying, for example, it is not appropriate to drop the 47 observations in which income < $5000 and WTP is in the interval [100-infinity] or [250-infinity]. In addition to the consistency check definitions involving income, a small number (19 in the national sample) of observations were dropped on the basis of inconsistent attitudinal responses. Since these checks involve an attitudinal variable concerning change in the “value” of National Parks, which in the author’s view is slightly ambiguous, it is excluded from the analysis. Only a small number of observations are at issue here.

A further reason for conducting a re-analysis is to remove the effects of ‘starting-point bias’ from the data. An examination of conditional acceptance probabilities presented in Imber et al (1991), suggests that responses to the bid values at the second stage are influenced by having already been presented with a bid value at the first stage, and that this bias is in the order of 10%, which is significant. Focussing purely on the first stage responses not only makes statistical analysis simpler, since non-linear (logistic) regressions rather than survival (Weibull) analysis can be used, but the effects of these biases are removed.

4.3.2 Econometric Re-analysis

The hypothesis to be tested is that stage one responses to the above CV question involved citizen responses. The basic strategy is to control for consumer tastes, and to consider whether variables taken to reflect citizen considerations then have any explanatory power. Logistic regressions of initial yes/no responses on the variables listed in Table 4.7 are conducted, when no respondents are deleted from the dataset on the basis of consistency checks.

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9 A re-run of the Table 4.9 model when these same observations are dropped from estimation does not change the fundamental results presented in this chapter.

10 The same checks also involve a “risk” variable which is also open to misinterpretation.
LOGC and LOGINC are the standard consumer WTP variables. Log specifications are used so as enable coefficients to be interpreted as the elasticity of the odds of yes response, with respect to the price and income variables. The findings reported below are insensitive to this specification.

The key consumer taste variables are those relating directly to components of total economic (preservation) value. In terms of attitudinal variables we have REC clearly relating to actual use value, OPTION relating to option value, and EXIST relating to existence value. In terms of behavioural variables we have ENVCONSM, CONMEM, ENVTV, VISPARKS, and VKAKADU\(^\text{11}\).

Citizen beliefs and attitudes are represented by the variables BAL1 and BAL2, FINANCE and JOBS. In the case of the FINANCE variable, individuals are asked about what they think is most important for Australia, and hence this variable picks up citizen attitudes. Note also that it addresses both sides of the economy-environment tradeoff. The JOBS variable is similar in nature. The BAL variables are obtained from the same question that was used to measure these variables in the south-east forests study. This question is clearly concerned with eliciting what the individual believes to be good for society, and implies consideration of both sides of the economy-environment equation. It is not concerned with costs and benefits specific to either mining or Kakadu, but rather with all aspects of Australia’s economy and natural environment.

Table 4.8 shows the distribution of WTP responses in relation to responses to this variable. As expected, the likelihood of a yes response is clearly higher amongst respondents selecting the first response option. The lack of variables representing the first citizen characteristic identified in Section 3.3.6 makes it impossible to test adequately. The effects of the second and third characteristics cannot be isolated from one another.

Table 4.9 presents the results for the multiple logistic regression containing major consumer and citizen independent variables. The first box of slope terms contains the classic consumer variables, the second contains the citizen variables, and the third contains variables that do not clearly represent purely consumer or citizen factors.

\(^{11}\) The variables REC, EXIST, FGEN, ABOR, FINANCE and JOBS were coded from one (strongly disagree) to five (strongly agree). Following Carson (1991), these variables are entered into regressions as single continuous variables, rather than a series of m-1=4 dummies. The additional variance created by following the latter approach is believed to “typically outweigh the bias introduced by treating the ordinal variable as a continuous one” (Carson, 1991, p 62).
### TABLE 4.7 VARIABLE DEFINITIONS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGC</td>
<td>log of stated cost of preservation (c=5,20,50,100)</td>
</tr>
<tr>
<td>LOGINC</td>
<td>log of gross income. Midpoints of intervals used except in case of highest category where respondents were arbitrarily assigned an income of $150,000.</td>
</tr>
<tr>
<td>SCENARIO</td>
<td>an indicator of whether the respondent received the major impact scenario (=1) or the minor impact scenario (=0).</td>
</tr>
<tr>
<td>ENVCONSM</td>
<td>a measure of environmentally conscious behaviour, equalling 1 if respondent both recycles and buys environmentally friendly products, and 0 otherwise.</td>
</tr>
<tr>
<td>CONMEM</td>
<td>a dummy variable equalling 1 if the respondent is a member of a conservation organisation, and 0 otherwise.</td>
</tr>
<tr>
<td>BAL1</td>
<td>dummy coded as 1 if respondent believes Australia needs to concentrate more on protecting the environment, 0 otherwise</td>
</tr>
<tr>
<td>BAL2</td>
<td>dummy coded as 1 if respondent believes Australia needs to concentrate more on developing the economy; 0 otherwise. Control response option is “currently have a reasonable balance”.</td>
</tr>
<tr>
<td>ENVTV</td>
<td>dummy variable which equals 1 if the respondent watches nature-oriented TV programs frequently, and 0 otherwise.</td>
</tr>
<tr>
<td>OPTIONV</td>
<td>dummy variable equalling 1 if respondent thinks he/she is likely to visit Kakadu National Park in the future, and 0 otherwise.</td>
</tr>
<tr>
<td>VISPARKS</td>
<td>dummy variable equalling 1 if respondent has visited national park or bushland recreation area in last 12 months, 0 otherwise.</td>
</tr>
<tr>
<td>VKAKADU</td>
<td>dummy variable equalling 1 if respondent has visited Kakadu National Park, 0 otherwise.</td>
</tr>
<tr>
<td>REC</td>
<td>strength of agreement with the statement: “The greatest value of National Parks and nature reserves is in recreation activities such as bushwalking, camping or just taking photographs”</td>
</tr>
<tr>
<td>EXIST</td>
<td>strength of agreement with the statement: “It is very important to have places where native wildlife and plants are preserved, even if I never go there to actually see them”</td>
</tr>
<tr>
<td>FGEN</td>
<td>strength of agreement with the statement: “In deciding how to use Australia’s natural resources, it is more important to consider the needs of future generations than our own”</td>
</tr>
<tr>
<td>ABOR</td>
<td>strength of agreement with the statement: “In deciding how to use areas like Kakadu National Park, their importance to the local Aboriginal people should be a major factor”</td>
</tr>
<tr>
<td>FINANCE</td>
<td>strength of agreement with the statement: “In deciding how to use our natural resources such as mineral deposits and forests, the most important thing is the financial benefits for Australia”</td>
</tr>
<tr>
<td>JOBS</td>
<td>strength of agreement with the statement: “Jobs are the most important thing in deciding how to best use our natural resources such as mineral deposits and forests”</td>
</tr>
</tbody>
</table>
The signs of the estimated coefficients are all as expected, except for the variables OPTIONV, and logINC which are not statistically significant. Although the RAC’s main report (Imber et al, 1991) reports a similarly not-significant result for income, the consistency checks employed in Carson (1991), and referred to above, produced a significant coefficient for this variable.

Examination of the t-statistics suggests that the appropriate behavioural model of CV responses in this instance is a combined consumer/citizen model. Both consumer and citizen variables appear to be driving responses. It is thus not appropriate to view WTP estimates as simply reflecting the sum of the different components of total economic value. Indeed, variables reflecting key components of total economic value,
<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>T-Statistic</th>
<th>P-values</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.4530</td>
<td>2.578</td>
<td>0.0099</td>
<td>3.291</td>
</tr>
<tr>
<td>LogC</td>
<td>-0.2625</td>
<td>4.866</td>
<td>0.0001</td>
<td>9.660</td>
</tr>
<tr>
<td>LogINC</td>
<td>-0.1378</td>
<td>1.839</td>
<td>0.0660</td>
<td>9.660</td>
</tr>
<tr>
<td>optionv</td>
<td>-0.0235</td>
<td>0.184</td>
<td>0.8538</td>
<td>0.603</td>
</tr>
<tr>
<td>exist</td>
<td>0.2950</td>
<td>3.054</td>
<td>0.0023</td>
<td>4.748</td>
</tr>
<tr>
<td>visparks</td>
<td>-0.0497</td>
<td>0.367</td>
<td>0.7136</td>
<td>0.722</td>
</tr>
<tr>
<td>vkakadu</td>
<td>-0.4382</td>
<td>2.361</td>
<td>0.0182</td>
<td>0.115</td>
</tr>
<tr>
<td>rec</td>
<td>0.1035</td>
<td>1.930</td>
<td>0.0536</td>
<td>3.686</td>
</tr>
<tr>
<td>envconsm</td>
<td>0.2437</td>
<td>1.998</td>
<td>0.0458</td>
<td>0.545</td>
</tr>
<tr>
<td>envtv</td>
<td>0.1504</td>
<td>1.187</td>
<td>0.2354</td>
<td>0.589</td>
</tr>
<tr>
<td>connmem</td>
<td>0.1181</td>
<td>0.396</td>
<td>0.6921</td>
<td>0.064</td>
</tr>
<tr>
<td>jobs</td>
<td>-0.2929</td>
<td>5.366</td>
<td>0.0001</td>
<td>2.578</td>
</tr>
<tr>
<td>finance</td>
<td>-0.5920</td>
<td>10.831</td>
<td>0.0001</td>
<td>2.882</td>
</tr>
<tr>
<td>bal1</td>
<td>0.8600</td>
<td>5.183</td>
<td>0.0001</td>
<td>0.338</td>
</tr>
<tr>
<td>bal2</td>
<td>-0.1131</td>
<td>0.821</td>
<td>0.4114</td>
<td>0.386</td>
</tr>
<tr>
<td>fgen</td>
<td>0.2127</td>
<td>2.914</td>
<td>0.0036</td>
<td>4.483</td>
</tr>
<tr>
<td>abor</td>
<td>0.1700</td>
<td>3.419</td>
<td>0.0006</td>
<td>3.600</td>
</tr>
<tr>
<td>scenario</td>
<td>0.4522</td>
<td>3.790</td>
<td>0.0002</td>
<td>1.501</td>
</tr>
<tr>
<td>age</td>
<td>-0.0189</td>
<td>5.141</td>
<td>0.0001</td>
<td>42.878</td>
</tr>
</tbody>
</table>

AIC: 1794.487
SC: 1899.930
-2logL: 1756.487
chi-square (-2logL) for covariates: 696.298, 18df, p=0.0001
% correct pred.: 77.7%
value, TEV, such as use value (REC) and option value (OPTION) are not statistically significant. The component of TEV that does drive responses to a significant extent is existence values (EXIST). This is as one might expect, given the considerable geographical distance separating the Kakadu Conservation Zone from the majority of the Australian population.

Standardised parameter estimates (not shown) and the t-values indicate that the variables BAL1, JOBS and FINANCE all have greater influence on the log(odds) than the existence value variable\textsuperscript{12}.

Given the reasonably high collinearity between the citizen variables, it may be appropriate to include one at a time. Table 4.10 presents results for two models containing the consumer variables plus one of the citizen variables. Several of the variables that failed to yield statistically significant coefficients in Table 4.9 have been dropped\textsuperscript{13}.

The goodness of fit criteria suggest that the first model in Table 4.10 provides the best fit, with Finance being highly significant. The omission of selected citizen variables tends to increase the significance of the citizen variables remaining in the model, with BAL2 becoming statistically significant in the second model. The essential results for the consumer variables are unchanged.

Consider the relative impact in the first model of the finance and log($e$) variables. In terms of the impact on the log(odds), a change in response to the finance question from strongly disagree to strongly agree would only be offset by an increase in price ($c$) by a factor of $5.3$ million! Finance has approximately twice the impact of Existence Values, for a given level of agreement.

In the second model, a change in response to the balance question from “reasonable balance” to “more on environment” would only be offset by an increase in price by a factor of 175. A change in response from “reasonable balance” to “more on economy” would only be offset by a decrease in price by a factor of approximately four.

\textsuperscript{12} Indeed, if the log(odds) is separately regressed on the entire set of consumer variables less variation in the log(odds) is explained than if FINANCE is the only independent variable. Both regressions included the scenario variable as the only additional variable. Percent correct predictions increases from 68.8% in the case of the consumer model, to 75.5% in the finance model. The respective figures for the Akaike Information Criterion are 2277.1 and 2166.5 respectively.

\textsuperscript{13} A separate analysis in which they were left in showed that the remaining two of the citizen variables had no significant effect on the significance of these variables.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T-Stat</td>
<td>P-value</td>
<td>T-Stat</td>
<td>P-value</td>
<td>T-Stat</td>
</tr>
<tr>
<td>Constant</td>
<td>1.5529</td>
<td>0.0930</td>
<td>-1.2581</td>
<td>0.1443</td>
<td></td>
</tr>
<tr>
<td>LogC</td>
<td>-0.2467</td>
<td>0.0001</td>
<td>-0.2112</td>
<td>0.0001</td>
<td>3.29</td>
</tr>
<tr>
<td>LogINC</td>
<td>-0.1184</td>
<td>0.1027</td>
<td>-0.0663</td>
<td>0.3327</td>
<td>9.66</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0199</td>
<td>0.0001</td>
<td>-0.0240</td>
<td>0.0001</td>
<td>42.88</td>
</tr>
<tr>
<td>Exist</td>
<td>0.3854</td>
<td>0.0001</td>
<td>0.4997</td>
<td>0.0001</td>
<td>4.75</td>
</tr>
<tr>
<td>Vlakadu</td>
<td>-0.4016</td>
<td>0.0237</td>
<td>-0.4227</td>
<td>0.0121</td>
<td>0.11</td>
</tr>
<tr>
<td>Rec</td>
<td>0.0657</td>
<td>0.1983</td>
<td>-0.0674</td>
<td>0.1488</td>
<td>3.69</td>
</tr>
<tr>
<td>Envcons</td>
<td>0.3617</td>
<td>0.0020</td>
<td>0.4339</td>
<td>0.0001</td>
<td>0.54</td>
</tr>
<tr>
<td>Finance</td>
<td>-0.7637</td>
<td>0.0001</td>
<td></td>
<td></td>
<td>2.88</td>
</tr>
<tr>
<td>BAL1</td>
<td>1.0918</td>
<td>0.7143</td>
<td>0.0001</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>BAL2</td>
<td>-0.3120</td>
<td>2.478</td>
<td>0.0132</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>Fgen</td>
<td>0.2347</td>
<td>0.0008</td>
<td>0.1622</td>
<td>0.0137</td>
<td>4.48</td>
</tr>
<tr>
<td>Abor</td>
<td>0.2311</td>
<td>0.0001</td>
<td>0.2379</td>
<td>0.0001</td>
<td>3.59</td>
</tr>
<tr>
<td>Scenario</td>
<td>0.4363</td>
<td>0.0002</td>
<td>0.5694</td>
<td>0.0001</td>
<td>0.50</td>
</tr>
<tr>
<td>AIC</td>
<td>1863.266</td>
<td></td>
<td>2456.902</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>1929.862</td>
<td></td>
<td>2462.452</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-logL</td>
<td>1839.266</td>
<td></td>
<td>2454.902</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-Square</td>
<td>613.519</td>
<td></td>
<td>431.785</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% correct pred.</td>
<td>77.2%</td>
<td></td>
<td>72.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examination of cross-tabulated data reveals that, for the combined scenarios sample, 89 percent of respondents who strongly disagreed with the finance statement also said Yes to the CV question, compared with 28 percent in the case of those who strongly agreed. If we attempt to predict Yes/No CV responses on the basis of responses to the finance question alone, we can do remarkably well, in comparison to the fully specified model. In the case where "strongly disagreed", "disagree" and "neither agree nor disagree" respondents are all predicted to say Yes to the CV question, and

14 In a couple of instances this differs from one model run to the next, but in all cases by less than 0.01.
those who either “strongly agree” or “agree” are predicted to give no responses, we predict correctly in 75% of cases. Recall that the fully specified valuation function (Table 4.10) only predicted 77% correctly.

So far citizen variables have been included in regression models in only additive form. Interest does however lie in whether the overall behavioural relationship (slope and intercepts) between WTP and the consumer variables is significantly dependent on, or moderated by, the citizen variables. This can be done by selecting a key citizen variable such as BAL1/BAL2 and adding all multiplicative terms involving this variable to the above set of explanatory variables. Alternatively, the dataset can be partitioned into three separate datasets corresponding to different responses to the ‘balance’ question. The logistic regressions are then re-run for each of these subsamples, plus the original (pooled) dataset. A likelihood ratio test can be used to test whether the above behavioural relationship is significantly dependent on the citizen variable. Results for the estimations are included in Table 4.11. The LR statistic for testing the hypothesis that the behavioural relationship between WTP and the consumer variables is unaffected by citizen attitudes is 125.094 on 22 degrees of freedom, which is highly significant. Citizen attitudes thus effect the behavioural relationship between WTP and the classic consumer variables.

4.3.3 Discussion of Kakadu Reanalysis

The results of the re-analysis of the Kakadu CV study indicate that variables influencing citizen preferences are again significant determinants of CV response. In addition to the results obtained for the south-east forest re-analysis, the Kakadu results indicate that these citizen variables remain statistically significant once consumer taste variables are controlled for. This indicates that the citizen variables are picking up more than consumer tastes.

A further result is that variables involving environment-development tradeoffs remain statistically significant even when separate environment and development attitudinal variables are already included in the model. This may reflect the highly significant effect that an individual’s general environment-development orientation has on CV responses. Individuals may think that both jobs and the environment are important, but when it comes to the crunch, and they have to choose one or the other, they tend to fall back on their general orientations regarding such matters.
### TABLE 4.11 MODERATING EFFECT OF BALANCE ATTITUDE ON WTP/CONSUMER VARIABLE RELATIONSHIP

<table>
<thead>
<tr>
<th>Parameter</th>
<th>More on Environment (BALI=1, BAL2=0)</th>
<th>More on Economy (BALI=0, BAL2=1)</th>
<th>Reasonable Balance (BALI=0, BAL2=0)</th>
<th>Pooled Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate t-statistic</td>
<td>Estimate t-statistic</td>
<td>Estimate t-statistic</td>
<td>Estimate t-statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.8688 t-0.461</td>
<td>-1.1256 t-0.869</td>
<td>-0.9910 t-0.663</td>
<td>-1.8147 t-1.53</td>
</tr>
<tr>
<td>log (Sc)</td>
<td>-0.3515 t-3.087</td>
<td>-0.1407 t-1.976</td>
<td>-0.2373 t-2.260*</td>
<td>-0.1970 t-4.114</td>
</tr>
<tr>
<td>log (income)</td>
<td>-0.0988 t-0.671</td>
<td>-0.0824 t-0.824</td>
<td>-0.0489 t-0.399</td>
<td>-0.0582 t-0.885</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>-0.0142 t-2.099*</td>
<td>-0.0270 t-5.541*</td>
<td>-0.0258 t-4.687*</td>
<td>-0.0249 t-8.114</td>
</tr>
<tr>
<td>Exist</td>
<td>0.7699 3.772*</td>
<td>0.4374 3.411*</td>
<td>0.4020 2.438*</td>
<td>0.5551 6.128*</td>
</tr>
<tr>
<td>Vikkadu</td>
<td>0.1903 0.438</td>
<td>-0.6390 -2.403*</td>
<td>-0.4663 -1.678</td>
<td>-0.4257 -2.639</td>
</tr>
<tr>
<td>Rea</td>
<td>-0.1805 t-1.765</td>
<td>-0.0903 t-0.707</td>
<td>-0.0197 t-0.242</td>
<td>-0.0825 -1.825</td>
</tr>
<tr>
<td>Econnum</td>
<td>0.6367 2.642*</td>
<td>0.3544 2.174*</td>
<td>0.4530 2.289*</td>
<td>0.5641 5.279*</td>
</tr>
<tr>
<td>Fgen</td>
<td>0.2908 2.143*</td>
<td>0.1270 1.329</td>
<td>0.1172 0.940</td>
<td>0.1989 3.117*</td>
</tr>
<tr>
<td>Arbor</td>
<td>0.0867 0.813</td>
<td>0.2676 4.030*</td>
<td>0.2892 3.699*</td>
<td>0.3039 7.026*</td>
</tr>
<tr>
<td>Scenario</td>
<td>0.6369 2.581*</td>
<td>0.4740 2.958*</td>
<td>0.6458 3.315*</td>
<td>0.4956 4.680*</td>
</tr>
<tr>
<td>Chi-Square (-2logL)</td>
<td>65.030(N = 642)</td>
<td>109.466(N = 734)</td>
<td>84.491(N = 525)</td>
<td>324.479(N = 1901)</td>
</tr>
<tr>
<td>-2logL</td>
<td>-476.687</td>
<td>907.289</td>
<td>621.353</td>
<td>2130.423</td>
</tr>
<tr>
<td>% Correct Predictions</td>
<td>86</td>
<td>66</td>
<td>67</td>
<td>72</td>
</tr>
<tr>
<td>AIC</td>
<td>498.687</td>
<td>929.289</td>
<td>643.353</td>
<td>2152.423</td>
</tr>
</tbody>
</table>

* indicates significance at 95%, two-tailed test.

An interesting criticism of the RAC study relevant to the above discussions is that of ABARE (1991), and see also Quiggin (1991), who present a statistical analysis of the data generated by this CV application, based on an ‘alternative’ interpretation of the survey data in which some individuals were held to be responding as voters. The ABARE/Quiggin analysis investigated their voting proposition by considering whether responses were insensitive to income, and by testing the restriction that individuals responding as voters answered yes/yes or no/no irrespective of the sums involved. The first involved simply drawing on the findings of the RAC study, namely that income does not have a statistically significant effect on estimated willingness to pay for either Australian population or NT samples. Carson (1991) shows that this result no longer occurs when other attitudinal and demographic variables are included in a multivariate regression model. The fact that variables such as income become significant when citizen type explanatory variables are included within the model, tends to suggest that a combined consumer/citizen model may be the most appropriate for explaining CV responses.
The second aspect of the ABARE/Quiggin analysis pertains to the assumption that some individuals respond as voters who are committed to a position, one way or the other, on the project and that the commitment is unaffected by the size of monetary sums mentioned in connection with the project. The results presented in ABARE (1991) are interpreted as being consistent with 53 per cent of individuals responding as voters, of whom 39 per cent support preservation, i.e., are committed to not allowing mining. Carson (1991) disputes this interpretation of the statistical results reported in Appendix B of ABARE (1991). However, Carson does not appear to dispute the more general proposition that some individuals responded as voters rather than consumers. His objection is to the interpretation that voters were unresponsive to the postulated income loss:

"ABARE seems to be arguing that Australians are incapable of understanding and answering questions of the form: "would you vote for this policy if the cost to you was $x, yes or no?", whether in an actual referendum or on a survey (p 3)."

It is noted here that the ABARE/Quiggin model does not indicate why voter responses would be insensitive to price. It has previously been noted that Mitchell and Carson (1989) expressed the view that for goods with which respondents have little familiarity the appropriate model for CV is referendum voting rather than the market model.

4.4 CHAPTER CONCLUSIONS.

The following conclusions appear justified:

(i) Variables reflecting the characteristics of citizen responses briefly outlined in Section 3.3.6 are powerful determinants of CV response in both of the case studies considered. This result appears to hold when consumer tastes are controlled for, suggesting that the citizen taste variables are distinct from consumer taste variables.

(ii) In the south-east-forest case, the expression of these citizen taste variables was not sensitive to the geographical scope of the environmental good, producing an embedding type effect.

(iii) Price was not highly significant in the south-east-forests case, suggesting that the expression of citizen attitudes may involve a disregard for the price variable. Income was not a highly significant determinant of CV response in either of the case studies.
(iv) An ABARE/Quiggin study suggested that the Kakadu results may have been dominated by ‘committed’ yes and no voter responses, but failed to offer an explanation as to why voter responses would be price sensitive.

(v) To the extent that citizen responses reflect voter responses, policy-referendum formats such as employed in the two RAC studies discussed in this chapter, are expected to stimulate such responses more than market based trust fund formats.

(vi) Both of the CV studies discussed in this chapter involved goods that were the subject of widespread public controversy at the time of the CV study. Many respondents would have formed citizen preferences prior to being presented with the CV questionnaire.
CHAPTER 5

AN EXTENDED MODEL OF RESPONDENT BEHAVIOUR

5.1 INTRODUCTION

The re-analyses in Chapter 4 are consistent with the hypothesis that respondents do not always respond to CV questions in the way that economists conducting CBA’s might hope. A number of studies reported in Chapter 2 support a similar conclusion. In addressing this issue, CV researchers have tended to focus on providing a comprehensive listing of potential response effect biases (see Mitchell and Carson, 1989), and attributing any questionable CV result to one or more of these biases. There have been few moves to extend the assumed model of respondent behaviour to encompass the factors leading to such biases. Associated with this is the tendency to assume that questionable results are a function of inappropriate questionnaire design or administration. In the main, CV research appears to be conducted in accordance with a working hypothesis that well designed questionnaires are not subject to significant biases.

Although this might often be the case, it is difficult to accept ‘optimally’ designed CV question will always produce useful results. There may be cases, for example, where no questionnaire could have produced results of an acceptable accuracy. Without a more comprehensive understanding of respondent behaviour, it will often be impossible to predict when this will be the case, resulting in wastage of public money. What is needed is a more comprehensive model of respondent behaviour, that permits one to better tailor questionnaires to the relevant sociocultural environment, and which gives an idea of how alternative courses of action might proceed, when an acceptable tailoring is not considered possible.

This chapter extends the basic model of respondent behaviour offered by Sagoff (1988) and introduced briefly in Chapter 3. This is prompted by the empirical findings of Chapter 4, which tended to support the citizen-consumer distinction. The chapter is structured as follows. Section 5.2 discusses the dimensions of citizen-consumer divergences (outlined briefly in Section 3.3.6) in considerably more detail than Sagoff (1988). This involves drawing on literature from several disciplines, most notably, psychology, economics and political science. Section 5.3 extends Brown and

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1 Some studies have, however, attempted to extend the model of respondent behaviour. See, for example, Edwards (1986) and the numerous papers in Peterson et al (1988).
Slovic's (1988) 'assignment of value' framework to encompass the expression of citizen preferences. Section 5.4 discusses what might constitute the ideal citizen response, which has implications for alternate questioning processes to that typically employed in CV questions. This involves a review of the relevant philosophical literature. Section 5.5 presents the conclusions for the chapter, including a discussion of the options facing the CV researcher, when a significant proportion of citizen responses are expected.

5.2 DIFFERENCES IN CONSUMER AND CITIZEN PREFERENCES

5.2.1 Ethical Preferences

According to Sagoff (1988), citizen preferences involve greater focus on ethical aspects of the issue under investigation, and tend to reflect what is perceived to be best for society rather than best for self and family. Since impartiality involves altruism and altruism involves a particular type of morality, the latter of Sagoff's claims may be seen as a particular case of the former. Sagoff's focus on protest responses also clearly involves ethical preferences. Hence we have one broad dimension through which citizen and consumer preferences may be seen to diverge, and two particulars:

Dimension 1: The extent to which the individual invokes ethical considerations when formulating a preference.

Particular 1: The extent to which the individual is willing and able to trade personal income for environmental quality as required.

Particular 2: The extent to which a preference is impartial and hence does not reflect dominant loyalties to self, family or any other individual or group of individuals.

Concerning the first particular, Sagoff denies that the utility function \( U_i(q,x,y) \) exists, arguing that a significant proportion of individuals will be either unable, or unwilling to make the required trade-offs. This essentially involves challenging the consumer theory axioms of completeness and continuity. Research in cognitive psychology suggests that lexicographic decision rules are a common type of simplifying heuristic that individuals employ to avoid tackling conflicts head-on (Payne et al., 1992). In the context of CV, Spash and Hanley (1995) identified lexicographic preferences in an open-ended CV study as corresponding to respondents who stated a zero WTP for the reason that biodiversity should be protected by law, and respondents who stated...
that animals/ecosystems/plants should be protected irrespective of the costs and who refused to give a WTP amount. In another CV study, Stevens et al (1991) found that the majority of respondents would not pay any money for the existence of bald eagles or wild turkeys in New England, or for salmon restoration. In the case of bird preservation, 40% of such responses protested the payment vehicle used in the CV question: "they stated that these species should be preserved but that the money should come from taxes or license fees. Twenty-five percent protested for ethical reasons, claiming that wildlife values should not be measured in dollar terms" (p397).

Given a choice between two bundles x and y, the completeness axiom requires that either xPy, yPx or xly, where P stands for "is preferred to", and I represents a relationship of indifference. As Opaluch and Segerson (1989) point out, however, this ignores a potentially important psychological feeling, that of ambivalence. Ambivalence arises when the individual faces strongly opposing feelings when making a decision. Indifference implies a complacency in decision-making that is not an appropriate description of the psychological demeanour for choice where the individual has strongly opposing feelings for two options. Rather, under extreme ambivalence the choice embodies a deep psychological conflict which must be resolved. Thus, rather than making decisions according to a balancing of costs and benefits, conflict resolution determines the choices to be made and this may result in behaviour that violates neoclassical assumptions (p87-88).

In addition to inaction or protest behaviour, ambivalence can result in problem denial, or more generally, belief modification in the form of cognitive dissonance (CD). In attempting to resolve inner conflict, individuals may modify their beliefs so as to remove conflict and hence permit a decision to be made. Ackerlof and Dickens (1982) were the first to address the issue of CD within an economic framework. They considered the case in which workers in dangerous jobs formulate certain beliefs regarding whether or not their job is safe in order to resolve the conflict between work and safety. CD is also likely to have widespread applications in the way people think about environmental problems.

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2 A classic example of cognitive dissonance is that of cigarette smokers seeking to reduce the discomfort that results from conflicting desires to live long and enjoy smoking. It is common for such individuals to modify their belief regarding the ill effects of smoking, using such rationale as 'smoking is relaxing and hence de-stressing', 'I'll do exercise to make up for it', or 'it won't happen to me'.

3 "If the psychological benefit of suppressing one's fear in a particular activity exceeds the cost due to increased chances of accident, the worker will believe the activity to be safe. Otherwise he will believe it to be unsafe" (Ackerlof and Dickens, 1982, p308). People in dangerous jobs may thus be seen to modify their subjective probabilities (beliefs regarding likelihood of accident) of an
The implications of ambivalence are not limited to inaction and other forms of protest behaviour, and cognitive dissonance. Rules of thumb, of various types, may involve modes of decision making that depart from the neoclassical model. Edwards (1986, 1992) considers the implications of ethical preferences for traditional welfare analyses of existence values, focussing on the likelihood of ‘bounded’ lexicographic preferences. A lexicographic strategy is likely to favour choices involving moral commitments as long as some minimum level of alternate welfare source, say income, is satisfied. When below this threshold value, $Y^*$, moral commitments may be sacrificed for any improvement in income $Y$. A key characteristic of lexicographic preferences is that points of indifference do not exist, which clearly has serious implications for the estimation of Hicksian surplus measures. Indeed, when $Y > Y^*$, the individual is willing to pay $Y - Y^*$ for any increase in the amount of the morally infused good. Alternatively, when $Y < Y^*$, the individual is willing to accept any amount of compensation for decreases in the same good. WTP and WTA figures will thus often be defined with lexicographic preferences and hence measured by CV studies. The resulting WTP estimates will not, however, represent the appropriate Hicksian surplus measures. The fact that WTP is the same no matter how large the change in the morally infused good when $Y > Y^*$, can be expected to produce an embedding type result. When WTP is undefined, such as when $Y < Y^*$, protest

4 Burton and Kates (1964), for example, identify a number of ways in which individuals may modify their beliefs in order to resolve conflicts pertaining to natural hazards such as floods, droughts and earthquakes. The beliefs of farmers regarding their resource and natural hazards will clearly be an important influence on whether or not soil conservation measures are adopted. A decision may not necessarily accord with the economically rational approach of calculating expected utilities. It is important to note that CD may occur under conditions of perfect information and excellent information-processing abilities. It must thus not be assumed that once farmers become aware of a soil erosion problem, they will take appropriate action. Perception of such problems may be influenced more by social and economic factors than by the actual extent of the problem (Green and Heffernan, 1987).

5 In addition to rules of thumb used by consumers, rules of thumb, of a sophisticated nature, are also used by government in respect to government regulations and standards. Regulations often rule out tradeoffs, although in some cases the rule may be modified to follow the regulation only when the opportunity costs of doing so are unacceptably large. Whether this approach is consistent with the neoclassical framework can be debated. Randall (1991), for example, believes that the Safe-Minimum-Standard approach to environmental decision-making may be consistent with this standard framework.

6 Lexicographic preferences involve a violation of the continuity axiom of consumer theory.
responses in the form of non-responses, zero values or excessively high values are likely, and similarly with WTA. In dichotomous choice CV studies, zero responses and excessively high responses will accord with committed-no and committed-yes responses respectively. Common et al (1994) conducted some experiments to investigate the possibility of lexicographic preferences with respect to environmental goods and found that results were consistent with a lexicographic model of respondent behaviour for approximately a quarter of respondents. An additional quarter reported preferences that were incomplete or intransitive.

Opaluch and Segerson (1989) use a diagrammatic representation of preference orderings to illustrate how individuals may behave under situations of ambivalence. The individual is assumed to be able to make some comparisons between values and tastes, but there exists a fuzzy ambivalence region where decision-making is very difficult and where indifference is not considered an appropriate conclusion. When considering tradeoffs between points within the ambivalence region, changes in values and tastes are in conflict and a decision is difficult to make, if possible at all. As one moves through the ambivalence region, the probability of accepting the trade tends to increase from zero to one (or vice versa depending on the circumstances). Opaluch and Segerson (1989) use their diagrammatic representation of ambivalence to illustrate how their model may be used to explain intransitive choices, the use of rules of thumb, and the divergence between WTP and WTA values that is encountered in practice.

O’Neill (1993) distinguishes between strong and weak commensurability. The former requires that there is a particular single property that all objects possess which is the source of their value, and that our evaluative measure indicates the amount or degree to which that property is present. Strong commensurability presupposes value-monism (O’Neill, 1993, p103).

One might suspect that for a significant proportion of CV respondents, weak commensurability may be more appropriate. This requires that proposals can be ranked in an ordinal fashion, which in turn requires strong comparability. Strong comparability requires that one must be able to say ‘This is more valuable than that’, which is held to be consistent with value-pluralism (O’Neill, 1992). The distinction between the two forms of commensurability is quite appealing in the context of CV, where individuals may be willing to give ordinal rankings (for example in a referendum format) but refuse to reduce all costs and benefits to a single monetary dimension (as may be the case when open-ended trust fund formats are employed). How individuals actually handle tradeoffs involving environmental matters will of
course depend on their particular philosophy or moral reasoning. According to Kohlberg’s (1976) theory of moral development, described briefly in Section 3.3.3, individual development proceeds through a sequence of stages, each implying distinct differences in modes of thinking. Many individuals do not reach the fifth and six stages, which involve moral judgement grounded in utilitarian and duty-based philosophies respectively.

Now consider the second particular. Sagoff (1988) claims that citizen preferences tend to be less self-centred and more impartial than standard consumer preferences. At the impartiality extreme of this continuum, the individual would effectively vote in terms of what he or she perceives to be in the best interests of society overall, irrespective of outcomes for self and family. Altruism only increases impartiality if the objects of the altruism are previously under-represented in the individual’s social preference, compared to an impartial preference, which implies equal weighting to all (discussed in more detail later in this chapter). These are likely to be the individuals who are unfamiliar to the respondent, but who would be effected by the project in question.

Consider the case of a vote in favour or against a given development. At one extreme of the impartiality continuum is the narrowly self-interested response, where the vote is formulated in terms of the option perceived to make the voter materially best-off. Slightly less self-interested is voting for the option that maximises benefits to those of high personal closeness such as family. When only material benefits are considered, this may be referred to as pocketbook voting. Personal cost-benefit-analysis (PCBA) preferences are similar but not necessarily restricted to material benefits. With respect to the impartiality extreme, it is important to note that self-benefits are only ruled out to the extent that they arise from the actual outcome about which preferences are being made. It is possible to maintain impartiality when the act of forming or expressing the impartial preference brings utility to the individual. The individual who votes out of a sense of civic duty, for example, may gain utility from the act of voting, but may still vote impartially. Ideally, the impartial preference might correspond to what would be preferred from behind a Rawlsian veil of ignorance (Rawls, 1971). The ideal citizen is discussed in more detail later in this chapter.

If preservation values arising from personal use and option values are subordinated in formulation of the CV response, as an impartial preference effectively requires, then the response will not represent total economic value, TEV, as typically assumed. A further implication of impartial preferences is that some weighting is given to other
members of the current generation, which as we saw in Chapter 2, may result in some degree of double-counting of the benefits to these individuals. Indeed, altruism need not be impartial for this problem to arise. One might expect that all CV studies involving existence values are subject to this double-counting effect, when results are required to be consistent with the compensation principle of CBA.

Mitchell and Carson (1989, p93) note that the referendum model is required in order to avoid downplaying the "public-regardingness behind existence values". Contextual factors such as the institutional nature of the CV question can clearly influence the impartiality of CV responses. It is, for example, conceivable that use of the referendum format could generate more impartial and hence different responses than a market based trust-fund format. Which of the resulting levels of impartiality would then be appropriate? As Brown and Slovic (1988) note, when CV responses become highly contingent on contextual factors, it becomes questionable whether such responses can still be considered consistent with the required axioms of expected-utility theory, and hence useable in CBA.

It is also noted that a considerable body of consumer behaviour literature, in the market research area, has focussed on the identification of 'ecologically concerned consumers', and 'socially conscious consumers' (Brooker, 1976, Kinnear et al, 1974). Since ecologically friendly products are often more expensive than their 'unfriendly' equivalents, consumers can be expected to have some experience in trading personal dollars for environmental quality. It is unlikely however that much subordination of private interests occurs in the purchase of environmentally friendly products. Although purchases of such products may resemble citizen considerations to a greater extent than other products, it is unlikely that they would bear much resemblance to the more impartial voter preferences. In the market place, ethical concerns are likely to play a more secondary role. Green consumer behaviour may involve the (symbolic) expression of identity and commitment more than a concern with the individual's own influence on outcomes (Simmons, forthcoming). In Chapter 10, it is argued that similar processes may be at work in the electoral context, in a more widespread form.

It is suggested then, that in general, individuals will tend to have more impartial sociopolitical preferences than market preferences. In the context of CV, it can be expected that responses to many CV questions will have a distinct sociopolitical flavour, and that the referendum format will increase this tendency, by encouraging respondents to formulate preferences according to their typical voting parameters. A considerable body of psychological and political science literature has been directed at
the role of self-interest in sociopolitical preferences. Sears and Funk (1991) review a large number of studies relating to this issue. The paradox of voting in public choice theory was noted in Section 3.3.2. Overall, it appears that there is mixed support for the hypothesis that sociopolitical attitudes are motivated mainly by self-interest. The definition of self-interest employed in these studies is frequently limited in one or more of the following important respects: only short-term benefits count, only material benefits count, and only private benefits count (see Bobo, 1983, Sniderman and Tetlock, 1986 for criticisms). Appendix C summarises some of this literature in more detail.

Perhaps of greater interest are the four explanations Sears and Funk (1991) offer concerning why self-interest may not have a significant effect on social and political attitudes. Firstly, they argue that the stakes are often not sufficiently large, clear or certain enough to motivate highly self-interested behaviour. Converse (1975) has suggested that self-interest may operate more strongly on local issues. Secondly, it is possible that one precondition for self-interest is external attributions (to governments or society) and that in reality there is a tendency to bias toward internal attributions. The ‘ethic of self-reliance’ and ‘belief in a just world’ are possible examples of internal attribution. If people believe they get what they deserve, they may be less motivated to get as much as they can for themselves, when they may not deserve it. A third explanation for the lack of observed self-interest motivations behind social and political attitudes concerns symbolic predispositions. According to this theory, political attitudes “reflect the affects previously conditioned to the specific symbols included in the attitude object” without detailed consideration of underlying meanings (Sears and Funk, 1991,p74). This conditioning and simplification is promoted largely via the external information environment. The political dialogue of politicians and journalists is held to involve coding information into abstract and symbolic terms.

In contrast, individuals’ “personal experiences are perhaps too close at hand, complex, and individuated, to lend themselves to easy generalisation; they are ‘morselized’ and difficult to trigger by political symbols”(p74). The result is cognitive compartmentalisation of personal and group well-being. There is some evidence (Iyengar, 1987, 1990) to suggest that each of these “two cognitive domains can be accessed separately by appropriate framing of political issues.... Framing an issue in terms of societal conditions or national problems tends to produce attributions that place responsibility (for either problem or solution) on government or

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7 Interestingly, Sears and Funk (1991) argue that in the majority of cases, symbolic predispositions tend to have stronger effects among the better informed and/or educated, whereas self-interest effects do not appear to be enhanced.
society at large, while framing it in term of individual cases yields internal attributions" (Sears and Funk, 1991, p75). In accordance with compartmentalisation of the two cognitive domains, people tend to be "slow to draw societal-level implications from personal level information, and vice versa" (Sears and Funk, 1991, p75). This supports the notion of a dual preference framework that cannot easily be reduced to a single utility framework dimension. In the context of CV, it also suggests that referendum and trust fund formats might prime different cognitive domains.

A fourth possible explanation for the lack of self-interest motivations in sociopolitical attitudes is that people "may be politically socialised to respond to public issues in a principled and public-regarding manner" (Sears and Funk, 1991, p75). People may be seen as donning their 'political hats' when forming social and political attitudes, in contrast to their private of self-regarding hats (Wilson and Banfield, 1964, 1971).

Wilson and Banfield (1964, p876) suggested that "some classes of voters ... are more disposed than others to rest their choices on some conception of 'the public interest' or 'the welfare of the community". In challenging the notion that individuals vote in accordance with their pocketbooks, Kinder and Kiewiet (1979) hypothesise instead that they draw on information about aggregate economic conditions, or what they call collective economic judgements. The sociotropic voter is held to ask "political leaders not 'What have you done for me lately?' but rather 'What have you done for the country lately' and, 'What are you likely to do for the country in the future?' "(Kinder and Kiewiet, 1981, p156). Symbolic or sociotropic attitudes might "express the adult's sense of the public good, and would be quite deliberately and self-consciously given more weight than private considerations in judgements about public policy" (Sears and Funk, 1991, p76). Citizens may thus be socialised to follow a 'norm of public-regardingness' about policy issues affecting the broader community.

When the definition of self-interest is broadened to include the individual's interests in the well-being of others, many public regarding attitudes will then be consistent with self-interest. Sears and Funk (1991, p76) note that little is currently known about

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8 Further, Wilson and Banfield (1964, p885) suggest that "both the tendency of a voter to take a public regarding view and the content of that view ... are largely functions of his participation in a subculture that is definable in ethnic and income terms. Each subcultural group, we think, has a more or less distinctive notion of how much a citizen ought to sacrifice for the sake of the community as well as of what the welfare of the community is constituted; in a word, each has its own idea of what justice requires and of the importance of acting justly." See Lupsha (1975), Durand (1972) and Wilson and Banfield (1971) for further discussion on such matters.

9 See Kinder and Kiewiet (1979, 1981) for further discussions of sociotropic economic judgements.
the "extent to which individuals feel that self-interest is a legitimate basis for forming attitudes about social and political issues, and if so, under what conditions".

Ethical considerations in the formulation of CV responses are of course not limited to the two specific particulars mentioned above. For a given level of impartiality, and willingness to make the required tradeoff, ethical factors can still play an important role in establishing the strength and/or direction of one's preferences. Table 5.1 lists a number of aspects of CV questions that ethical factors, or notions of justice or fairness, may relate to. These do not necessarily relate to the two particulars outlined above, although many will clearly have a bearing on the first. For present purposes, two types of justice may be distinguished: distributive justice being concerned with the fair allocation of resources, and procedural justice being concerned with establishing fair procedures with which outcomes may be assessed. Tyler et al (1986) argue that economic theories have commonly ignored the 'alternate images of the citizen' that arise when psychological research relating to such factors is considered.

The individual's beliefs regarding the importance of community input in environmental decision-making, and the perceived usefulness of questionnaires in providing such input are examples of procedural considerations that may influence CV responses. For those individuals who perceive a CV question to be an attempt at estimating the dollar value of the good in question, beliefs regarding the desirability of such an exercise will also be relevant. Some individuals may also reject the institutional apparatus of a CV question. A referendum format may be considered more appropriate by some than a market-based format such as a trust fund. Further notions of justice relate to ascription of responsibility for both cause of an environmental problem and its treatment (Schwartz, 1968, Brickman et al, 1982). In discussing how citizens think about national issues, for example, Iyengar (1989) found that individuals' attributions of responsibility for both the cause of a problem and its treatment, were significant determinants of issue opinions. Since most CV questions implicitly or explicitly imply that the individual has some responsibility to help protect the environment, thereby justifying some sort of payment, the extent to which this aligns with the individual's own perception of responsibilities regarding the issue in question has an important influence on both the likelihood of payment and the likelihood of protest. Peterson et al (1994) investigated the effects of different levels of moral responsibility on CV responses and concluded (p11) that:

When in a role of agency for the public interest, people tend to use a different utility function that when in the role of individual consumer. When compared with shared responsibility, sole responsibility for choices among public circumstances tends to increase the relative value
Psychologists such as Rasinski (1987) distinguish between notions of justice such as egalitarianism and proportionalism. Depending on the nature of the good being valued, measurement of respondent beliefs regarding such measures may be useful in understanding responses to CV questions.

To a large extent, notions of distributive justice will not cause problems for the purposes of CV responses. Notions pertaining to the appropriate distribution of resources are clearly related to the magnitude of existence, bequest values etc. As noted above, however, WTP arising from altruism toward members of the current generation who stand to benefit from preservation outcomes may result in double-counting from a CBA perspective.

The idea that beliefs about fairness are likely to play an important motivational role in consumer behaviour appears to be supported by the results of laboratory experiments reported over the past decade. Perhaps of most relevance here, are models of bargaining in which two players must divide some amount of money $x, by making alternate offers to one another. Co-operation in which players are permitted to discuss strategies prior to the game are not permitted. Guth et al (1982) conducted simple one-period games, or ultimatum games, in which player 1 simply makes an offer of $a to player 2 and player 2 must either accept or reject it. If he accepts it, he gets $a and player 1 gets the remainder $x-a. If he rejects the offer, both players get $0. The optimal strategy for player 1 is to offer player 2 the smallest possible positive amount, which player 2 should accept since it is better than nothing and not worth forgoing through a ‘no’ response. Results showed, however, that players often did not conform to equilibrium prediction of almost 100% of $x going to player 1.

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10 Peterson et al (1994, p10) note that under “the shared responsibility treatment, each student has little effect on the overall outcome and may therefore feel little responsibility for the effect on others.... The role of sole responsibility, however, may invoke a different framework of values ... based on greater moral responsibility for the consequences of the choices on other people”. In cost-benefit terms, the sole-responsibility treatment would appear to stimulate people to compare benefits to society as a whole with the relatively minor costs to the individual.
### Objects of Procedural Beliefs

- sponsoring organisation/ overall decision-making apparatus
  - desirability of government involvement
    - unbiasedness of sponsoring organisation
    - competence of government organisation
    - desirability of a public inquiry
  - desirability/usefulness of community input
  - usefulness of questionnaires in providing community input
  - role of economics in environmental decision-making
  - desirability of monetary valuation of the environment
  - appropriateness of payment vehicle
  - appropriateness of institutional apparatus employed in CV question (eg referendum format, market based trust-fund format)
  - how individuals should form preferences in given contexts (eg the sense of impartiality required when formulating voter and market preferences).

### Objects of Distributional Beliefs

- specific targets of altruistic interest
  - importance of doing what is right for (or beneficial to) loggers and/or logging communities
  - importance of doing what is right for (or beneficial to) members of the public
  - importance of doing what is right for (or beneficial to) species and their habitats
- who should pay for the environmental benefits in question
Rather, the average demands made by the first players were under 70% of $x, which Guth et al (p384) believe to be due to subjects often relying ‘on what they consider to be a fair or justified result’. Kahneman et al (1986) in their article ‘Fairness and the assumptions of economics’ also report the results of several experiments designed to investigate fairness as a legitimate motivation behind consumer and producer behaviour. Shogren (1989) argues that fairness in bargaining involves a context. He focuses on loyalties, stressing the importance of explicitly investigating a bargainer’s ‘radius of loyalty’. This would permit a better understanding of the threshold at which loyalties move from one party to another.

The literature on fairness and bargaining indicates that the ethical dimensions of the consumer-citizen divergence are best seen as a continuum rather than a dichotomy. The relative weights given to private and social considerations will vary from good to good, person to person and even for a given person in different contexts. To varying degrees, respondents in CV studies will have ‘loyalties’ to future generations, family, species etc. The next section discusses notions of fairness and justice directed toward those benefiting from developments.

5.2.2 Perceived Opportunity Costs of Preservation

A second consumer-citizen dimension may be outlined, that is specific to CV. As Broome (1992) notes, in addition to the standard axioms of consumer theory, specific types of economic analysis may require that further restrictions are placed on the nature and/or objects of individuals’ preferences. Contingent Valuation is a case in point. If values estimated in CV studies are to be consistent with the requirements of cost-benefit analysis, respondents must not take the importance of the development in question and the associated economic benefits into account. CV responses must be independent of perceived development benefits, since if individuals conduct personal cost-benefit analyses, development benefits will be double-counted in the CBA.

In cases where responses are contingent on perceived importance of development benefits, the decision facing the respondent is no longer whether \( U'(q_0, y^{10}) \geq U'(q_1, y^{10} - c') \), but rather whether \( U'(d_1, q_0, y^{10}) \geq U'(d_0, q_1, y^{10} - c') \), where \( d_1 \) and \( d_0 \) are vectors

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11 See also Binmore et al, (1985), Guth and Tietz (1987), Hoffman and Spitzer (1982, 1985). Ochs and Roch (1988, p378) conclude that the outcomes observed in their study “can be reconciled with a theory in which bargainers incorporate distributional concerns directly into their utility functions.” They consider what types of non-monetary motivations could explain the observed results. The preferred explanation is in terms of a ‘deviation threshold’, in which player 2 is viewed as tolerating only some maximum deviation from an equal division of the available cash. Beyond this deviation, offers are refused on the grounds that they are unfair.
differentiating the perceived benefits from the environmentally threatening development in question. The literature on referendum CV studies seems to overlook the fact that at referenda, people generally take both sides of an issue into account. Mitchell and Carson (1989, p297), for example, state that:

... CV surveys offer the possibility of obtaining meaningful information about consumer preferences for nonmarketed amenities. During the course of the interview, respondents make a decision about how much they are willing to pay for the amenity based on the material presented in the scenario, any prior information they might have, and their preferences regarding what they would like the government to do with tax dollars (emphasis added).

But in considering what I would like the government to do with my tax dollars I am clearly venturing into the realm of the citizen. If someone asks me whether or not I would like to spend $c out of my taxes on preservation of a given wilderness area, for example, am I not likely to take into account how much I value logging, and how I view the whole development-conservation trade-off? If I do, and if the CV results are incorporated into a comprehensive cost-benefit-analysis, alongside separate estimates of logging benefits, then we have double counting. A true estimate of preservation value would be insensitive to the nature and magnitude of the opportunity costs of preservation, and hence for example, the number of jobs that would be lost. This technique-specific assumption is in addition to the standard axioms of consumer theory\(^2\). The ‘CV-consumer’ may thus be defined as an individual who satisfies the standard rationality axioms of consumer theory, PLUS the CV-specific assumption that responses must be independent of perceived development benefits, PLUS the CBA requirement that altruism toward members of the current generation be excluded, PLUS the requirement that responses are independent of procedural notions of justice, particularly those that are a function of decisions made by the researcher and not the actual institutional milieu of the time. As the thesis progresses, further requirements can be added to this list.

We now have a second dimension through which citizen type deviations from desired CV responses can be expressed:

**Dimension 2: The extent to which development benefits are considered in addition to preservation benefits.**

\(^2\) The assumption effectively places a restriction on the nature of the commodity for which the standard axioms are assumed to apply.
Although altruistic concern for individuals involved in the timber industry will often underlie citizen thoughts regarding the opportunity costs of preservation, and what is best for society overall, respondents may also think that logging is important from a self-interest perspective, perhaps because it generates exports that may help keep interest rates and hence mortgage payments down. For this reason, this second dimension is not viewed as a third particular of the first.

Evidence has previously been presented to suggest that in responding to a state-of-the-art CV study regarding Kakadu National Park, respondents took account of the importance they place on mining and the associated economic benefits for Australia. The issue of whether or not to mine Coronation Hill in Kakadu National Park had been the subject of a great deal of public controversy and media coverage in the months leading up to the CV study. For a significant proportion of the populace, issue-opinions had already been formed before being faced with the valuation situation. These issue-opinions are perhaps best thought of as the result of mini personal cost-benefit-analyses, rather than as relating to TEV as required. In cases where CV responses are as much a function of perceived importance of development as perceived importance of environmental protection, the usefulness of such results for the purpose of cost-benefit-analysis may be questioned, since double-counting clearly arises. For the purposes of a real referendum, however, the results of mini cost-benefit-analyses are actually sought. Citizens should consider development benefits, since they are being asked to vote on an issue such as whether to allow mining. Although one possibility with CV is to assume that resultant estimates of TEV will be conservative, since development benefits will have been subtracted by many individuals, this effectively limits the usefulness of CV to cases where the costs and benefits associated with development are not close to being evenly balanced\(^{13}\).

A further response to the double-counting problem discussed in this section is that WTP for these development benefits is small, and to the extent that double-counting occurs, it will little affect the general cost-benefit conclusions drawn. Lockwood et al (1994) conducted a CV study of the willingness to pay for timber harvesting and

\(^{13}\) A further point is that this assumption of conservatism will not necessarily apply to all individuals. It seems likely that for some pro-environment individuals, for example, viewing television footage of loggers ‘ruthlessly’ cutting or bulldozing trees down may actually stimulate or arouse their anti-logging evaluative feelings, thereby resulting in higher environmental values than would otherwise be the case. This may be a more likely response for some individuals than making altruistic considerations toward loggers and the timber industry. Similarly, some pro-logging individuals may reduce their WTP for preservation in response to viewing symbolic footage of greenies chained to trees, rather than being primed to attach greater importance to environmental values. Such suggestions remain to be empirically investigated. The significance of symbolic stimuli is explored in Chapter 10.
found that mean WTP was $38 in a dichotomous choice question, leading to the conclusion that WTP for timber harvesting was 'relatively unimportant'. The problem with estimating WTP for development in this way is that results tend to reflect net WTP, since respondents who strongly favour preservation are unlikely to indicate a high WTP for development, even if they do place a high value on it. The point is that if they have a higher value for preservation, they will tend to downwardly bias their WTP for development. According to the consumer-citizen model advocated here, the $38 reported by Lockwood et al (1994) represents an underestimate of WTP for development, with the size of the downward bias being unknown.

5.2.3 Citizen or Consumer?

Consumer preferences may be defined in several ways. One way to define them is in terms of the axioms that they must satisfy. In this respect, we would expect citizen-consumer deviations to involve the degree to which the axioms of continuity and completeness, and possibly transitivity are satisfied. When the further CV specific 'axiom' is added, relating to dimension 2 above, a model of the CV-consumer is obtained, from which deviations can be observed. Another way of viewing consumer preferences is to say that such preferences exhibit the same characteristics as those typically involved in market purchases. The CV specific (dimension 2) requirement again has to be appended, before useful consumer-citizen CV comparisons can be made.

The second approach focuses attention on the extent to which market and voter preferences differ in terms of various parameters that are characteristic of them. If citizen or voter preferences tend to result in different CV responses to CV-consumer preferences, which of these preferences do we actually desire for the purposes of CV? The answer depends on what we are going to do with the results. If citizen preferences involve subordination of private interests such as use values, then consumer preferences will be preferred, if estimates of TEV for inclusion within CBA's are sought. In the event that citizen preferences are instead obtained, we may then wish to know the direction and size of the 'bias'. If instead the results are to be used to give an indication of WTP to prevent development, or a majority rule indication of the preferred course of action, then the citizen preferences might be preferred. I believe that both views of the CV-consumer are useful in understanding citizen and consumer CV responses. Indeed, the two views are fundamentally related, one focussing more on the motivational origins of preferences, and the other focussing on whether resultant preferences satisfy given criteria.
Two broad dimensions, or three specific dimensions have been identified through which responses to CV questions may diverge from the desired CV-consumer responses. The three factors cannot be expected to be independent, if we are to assume that individuals adopting a voting role are likely to bring all three in together. Indeed, if we are to use the term ‘citizen’ to refer to divergences on the dimensions outlined above, we require such an interdependency. Such interdependencies do not appear to have been empirically investigated.

Sagoff (1988) is clearly of the view that for any given environmental conflict, many individuals will have a better idea of their citizen preferences than their consumer preferences. This may be a reasonable argument. Given the complexity of environmental matters and the general unfamiliarity of respondents to CV type questions, it must be assumed that preferences are not simply revealed through such questions, but rather they are socially constructed. Indeed, an “underlying theme of much recent [behavioural] decision research is that preferences for and beliefs about objects or events of any complexity are often constructed—not merely revealed—in the generation of a response to a judgement or choice task” (Payne et al, 1992, p89).

Research has also shown that the “information and strategies used to construct preferences or beliefs appear to be highly contingent upon and predictable from a variety of task, context, and individual-difference factors” (Payne et al, 1992, p90). A variety of situational and dispositional factors can be expected to influence the construction of CV relevant beliefs and preferences at any point in time. This is taken up in more detail in the next section. The way in which CV-responses are socially constructed can be expected to be a function of the social role adopted by that individual at the time of the response. As Donahue et al (1993, p834) state, some individuals “see themselves as essentially the same person across their various social roles, whereas others see themselves quite differently”. In the context of controversial resource-use conflicts, it seems that a citizen state of mind could, for many individuals, be more likely to exist, or at least to be developed (or socially constructed) to a significant extent, than a consumer ‘state of mind’. In response largely to media exposure, individuals are thus likely to have well-developed citizen issue-opinions (CIO’s) at the time they are presented with a CV questionnaire. In contrast, consumer preferences may not be well-developed, or socially constructed, at all.

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14 Gregory et al (1993) clearly recognise this in their discussion of ‘the constructive nature of preference’, stating that: “The fact that people are not used to thinking about environmental goods in monetary units suggests that a CV approach must function as a kind of tutorial, building the monetary value as it elicits it. We therefore view a CV survey as an active process of value construction ... rather than as a neutral process of value discovery. Thus, we believe, the designers
It is citizen-issue-opinions, and associated values and attitudes, brought to the valuation situation that tend to result in voter-responses, which deviate from the desired consumer responses in terms of the dimensions outlined above. Since citizen-issue-opinions will often not be highly deliberated and based on vast amounts of information, such opinions may not resemble the more ideal citizen preferences to which often Sagoff refers, and which are to be referred to herein as **citizen-informed-preferences (CIP’s)**. The extent to which voter responses reflect higher levels of reasoning and deliberation will clearly vary from one respondent, and context, to the next. It is not entirely clear how Sagoff reconciles his voter (political statement) view of the citizen with the notion that citizen preferences are highly informed and deliberated. It appears, however, that the more informed citizen preferences are in the nature of an ideal, requiring special procedures to guide and encourage individuals to make the required deliberations, and hence to move beyond citizen issue opinions and the expression of related attitudes and values. In the absence of such a process, citizen influences will be limited to the political statement type, which for the purposes of analysing CV responses, are the most relevant. The next section provides a framework for thinking about such factors.

### 5.3 AN EXTENDED FRAMEWORK FOR THE EXPRESSION OF CV PREFERENCES

Central to the theory of citizen CV responses is the distinction between factors that the individual brings to the valuation situation and those that characterise the valuation situation itself (Brown and Slovic, 1988). As defined in Brown and Slovic’s original ‘assignment of value’ framework (see Figure 5.1), the former include a collection of held values, beliefs and dispositions (including tastes and preferences); a physical and emotional state; and an endowment of current and expected assets.

Borrowing a term from sociology, we may say that individuals bring certain ‘perspectives’ to the valuation situation (Charon, 1992). The perspective that the individual brings to a valuation situation will, among other things, be affected by the physical and emotional state that the individual brings to the situation. This state may “interact with his or her values, affecting the relevancy of beliefs and causing different valuations of the same object or event at different times” (Brown and Slovic, 1988, p24).15

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15 Brown and Slovic cite Schelling’s (1984) discussion of self-command as an example. This would appear to open the way for discussions of higher and lower preference orderings, and indeed multiple preference orderings in general. Indeed, Brown and Slovic (1988, p28) appear to agree with
A given individual may bring any of a number of perspectives or roles to a valuation situation. Brown and Slovic (1988, p26) draw on Arrow’s (1963, p18) comment that “In general, there will ... be a difference between the ordering of social states according to the direct consumption of the individual and the ordering when the individual adds his general standards of equity...”. Sagoff’s consumer/citizen distinction may be seen in this light. Sagoff (1988) describes a classroom experiment that illustrates how citizen and consumer perspectives can result in preferences that diverge\(^1\).

\(^{1}\) Students’ consumer interests in a proposed ski resort were first assessed, results indicating that students became excited by the prospect and were more likely to visit the area if the resort went ahead. When asked to reflect on whether they thought the resort would be a good thing for the nation, Sagoff (1988, p51) reports that “The students believed that the Disney plan was loathsome
In contrast to factors brought to the valuation situation, the context of a valuation is the set of circumstances that characterises both the situation in which the person interacts with the object(s) and the mode in which the assigned value is expressed ... [T]he valuation context may affect how objects are perceived, the beliefs that become relevant, the utility experienced, and the value assigned (Brown and Slovic, 1988, p24).

Focussing on the second, contextual part of their framework, Brown and Slovic discuss factors that characterise the valuation context, including response mode (ratings versus rankings, WTP versus WTA etc); order effects; informational cues (labels, starting points etc); social setting (and hence determinants of socially desirable responses); and the explicit or implied constituency of a valuation. How contextual information is interpreted by respondents depends on the perspective those respondents bring to the valuation situation. Table 5.1 listed a number of contextual factors that different perspectives may react differently to. Some individuals may, for example, react to the institutional nature of a CV question. Context misspecification bias can occur if individuals adopting a perspective consistent with a social constituency interpret the question to involve a private constituency. A market based CV question could be rejected by individuals bringing a citizen state to a valuation involving a public good or social constituency. A referendum CV question may be seen as more appropriate. Mitchell and Carson (1989) have suggested that referendum formats may be more appropriate when public goods are being valued.

The perspective brought to a valuation situation will not necessarily persist through to completion of the CV and other questions. Contextual factors may alter it during the course of the valuation exercise, with the consequence that the perspective dominating a CV question can be quite different to the perspective originally brought to the overall valuation situation. Rather than questioning the appropriateness of a referendum format CV question from the perspective brought to the situation, an individual may actually be primed by such a referendum question, to adopt a more citizen, or voting type of perspective. Brown and Slovic (1988, p26) have also noted that “the nature of the good being evaluated may suggest a constituency, a rival and exclusive good ... may engender a private constituency while a ‘public’ good may
incite a social constituency". Characteristics of the valuation context may thus activate different perspectives within the individual, in addition to influencing responses for a given perspective. Some individuals may be more susceptible to such contextual influences than others, and some may be practically immune to such influences, bringing a given perspective to a valuation situation and sticking to it. Citizens will tend to perceive social rather than private constituencies, and as a result, we would expect social values to be more salient than personal values, when compared to other individuals.

As noted above, Brown and Slovic (1988) focussed the discussion of their framework around contextual factors. In order to understand the theory of consumer and citizen CV responses, however, it is useful to consider an expanded form of this framework in which the factors that individuals bring to the valuation situation are represented in more detail. Figure 5.2 presents an extended form of Brown and Slovic's valuation framework. The main changes are as follows. Firstly, and following in the footsteps of Harris and Brown (1992), information sources are explicitly included as components of the model.

Secondly, factors that individuals bring to the valuation are seen as the product of two stages of preference. Although the precise division is somewhat arbitrary, in Figure 5.2, factors associated with recent issue-specific information have been distinguished from factors associated with other information relating to socialisation, general knowledge, core values, beliefs etc. Regarding the former, of particular interest is information derived from the media regarding the particular resource-use conflict in question. This includes news coverage relating to protests, interviews with development (eg timber industry) representatives, documentaries or special reports, newspaper articles, radio coverage including interviews and phone-ins, stickers, posters, banners, graffiti etc. It is exposure to such information that tends to result in the construction of issue-opinions that the individual is likely to bring to the valuation.

When issue-specific information is imposed over the appropriate domain or resource-specific orientation, the individual may arrive at a specific opinion regarding what should be done with the issue under investigation. The individual might think, for example, that logging in the Wet Tropics Area of northern Australia, should be banned, or that it should be permitted. The individual might feel strongly about this citizen issue-opinion, and conceivably be quite unlikely to revise it, or alternatively, he or she may feel weakly about it and quite willing to revise it in the light of new information. For given information exposure, individuals will vary in the extent to which issue-opinions form as a result. For those individuals who do not become
exposed to the issue-specific information sources, or who are unaffected by such exposure (for example because they are totally uninterested), the middle component of the model will involve little transformation of beliefs, opinions, knowledge etc.

Although these CIO's may not resemble the kind of highly informed and deliberated CIP citizen preference to which Sagoff refers, in many cases, and probably the majority, such opinions may represent first-order approximations to the true 'Sagoffian' preferences\(^\text{17}\). For many individuals, CIP's may not arise during any of the three stages of preference formation shown in Figure 5.2. Eliciting CIP's may require replacing the typical CV valuation context with a context more suited to the elicitation of such preferences. Some alternatives are discussed in Section 5.5.2.

A third alteration to the original Brown and Slovic (1988) framework is that a stream of orientations/opinions, ranging from the highly general to the highly specific, is seen to mediate between the components of the first box in Figure 5.2 and the highly specific CV response. It is argued that individuals typically have some form of general environment/development orientation, which in the absence of all further information sources, may be drawn on in responding to a CV question. Typically, however, such general orientations may evolve into more resource-specific orientations, as throughout his or her lifetime, the individual is exposed to resource or domain specific information and experiences. It is thus conceivable that a given individual might be generally opposed to logging, but might think that uranium mining is acceptable. If presented with a CV question pertaining to forest existence values, the individual's general orientation regarding forest management may have an important influence.

When measured using attitudinal or value questions, more specific orientations should have higher explanatory power than less specific orientations (Ajzen and Fishbein, 1977)\(^\text{18}\). It follows that when highly specific attitudes are included within valuation

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\(^{17}\) Much of the issue-specific information will be of dubious value to individuals in terms of the extent to which it aids deliberative reasoning. Media coverage is, of course, full of symbols to which individuals attach different meanings. The findings of a study of Austrian press coverage of forest die-back in Waldsterben (Krott, 1987), for example, suggested that the theme of articles "was usually the symbolic drama of forests or mother-earth (the cradle of strength and spirit) under attack by the evil forces of civilization (technology, chemicals and corporate greed)" (Kennedy, 1988, p.249).

\(^{18}\) Ajzen and Fishbein (1977) pointed out that a large attitude-behaviour correlation will be most likely when there is a close correspondence between the specificity of the attitude and behaviour measures concerning the following four elements: action (what behaviour is to be performed e.g. voting); target (what is the target at which action is directed e.g. environmental policy); context (in what context is the behaviour to be performed e.g. other political factors); and time (when is behaviour to be performed).
HISTORICAL (PRE-CONTEXT) | ISSUE-SPECIFIC (PRE-CONTEXT) | VALUATION CONTEXT

Held Values, Beliefs, Dispositions, Physical & Emotional State, Endowment (eg. income)

General Environment - Development Orientation

Historical Information Environment

Knowledge of Objects

Relevant Values, Beliefs, etc.

Domain or Resource Specific Orientation

Issue Specific Information (largely media)

Knowledge/Perceptions of Objects

Relevant Values, Beliefs, etc.

Issue - Opinion

New Contextual Information

Perception of Objects

Dominant Attitude/ Opinion/ Preference

Response to CVM Question

Protests, etc.

Income
functions, less specific attitudes, from which the more specific ones evolved, should add little, if any, further explanatory power to the model. Furthermore, if attitudes regarding the different components of total economic value are fully represented in a valuation function, other less specific attitudes and values should have little or no explanatory power. In the event that such attitudes do have significant explanatory power, the question arises as to whether the CV responses represent something more than just the desired total economic value (TEV) for preserving the area in question. In such cases, the nature of the attitudes/values involved may have to be examined before any further conclusions can be drawn.

The attitudes, values, beliefs etc. arising in the first two boxes of Figure 5.2 are, of course, all brought to the valuation situation, and aspects of the valuation context will be interpreted accordingly. If CV results are to be used as estimates of environmental cost in a cost-benefit-analysis, the valuation context must ensure that what individuals bring to the valuation situation is moulded into the desired type of CV response. Given the diversity of beliefs, attitudes, interests, knowledge etc. existing in populations typically surveyed by CV practitioners, this is clearly an ambitious objective.

In Figure 5.2, information supplied with the valuation context is seen to influence CV response via several paths. Firstly, information supplied in the questionnaire (and other aspects of the valuation context) will tend to be assessed in relation to the beliefs etc. that the individual brings to the situation. When the individual has considerable confidence in his or her prior beliefs, it cannot be assumed that contradictory information supplied in the questionnaire will over-ride that brought to the situation. Rather, it might result in the questionnaire heading for the rubbish-bin, item non-responses, or biased responses. An obvious example of such context misspecification concerns the extent to which (prior) perceived property rights align with those implied in the scenario. The dilemma regarding choice between WTP and WTA measures arises here. Beliefs regarding ascription of responsibility, procedural and distributive justice, also result in such assessment, as previously outlined.

In addition to influencing the acceptance or rejection of specific features of the valuation context, baggage brought to the valuation context may influence CV response through the effect it has on the preference that is dominant in the individuals mind at the time of considering price and income constraints. Since the objective of CV is to provide a monetary quantification of the strength of an individual's TEV attitude or preference, it is important that the preference being valued is the right one. A serious problem can arise here, however, because the dominant attitude or
(unconstrained) preference in the respondent’s mind at the time of CV response formulation, may not satisfy the requirements of contingent valuation, and the valuation context may fail to provide the required moulding.

When beliefs, attitudes and hence citizen-issue-opinions are highly constructed before being faced with the valuation situation, no amount of moulding through careful questionnaire design may be able to ‘recover’ such respondents, as far as the CBA use for CV results is concerned. An important point is that especially in cases where the issues under investigation are highly controversial and subject to widespread media coverage, little room exists for sacrificing the face validity of the CV scenario and other questions. In attempting to mould individuals’ preferences into the desired type of CV response, it will often be unacceptable to a large proportion of respondents to simply omit mention of the development in question and the associated economic benefits, such as jobs. Theoretical requirements can thus conflict with the face validity of the questions.

To sum up to this point. In some circumstances and for some individuals, the baggage that they bring to the valuation situation will make the desired form of CV response highly improbable. This will be most marked when citizen issue-opinions are highly constructed on entering the valuation situation and when the characteristics of such preferences diverge considerably from those required for the purposes of CV.

On entering the valuation situation, individuals’ responses will be influenced by the valuation context to varying extents. Those entering with issue-opinions formed on the basis of prior information may either ignore contextual information and respond in terms of their issue-opinion (or more general orientation if subjected to less issue-specific information), or they may interpret such information from the perspective that accords with the issue-opinion. In some cases, the latter process may result in protest or strategic responses, and in others it will simply influence the strength of CV-relevant preference. As more issue and context specific information becomes available, the values and attitudes that the individual perceives to be relevant may change. In the valuation situation, attitudes and values relating to many of the aspects listed in Table 5.1 may become important, and as a result, the explanatory power of some values and attitudes such as those relating to environmental concern, may drop off. This accords with the Ajzen and Fishbein’s (1977) observations relating specificity of attitudes to their explanatory power in relation to behaviour.
5.4 THE CITIZEN IDEAL

The discussion thus far has focussed on how individuals might actually respond to CV questions, and how such responses might differ from the economist's ideal consumer response. In this section, the ideal citizen response, or that response that might be said to be 'right' for the citizen in some sense, is briefly considered. This is clearly a philosophical matter, and more specifically, a matter dealt with by ethical theory, the subset of philosophy concerned with ascertaining the nature of the good life, and hence what constitutes good behaviour. Ethical theory deals with questions such as 'What is the good life for people?', and 'How should people act?' Some examples of how ethical theories have seen the good-life as being attained are through knowledge, self-control, reason, pursuit of pleasure, indifference and salvation, living in accordance with the divine being, reflection, adopting only universalizable behaviour, benevolence, sympathy, and pursuit of pleasure and avoidance of pain (Popkin and Stroll, 1986).

In the context of the thesis, ethical theories may be seen as relevant for two reasons. Firstly, they permit us to consider whether procedures involving economics are likely to produce what is right, or at least, acceptable approximations to such outcomes. Since economic techniques such as CV are based on a preference utilitarian framework, they may be rejected on the basis that other ethical theories are more appropriate. We might, for example, believe that rule utilitarianism (RU) provides the most appropriate ethical theory for guiding social decisions, but object to its operationalization through the linking of utility to preference satisfaction. Sagoff (1988) clearly opposes preference utilitarianism, advocating instead some form of deontological liberalism. According to this position,

19 Act-Utilitarianism, AU, involves applying the principle of utility to each individual decision. It thus involves asking in a particular circumstance, “Given my situation, which of the possible actions open to me is expected to produce the greatest balance of good over evil in the world as a whole?” It does not involve asking “Which action, according to the principle of utility, would be best for everyone to adopt in the same circumstances?” General rules such as ‘never steal’ or ‘never steal if you want to promote the general good’ may only used as a guide to the act-utilitarian, since the morally correct decision will always be situation and person specific. Advocates of AU do not believe in setting up rules to guide action because every situation and every person is different. Rule Utilitarianism, RU, on the other hand, emphasises the centrality of rules in morality, and as such, insists that morally good behaviour involves action in accordance with rules. The principle of utility is used to set the rules, and hence the selected rule is to be that which promotes the greatest general good for everyone. Revision and replacement of rules is undertaken on the same basis. Exceptions may be built into rules.

20 Deontological theories claim that the "rightness or wrongness of an act depends neither upon the motive from which the act was done, nor upon the consequences of the act- but solely upon what kind of an act it was. Thus, it is right to keep one's promises, because in making a promise one has
a legal or political decision is right insofar as it is just and fair and respects the fundamental equality of persons. For the deontological liberal, the principles of justice are established independently of social interests and preferences... [P]olicies that advance justice, fairness, and social equality 'trump' claims that may be made on behalf of the general welfare (Sagoff, 1988, 152).

Another reason for an interest in ethical theories is that individuals may employ such theories, when deciding what they think is a right course of action. In this respect, ethical theories may be seen as a form of non-observational psychology. Indeed, individuals are socially conditioned, and writings in ethical theory have had an important influence on such conditioning. They will also reflect this conditioning, to some extent.

Of particular interest, however, is how we might design ways of eliciting individual social preferences that more closely accord with some notion of the ideal citizen preference. Designing such procedures first requires knowledge of the qualities or properties of the ideal citizen preference, and the relationship between such properties and different preference-revealing mechanisms. In considering the ideal citizen preference, the subset of ethical theory referred to as hypothetical choice theory is particularly relevant. Hare (1975, p87) uses the term 'hypothetical choice theories' to refer to "theories which say that the right answer to some question is the answer that a person or set of people would chose if subject to certain conditions". There are essentially three main alternate forms of such theories: rational contractor theories, ideal observer theories, and the theory of Robin Hare. These are discussed in turn, beginning with rational contractor theories.

### 5.4.1 Rational Contractor Theories

Hare (1972, p168) defines a rational contractor theory as one that holds that:

> what we ought to do is to follow those principles which would be adopted by a set of rational people, each prudently considering his own interest, who were seeking agreement with each other on the principles which should govern their conduct in a society of which they were to be members; these rational contractors are presumed to have complete knowledge of all facts about the society and the environment in which they are to live, except the particular role which is to be played by each individual one of them.

performed an act which by its very nature obligates one to carry it out, regardless of one's inclinations or the effects which carrying it out will have. Because they stress the notions of 'obligation' and 'duty', deontological theories are often referred to as 'duty ethics' (Popkin and Stroll, 1986, p56). W.D. Ross refers to such duties that one is obliged to perform, in the absence of overriding factors, as 'prima facie duties' (Popkin and Stroll, 1986).
Rawls (1971) provides the most well known rational contractor theory, and indeed, the most well known hypothetical choice theory. He argues that the way to properly develop a theory of justice is to undergo a thought experiment in which we imagine that we no nothing about our tastes, talents, interests, our social or economic position in society, and we do not even know in which society we live. From behind this 'veil of ignorance', we are to imagine that we are drawing up a social contract to which we must all consent. The 'veil of ignorance' is seen as a necessary 'impartiality' condition for the assurance of a fair contract. If individuals are to define morally just principles, then their own position in society should not affect their view, and knowledge of this position is thus morally irrelevant.

Rawls believes that under such conditions, rational individuals would agree on the following two principles.

**First Principle**

Each person is to have an equal right to the most extensive total system of basic liberties compatible with a similar system of liberty for all (p250).

**Second Principle (Difference Principle)**

Social and economic inequalities are to be arranged so that they are both (a) to the greatest benefit of the least advantaged, and (b) attached to offices and positions open to all under conditions of fair equality of opportunity (p83).

According to the second principle, fair-shares resulting from the ‘co-operative enterprises’ would take the form of the minimax criterion of game theory, in which the objective is to minimize our maximum losses.

Rawls turns to a contractarian approach to justice in an attempt to avoid the problems associated with utilitarianism. Like many, he sees a principle that can advocate the punishment of innocent individuals for the overall benefit of all individuals as unsatisfactory, and hence not totally just. Like Kant, he insists that nobody should be treated as merely the means to others’ ends. Rawls clearly draws on Kant in advocating a ‘veil of ignorance’.

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21 According to Kant (1724-1804), virtue is the result of the individual’s free submission to laws arising from reason. Pure practical reason is seen to give rise to the Categorical Imperative, or the Fundamental Law of Practical Reason: “I should never act in such a way that I could not also will that my maxim should be a universal law”. Another formulation of the categorical imperative is: “So act as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as a means only”. This essentially says that we should always treat others as ends
Both principles are the subject of great controversy. Not only do critics argue that individuals in the ‘original position’ will not necessarily choose these two principles, but the argument is also made that even if this would be the case, they may still not provide us with a standard of justice against which to test existing institutions. There has been a great deal of literature directed at Rawls’ work (see, for example, the numerous papers in Daniels, 1975). Of particular interest are criticisms directed at the minimax outcome, and the lexicographic priority of the first principle (see Cooter, 1989, Harsanyi, 1977, and Hare, 1975). Hare (1975) argues that a utilitarian outcome is more likely to result from deliberation behind the veil of ignorance, and if this is the case, then Rawls’ hypothetical choice theory may offer little that Harsanyi’s theory of eighteen years prior does not (Harsanyi, 1953, 1955). In short, Harsanyi’s ethical preferences, referred to in Section 3.3.3, are not the result of altruistic considerations appended to one’s self-interest preferences, but rather the result of a utilitarian calculation arising from behind an ‘equi-probability’ veil of ignorance.

Gauthier (1986) argues that both Harsanyi’s and Rawls’ theories are flawed, and offers his own theory. Unlike Rawls and Harsanyi, Gauthier does not require individuals to be unaware of their identities and circumstances, and represents moral choice as a bargain, or agreement, among real individuals. Furthermore, there is often in themselves, because that is how we treat ourselves, and as such, it may be regarded as a different way of saying “Do unto others as you would have them do unto you” (Popkin and Stroll, 1986).

22 Harsanyi (1975, p45-46) summarises the model put forth in his 1953 and 1955 papers as follows: “let us assume that society consists of n individuals, and that the individual under consideration would choose between the two alternate social systems on the assumption that under either system he would have the same probability, 1/n, of taking the place of the best-off individual, or the second best-off individual, or the third best-off individual, etc., up to the worst-off individual. This I shall call the equi-probability assumption. Moreover, let us assume that in choosing between the two social systems, he would use the principle of expected utility maximization as his decision rule... It is easy to verify that under these assumptions our individual would always choose that social system which, in his opinion, would yield the higher average utility level to the individual members of the society. More generally, he would evaluate every possible social arrangement (every possible social system, institutional framework, social practice, etc) in terms of the average utility level likely to result from it. This criterion of evaluation will be called the principle of average utility... [U]nder this model, each individual will have two different sets of preferences: he will have a set of personal preferences, which may give a particularly high weight to his personal interests (and to those of his close associates); and he will have a set of moral preferences, based on a serious attempt to give the same weight to the interests of every member of society, in accordance with the principle of average utility.”

23 He sees Harsanyi as failing to account for the influence of individual i’s preferences on his/her final choice, and is led to (correctly) conclude “Full impartiality, as expressed in Archimedean choice, requires that one be ignorant, not only of the characteristics one will have and the role one will play in each of the feasible social structures among which one may choose, but also of the characteristics one now has, determining one’s preferences for the characteristics of the persons in the social structures” (Gauthier, 1986,p243).
a rational requirement to act morally. Gauthier's main argument has three parts: (i) The identification of a rational strategy of co-operation that yields a single outcome in bargaining problems for which multiple mutually advantageous outcomes are possible; (ii) A solution to Hobbes's problem of compliance, once the co-operative strategy has been agreed upon; (iii) The determination of preconditions in the form of initial endowments that permit the required rational outcomes to be realised. Gauthier's theory has had a considerable, albeit controversial, impact on discussions of rational contractor theories, as evident in a special issue of the journal *Ethics* (July 1987) and a special symposium in the *Canadian Journal of Philosophy* (June, 1988). Gauthier's theory is attractive from an economic standpoint, since it appears to be more consistent with free-market principles. Rational agreement can be used to identify appropriate outcomes, without the need for special restrictions or procedures such as a veil of ignorance.

Unlike the many of the hypothetical choice theories considered in this section which tend to focus on how isolated individuals might best decide on an appropriate course of action, Gauthier's involves some degree of agreement amongst different individuals. An alternate theory, less grounded in rational choice theory, but more firmly grounded in communicative action and agreement, is that of Habermas (1984, 1990). In concerning himself with the identification of procedures for impartially adjudicating among competing normative claims, Habermas draws on the likes of Kant and Rawls. In the tradition of Kant, Habermas sees the required procedure as involving practical reasoning and the principle of universalizability (McCarthy, 1990). Kant's categorical imperative is however replaced with a procedure of moral argumentation. Central to this theory is the principle of discourse ethics, which postulates that "Every valid norm would meet with the approval of all concerned if they could take part in a practical discourse" (Habermas, 1990, p121). Unlike Rawls's original position, where essentially isolated individuals act in a self-interested manner from behind a veil of ignorance, Habermas's discourse model "builds the moment of empathy into the procedure of coming to a reasoned agreement: each must put himself or herself into the place of everyone else in discussing whether a proposed norm is fair to all" (McCarthy, 1990, pvi-xi, emphasis in original). Individuals would be assumed to bring to the participatory activity strategic (personal) goals on the one-hand, and a communicative goal of reaching mutual understanding on the other. The 'ideal speech situation' involves a democratic form

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24 As Miller (1992, p27) notes, this "represents a shift away from individualistic and self-interested philosophies of consciousness-in which rational choice theory is grounded-and toward a philosophy acknowledging consensus and the collective/cooperative origins of human action".

of public discussion where discussion takes place freely and in the absence of coercion. Because such a situation becomes more difficult as the number of participants increases, real life attempts at communicative action of this type tend to be limited to fairly small groups. Group dynamics in small group situations can become important. Miller (1992) notes that discussions of community often have much in common with Habermas’s theory.

Sagoff’s (1988) preference for grounding ‘hard’ decisions in a deontological liberal tradition is not too distant here. Like Habermas, Sagoff is attracted to the Kantian notion of basing policy recommendations on practical reason, rather than wants. Sagoff is also attracted to liberalist principles. The “tolerance for competing views makes liberalism particularly compatible with democratic institutions, in which individuals and groups may argue for the policies they favour and may advocate various conceptions of the good” (Sagoff, 1988, p167). Beyond broad guiding principles, Sagoff (1988) suggests little in the way of institutions that might best be used for environmental decision-making. He does, however, appear to see a role for the courts, and juries. An analogy is used, to contrast such an approach with the approach of economists:

Let us suppose that a person has been called to perform jury duty. The judge informs each juror that a Mr. Smith has been accused of robbing a liquor store. Then the judge asks each juror separately whether Mr. Smith is guilty. If the judge is methodologically sophisticated, indeed, he or she may ask how much each juror is willing to pay for the preferred verdict. The judge may then report the verdict in terms of the mean, the average, or some statistical transformation of the weighted average of the juror’s preferences.... If you were a juror, how would you respond to the judge? (Sagoff, 1988, p87).

5.4.2 Ideal Observer Theories

Hare (1972, p168) defines this second type of hypothetical choice theory as holding:

that in considering what we ought to do, we have to confine our thought to what would be said by a person who had access to complete knowledge of all the facts, was absolutely clear in his thinking, was impartial between all the parties affected by the action, and yet equally benevolent to them all. That is to say, we are to think like a person who

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25 The ideal speech situation requires that no participants or subset of participants dominate discussions to the point that discussion is limited and/or participants feel pressured to take a particular line without valid reason to do so.

26 Miller (1992, p29) describes the most relevant notion of community as follows: “Common understandings arrived at consensually provide the basis for a morally valued way of life and the construction of collective identities that transcend the individual. These moral bonds and collective identities can form the bases for collective action”.
gives equal, and positive, weight to the interests of all the parties and to nothing else, and in serving these makes no factual or conceptual errors.

The work of Smith (1759), Kneale (1950) and Firth (1952) are examples of such a theory. The ethical theory of Adam Smith builds on the work of Hume and Hutcheson in particular. In *The Theory of Moral Sentiments*, Smith shares the general view of Hume in which moral sentiments are seen to have roots in feelings of sympathy, but gives the notion his own distinctive slant. Sympathy is seen to involve the sharing of the feelings of another in a particular circumstance, and this clearly involves imagination. Smith essentially endorses a dual-self conception of the individual in statements such as the following:

> *When I endeavour to examine my own conduct, when I endeavour to pass sentence upon it, and either to approve or condemn it, it is evident that, in all such cases, I divide myself, as it were, into two persons; and that I, the examiner and judge, represent a different character from that other I, the person whose conduct is examined into and judged of.*

This sense of impartiality is learnt through association with others. It involves the judgement of a well-informed and ‘indifferent bystander’. For those (many) individuals that do not develop an impartial spectator ability, virtue is limited to the disposition to obey general rules of conduct- or laws of the Deity, which are formed from experience and induction. The motivation to abide by such rules is seen to boil down to the self-interested desire for divine reward. Adam Smith’s ethical theory falls within the realm of moral intuition, or moral sense theories, in this instance involving an instinctive sentiment of sympathy. As such it may be criticised on the same basis as most moral sense theories: there is little evidence for the existence of such innate ideas in the human mind.

Firth (1952) argues that all ideal observers will react to an action $x$ in the same way, if they have the same characteristics. Indeed, it is these characteristics, qualifications, or conditions which limit the respects in which the assessments of any two observers could differ. By imposing specified constraints on individuals who make judgements, the potential for differences in judgements is reduced, and what may previously be considered to be relativist judgements, now appear to be more along the absolutist line. If we were to impose that all observers had the same level of fatigue, and the same level of experience regarding a particular action, we would expect less divergences in their assessments of that act than otherwise. If we seek ideally rational or ‘right’ judgements, we would require that all observers had zero level of fatigue. Firth is interested in identifying the minimal set of characteristics necessary to define the ideal observer. Firth (1952) identifies the following characteristics of an ideal observer: (i) He is omniscient with respect to non-ethical facts; (ii) He is
omnipercipient; (iii) He is disinterested; (iv) He is dispassionate; and (v) He is consistent. Kneale (1950) also considers ideal observer theories.

5.4.3 The Theory of Robin Hare

The core of Hare’s theory involves distinguishing between two levels of moral thinking: intuitive thinking and critical thinking. The distinction between the two levels of thinking is discussed largely with reference to how each handles conflicts in moral principles.

Those who say ... that there can just be irresoluble conflicts of duties are always those who have confined their thinking about morality to the intuitive level. At this level the conflicts are indeed irresoluble; but at the critical level there is a requirement that we resolve the conflict, unless we are to confess that our thinking has been incomplete. We are not thinking critically if we just say 'There is a conflict of duties; I ought to do A, and I ought to do B, and I can't do both.' But at the intuitive level it is perfectly permissible to do both (Hare, 1981, p26).

So what does critical thinking entail? According to Hare (1981, p40) it “consists in making a choice under the constraints imposed by the logical properties of the moral concepts and by the non-moral facts, and nothing else” (certainly not through appeal to our intuitions). And what are these logical properties that are to provide the ‘canons’ to be used in moral thinking? They are the properties of universalizability and prescriptivity, developed in detail in Freedom and Reason (1963). Conflicts are handled in a consequentialist manner.

Hare (1981) considers two extreme types of individual, the archangel and the prole. The former may be considered “a being with superhuman powers of thought, superhuman knowledge and no human weaknesses” (p44). Such an individual possesses superior imagination (ability and accuracy) and has powers of prediction that resemble a ‘clairvoyant’; that is, “he has a peculiar type of clairvoyance such that he can know everything about the effects of all the alternative actions open to him” (1952, p58). The archangel employs only critical thinking, and as such, makes evaluations or prescriptions in an act utilitarian manner:

*He will need to use only critical thinking. When presented with a novel situation, he will be able at once to scan all its properties, including the consequences of alternative actions, and frame a universal principle*

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27 Kneale (1950) considers the objectivity of ‘narrow’ moral theories in which moral questions of the following form are asked: “What ought I to do in these circumstances?” He concludes that moral law is “a set of commands such as would be given by an impartial spectator who was endowed with sympathy and intelligence and possessed all relevant information” (p162). A certain degree of objectivity can be attributed to the outcomes of such a process.
(perhaps a highly specific one) which he can accept for action in that situation, no matter what role he himself were to occupy in it. Lacking, among other human weaknesses, that of partiality to self, he will act on that principle if it bids him act. The same will apply to other partialities (eg to our own friends and relations) which are hardly weaknesses, but [nonetheless] excluded from critical thinking, though they play a large part in intuitive thinking.... Such an archangel would not need intuitive thinking, everything would be done by reason in a moment of time (Hare, 1981, p44-45).

The prole, on the other hand, possesses

these weaknesses to an extreme degree. Not only does he, like most of us, have to rely on intuitions and sound prima facie principles and good dispositions for most of the time; he is totally incapable of critical thinking (let alone safe or sound critical thinking) even when there is a leisure for it. Such a person, if he is to have the prima facie principles he needs, will have to get them from other people by education or imitation (Hare, p45).

The prole is thus not capable of selecting prima facie principles, or of resolving conflicts between them, since such behaviour requires critical thinking. Hare recognises that the archangel and the prole are mere hypothetical extremes, and that in reality “we all share the characteristics of both to limited and varying degrees and at different times” (p45). The prescription of an archangel will be that which is right, and “archangels at the end of their critical thinking, will all say the same thing... on all questions on which moral argument is possible...; and so shall we, to the extent that we manage to think like archangels” (Hare, 1981, p46). In reference to the latter point, we must ask how satisfactory the resultant evaluations and prescriptions will be, if we attempt to approximate archangel type responses, as closely as possible, with some form of questioning process or hypothetical thought experiment. Hare (1981, p46-47) states: “Intuitive thinking has the function of yielding a working approximation for those of us who cannot think like archangels on a particular occasion”.

5.4.4 Hypothetical Choice Theories and the Environment Domain

If we are to attempt to elicit approximations to impartial ‘archangel’ judgements, we must clearly define the boundaries within which impartiality is to be exercised. Harsanyi (1977, p60) briefly touches on this problem referring to it as the boundary problem for a society. This is the problem of deciding “who those individuals are whose utility functions ought to be included in our social-welfare function”. He goes on to note (p60) that for both theoretical and practical reasons:

we would like to have an operationally meaningful analytical criterion that could help us to decide whether to include, eg, higher animals, human idiots, unborn babies in their mother’s wombs, more distant
future generations- or even to decide under what conditions the inhabitants of other celestial bodies, or man-made robots, would qualify or would fail to qualify.

Permitting only those beings capable of entering into co-operative relationships with us would clearly be highly restrictive. Boundaries involving 'inter-species' impartiality require an extension of hypothetical choice theories to ensure justice to both human and non-human species. For the purposes of this thesis, there is no need to extend the boundaries of the ideal citizen this far, since interest lies primarily with how individuals weigh up different types of homocentric (or anthropocentric) values.

Some individuals may attempt to take account of 'intrinsic', or non-homocentric values, however [for example, by endeavouring to be empathic towards endangered species], and hence a brief overview of the literature relating to how hypothetical choice theories might be extended to cover non-human species is justified.

Although much has been written in the area of environmental ethics, little has been written that specifically relates to hypothetical choice theories. Taliaferro (1988) has discussed 'The Environmental Ethics of an Ideal Observer', arguing that classic ideal observer theory has distinct advantages over Rawls's theory in this respect.

It would be problematic to identify the worth of plants or ecosystems or to identify principles of justice involving them by characterising what self-interested subjects would prefer from behind the veil of ignorance. While it may be possible for you to be a chimpanzee (chimps being candidates for personhood), it is more problematic to suppose you could become an elm. If you embrace Leopold's land ethic or some version of ecological holism, it is not obvious how you can fruitfully employ Rawls' theory" (p237).

The ideal observer is not required to adopt all the viewpoints of the involved parties, but rather "would have to believe and not believe that trees have inherent worth ... [T]he ideal observer theory characterises the ideal observer as being able imaginatively and vividly to know all the points of view, grasping, too, what it is like to have the given viewpoints, and why they might appear to be justified to different parties" (p237). Taliaferro (1988) argues that the IO must be person-like in at least some respects, and that different IO's would necessarily come to the same judgements (ie absolutist).

5.4.5 A Preferred Theory?

The above overview of hypothetical choice theories is clearly selective, and a critical appraisal of those presented has not been attempted. Indeed, this could form the basis of a separate thesis. The questions that immediately arise are 'How might we expect the results of the theories to differ?', and 'Overall, which is the preferred
theory?’. Finally, of course, we must ask which is best translated into specific social institutions to be used for the purposes of social choice?

According to Hare (1975), all three types of hypothetical choice theories are practically equivalent, the only differences being in the way impartiality is ensured. With rational contractor theories, the veil of ignorance ensures impartiality and hence self-interested behaviour is required in order to avoid ‘double-counting’. The absence of a veil of ignorance requires impartial benevolence in the ideal observer. As Hare (1975, p89) states: ‘... these two changes exactly cancel one another, so that the normative consequences ... would be identical’. Hare’s own theory ensures impartiality through the requirements of universalizability and prescriptivity, and hence all three theories are seen as practically equivalent (and utilitarian), and hence “it is largely a matter of taste which one adopts” (p94).

The theory of Harsanyi (1955) is an example of a rational contractor theory with utilitarian consequences, and which Hare would see as practically equivalent to ideal observer theories and his own theory. It has been noted, however, that in its original form, Harsanyi’s theory allows some influence from the original preferences of the contractor. If his theory is to be considered absolutist in the sense that all contractors should agree to the same principles, this influence must be removed, leaving no more than a calculation to be made. The judgement of the archangel may thus be more accurately described as an informed calculation rather than an informed preference, since the preferences of the archangel do not influence judgements in any way. The extent to which the theories of Habermas, Gauthier and Sagoff (1988) produce equivalent prescriptions in the ideal is not entirely clear, although one might expect a considerable degree of convergence.

It appears then that the informed-citizen preference will not necessarily deviate from a utilitarian framework, although Sagoff (1988) would probably take issue with this. This does not mean that utility will be equated with preference satisfaction, however, since this presents the type of ‘one-dollar-one-vote’ criteria for which economics is often criticised. As noted in Chapter 2, economic methods such as CBA make no claim to produce morally correct decisions. The failure of economics to adequately address distributional equity is largely a consequence of its commitment to one-dollar-one-vote principles. The above discussion suggests a range of principles that should apply to citizen-informed-preferences, and gives an idea of the frameworks that may be used to elicit individual preferences that best approximate the achangelican ideal.

In the next section, some suggestions are made regarding alternatives to traditional CV studies.
5.5 IMPLICATIONS AND CONCLUSIONS

5.5.1 Some Brief Theoretical Conclusions

Several aspects of a theory of consumer/citizen CV responses have been outlined and discussed.

(i) Dimensions underlying the consumer-citizen distinction have been explored, and in the CV context, we may, for illustrative purposes, refer to a citizen role as distinct from a consumer role. It is probably not appropriate, however, to view CV respondents as adopting either citizen OR consumer roles. There are several dimensions that may be used to differentiate citizens from consumers, and each dimension presents a continuum of possibilities. The citizen-consumer distinction is thus multi-dimensional rather than unidimensional.

(ii) The citizen-consumer dichotomy is perhaps, however, an attractive way of communicating the message that the distinction embodies. This is that “Existence values conflate these two persona; they illustrate a kind of double-think that at once recognises and denies the logical nature of commitment or ideal [moral]-regarding values’ (Sagoff, 1994, p140).

(iii) It is useful to identify two types of citizen preferences. Citizen-Issue-Opinions, or CIO’s refer to issue-opinions that individuals in society actually have. As such, it simply refers to how individuals actually think about specific environmental issues. Many of the biases commonly accounted in CV studies result from a misalignment of scenario characteristics with the held values, attitudes and beliefs that citizens bring to the valuation situation. Citizen-Informed-Preferences, or CIP’s, are the highly informed and deliberated type of preference that Sagoff (1988) advocates. Both CIO’s and CIP’s can present problems when CV results are intended for use in CBA. It is noted that CV researchers are implicitly dealing with CIO’s when they seek to design questionnaires so as to minimize biases.

(iv) A number of factors can be expected to influence the likelihood of citizen responses. For a given question format and elicitation method, responses are likely to have a more citizen flavour, for example, when (a) the issue under investigation is more of a public good nature, (b) the issue is controversial and widely known to be under investigation, (c) when the sponsoring organisation is clearly concerned with a social choice, and (d) when moral issues are involved.
Some degree of 'citizen' considerations can be expected to affect all CV studies involving public goods, irrespective of elicitation format (closed ended, open-ended etc), or 'institution nature' of the question (referendum format, market format). Although individuals who prefer to think about national issues as citizens are probably least likely to protest when referendum formats are used, the same format will also tend to encourage citizen considerations amongst other individuals. It would appear that the implications of the referendum format have not been fully explored.

An understanding of a more encompassing framework than that typically discussed in CV circles is required to permit practitioners to address the factors discussed in this Chapter. The less encompassing the accepted model of CV behaviour is, the greater the tendency to attribute problematical CV results to poor questionnaire design, and speculate as to where improvements could have been made. Without a broad and encompassing model of factors influencing CV responses, however, such speculation will be hit and miss, and typically after the fact. We need to be able to anticipate problems before they occur, and take appropriate action accordingly. More encompassing models of human behaviour relating to the CV context are possible, and can be used to design questionnaires, if we are clear about what we want them to do. A theory of citizen and consumer behaviour provides one such area in which existing models can be directed.

### 5.5.2 Practical Implications

In circumstances where citizen preferences are expected to be highly salient in respondents' minds and problematic for overall results, the CV researcher faces several options. The first option is to make little or no mention of citizen type information such as employment implications in the scenario and payment vehicle, in the hope that respondents will not bring their own perceptions of such factors in as external variables. Results are to be used as estimates of consumer surplus, despite the fact that:

(i) private interests relating to use or option value may have been subordinated,

(ii) other individuals in the population who haven't been sampled are unlikely to have consumer surpluses that resemble that of respondents (they may never have heard of the good in question),
(iii) double-counting associated with benefits accruing to members of the current population will occur when sampled individuals act altruistically toward them, 

(iv) economic benefits associated with development will more than likely have been considered, and 

(v) responses motivated by ill-considered, impulse, lexicographic, warm glow, and value-expressive (introduced in Chapter 10) factors are likely.

After all these factors are considered, it is questionable whether a consumer surplus interpretation will be appropriate. Of course one might be happy with a non-surplus interpretation. Results could, for example, be interpreted as WTP to prevent development, or WTP to obtain a public program. There is one problem with this ‘citizen’ type interpretation, however, and this is that as CV questionnaires typically focus on only the preservation case, giving little or no attention to the case for development, this interpretation is likely to be biased in favour of preservation. Blamey (1994) describes a CV study of Fraser Island, in which both preservation and logging cases received equal attention in the scenario, and results were deliberately interpreted as net WTP.

A second option is to attempt to avoid the problems associated with dimension 2, by ensuring that the payment vehicle involves full representation of the opportunity costs of preservation. The stated cost of preservation thus includes opportunity costs such as foregone employment, income and export benefits, in addition to any other costs that may be considered realistic and appropriate, such as management costs. Respondents then have to ask themselves whether preservation is worth at least this much. This approach has the advantage of greater face-validity and hence less protest responses, at a cost of stimulating citizen preferences which are of less use for CBA. At least you know what you are getting, since respondents are explicitly given information regarding development benefits. The dependency of CV results on perceived importance of development benefits may, to some extent, be minimized by including full compensation to developers (eg loggers) as part of the justification for a payment. This possibility is empirically explored in the case study presented in following chapters.

A third alternative is to not try and estimate a consumer surplus measure, and instead treat 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, namely the opportunity costs of preservation in the form of economic benefits associated with mining, preferably reduced to the individual level, but only if this is likely to appear realistic to respondents. In cases where it does not, questions could be framed in terms of a reallocation of public expenditure. A question of this nature is employed in the case study described in the next chapter.

Several ‘bid’ values could be employed, corresponding to high, low and best estimates of the expected developmental benefits at stake. In the case of a study employing a tax increase payment vehicle, results would then be presented in a table such as the following.

<table>
<thead>
<tr>
<th>Estimate of Preservation (Opportunity) Cost*</th>
<th>Minimum ($10/yr)</th>
<th>Most Likely ($15/yr)</th>
<th>Maximum ($20/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Impact Scenario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Impact</td>
<td>55%</td>
<td>45%</td>
<td>40%</td>
</tr>
<tr>
<td>Low Impact</td>
<td>45%</td>
<td>40%</td>
<td>35%</td>
</tr>
</tbody>
</table>

* 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. For the results of the above Table, for example, an appropriate conclusion would be as follows:

Under the high-environmental impact scenario, 45 percent of respondents are prepared to forgo the economic benefits associated with mining, when the most likely estimate of such benefits is used. It would thus appear that the majority (55%) of respondents do not consider the environmental values at stake to be as important as the opportunity costs at stake. If, however, the economic-benefits associated with mining turn out to be at the lower end of the expected range, the majority of the population (55%) then favours preservation.

Interpretation of results is then in terms of the degree of public support for or against the project in question, when individuals are aware of the development benefits 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. This approach is consistent with a policy-referendum interpretation, as opposed to the half-policy referendum interpretation often assumed in referendum CV studies. Results are not used to estimate the value of just one attribute of the policy, but rather the whole policy, as it is actually proposed.

A fourth approach is suggested by Kohn (1993), who has considered Sagoff's consumer-citizen distinction within the standard apparatus of consumer theory. Drawing on the work of Bergson (1938), Samuelson (1981), and Tintner (1946), he suggests that citizens and consumers may be 'disentangled' by viewing individuals as seeking to maximize the ethical function \( W(U(x,y,h), V(h)) \), where \( W(U, V) \) represents the preferences individuals form as citizens, and \( U(x,y,h) \) represents the preferences individuals form as consumers. \( x \) and \( y \) are normal market goods, \( h \) represents species habitat, and \( V(h) \) is a damage function relating species habitat to probability of survival. The unique aspect of \( W \) is that \( h \) appears in both \( U \) and \( V \), where the former appears to be restricted to use and option values associated with the habitat\(^{28}\). Kohn (1993, p306) argues that implication of his ethical function is that

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\text{two distinct valuations are required for measuring the benefits of preserving endangered species in their habitats. In the context of a survey approach, each respondent can be asked, first, ..., how much of the public budget should be allocated for securing habitat.... Then the respondent can be asked how much he or she is personally willing to pay each year to preserve the option of visiting the habitat and observing the wildlife in its natural setting. The total value of the marginal acre of habitat is the average, over all respondents, of the first valuation, converted to a per acre figure, plus the second summed over all possible respondents.}
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Although Kohn's demarcation between citizen and consumer preferences may be theoretically appealing, operating his twin valuation approach is far less so. Of particular concern is the problem of double-counting that may arise when the two valuations are summed. If, for example, respondents take use values into account when responding to the citizen question, double-counting will occur when added to WTP arising from the consumer question. One might expect that in reality only a minority of respondents will make the required separation of citizen and consumer motives. A more fundamental question arises concerning the appropriateness of the summation process. One might expect that to the extent that individuals subordinate

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\(^{28}\) Among the economic efficiency conditions arising from the optimal solution to Kohn's model is the condition that "the marginal unit of habitat converted to production for humans must produce the quantity of good \( Y \) that increases consumer utility and thereby ethical welfare by the same amount as the marginal unit of preserved habitat increases ethical welfare" (Kohn, 1993, p305).
their private interests (including use and option value) in responding to citizen 'public budget allocation', they see such interests as inappropriate for the purposes of social choice. In other words, individuals may see citizen preferences as providing the appropriate public input to social choice, and private interests are only relevant to the extent that they are already represented in preferences expressed in citizen questions.

A fifth way of handling the likelihood of citizen considerations is to sacrifice representativeness and endeavour to elicit more highly informed and deliberated citizen preferences from a comparatively small sample. In-depth questioning processes may be required, and attention would have to be given to the information supplied to respondents. Individuals would be encouraged to act as in those "rare moments" when they "force a special impartial and impersonal attitude" upon themselves (Harsanyi, 1955, p315). One possibility here is to subject a small sample of individuals to a hypothetical choice situation. There are numerous ways in which such an exercise could be structured. Individuals could be asked to consider a purely hypothetical society, another society with a very similar problem, a future society etc. They could be asked to consider their own society and the problem of interest, although strategic and cognitive considerations may cause them not to act as if they did not know their current life circumstances. A notable example of a real life hypothetical choice experiment is that of Mitchell et al (1993). The hypothetical choice experiment involved eliciting various preferences concerning an anonymous society Alpha. The description (scenario) of the society and the issues of interest were prefaced as follows:

As you read the following paragraphs, imagine that you are an outside observer to the society described. Your task is not to imagine yourself as a member of any specific social class in Alpha; instead, we wish you to consider how societal conditions in Alpha are related to the whole range of social classes in Alpha. We are interested in your ideas about how society as a whole should be organized when your personal interests are not at stake.\(^{29}\)

Results suggested that a Rawlsian maximin principle in which respondents maximized the minimum standard of living best described trade-off resolution strategies when effort and income were weakly linked. When tightly linked, a compromise strategy was most prevalent, in which people rejected some outcomes in which individuals

\(^{29}\) Mitchell et al (1993, 636) note that "we did attempt to simulate [Rawls's] ... original position (we believe that to be impossible-subjects cannot be made unaware of who they are); instead, we opted to see how subjects would distribute wealth in a society in which there were no obvious implications for subject's material self-interests."
would fall below the poverty line, but maximized efficiency above this threshold (Mitchell et al, 1993).

In contrast to the elicitation of isolated individual preferences, with or without a hypothetical situation, an alternate approach is to use small groups, and emphasise reasoning and deliberation in a communicative manner, as discussed above in relation to Habermas, and 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, 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 CV 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, the above philosophical considerations suggest that over several
replications, convergence on the result which is best for all (as defined by the boundary conditions) may be possible.

The above discussion of options facing the researcher when citizen considerations are likely to be dominant in individuals’ minds is by no means exhaustive. A range of approaches that have not been discussed (such as Stated Preference Modelling, Adamowicz et al, 1994, and Social Indicator Methodolgy, Syme et al, 1990) could equally be of use.
CHAPTER 6
THE AUSTRALIAN FOREST ATTITUDES SURVEY

6.1 INTRODUCTION

Chapter 3 and 5 have addressed much of the theory relating to an expanded citizen-consumer framework of CV responses. The distinction between citizen and consumer CV responses, or voter and CV-consumer responses, has been discussed in detail, and the implications of the former for the use of CV in CBA’s has been explored. It is argued that CV-consumer considerations may be seen as a subset of those relevant to the citizen.

The empirical re-analyses of two recent Australian CV studies in Chapter 4 provides a good deal of support for the framework presented. Such re-analyses have, however, been necessarily limited in scope, since the questionnaires employed in these studies were not designed with this thesis in mind. As a consequence, it was desirable to generate new data so as to explore many of the suggestions and hypotheses of the earlier chapters in more detail.

This chapter is organised as follows. Section 6.2 outlines the research objectives of the study. Section 6.3 discusses the qualitative/quantitative dilemma. Section 6.4 describes the AFAS study, including logistics and design of the survey instrument. Section 6.5 discusses the response rate for the questionnaire and the likelihood of non-response biases.

6.2 RESEARCH OBJECTIVES

The empirical study to be conducted here focuses on three main aspects of the consumer-citizen model presented thus far:

(i) An Investigation into Ethical Beliefs that Bear Directly on CV Responses

In accordance with the influence of ethical beliefs on citizen, and to a lesser extent, consumer CV responses, it is desirable to seek information regarding the nature and significance of CV relevant ethical beliefs, as they exist in a typical Australian CV context. As Chapter 4 clearly indicated, there appear to be factors driving CV responses in Australian CV studies, that are difficult to predict, and which can cause

1 A fourth, more qualified analysis is discussed in Chapter 10.
problematical results. By obtaining an inventory of ethical beliefs, further insight may be gained regarding the nature of responses, thereby permitting future studies to better address the complex issues involved in seeking to obtain valuation relevant data from the Australian public.

Both procedural and distributive beliefs are relevant here, although as noted in the previous chapter, the former are probably less desirable for the purposes of the CBA use of CV results. Distributive beliefs, such as those relating to the intrinsic rights of species, are also important, however, since it is these that may be driving individual’s level of commitment to environmental preservation, and subsequent use of non-compensatory lexicographic response heuristics. This first objective of the case study expands on the initial discussion of justice notions presented in Chapter 5, and provides an empirical assessment of such notions in the context of a typical Australian CV study.

(ii) Comparison of Different CV Scenarios

It has been suggested in previous chapters that different institutional CV formats are likely to stimulate different types of responses. The referendum CV format is most consistent with the elicitation of citizen preferences, and the trust fund format is most consistent with the elicitation of consumer preferences. It is thus desirable to compare referendum and trust fund CV formats in terms of the dimensions of citizen-consumer divergence outlined in the previous chapter. One of the tasks here is to investigate the differential influence on CV responses of selected ethical beliefs across the two CV formats.

In addition to a comparison of referendum and trust fund scenarios, two further comparisons are of particular interest, in light of the discussion of Section 5.5.2. First, is the question of whether including compensation to loggers within the payment vehicle reduces the influence that respondent concern for the opportunity costs of preservation has on CV responses. If so, this may be a way of reducing the associated double-counting problem. Second, there is the possibility that an alternate question could be developed, that is better suited to a citizen perspective. One possibility here is to frame questions in terms of a re-allocation of government expenditure rather than a tax increase. Such a question is likely to be more consistent with respondents’ beliefs regarding how the costs of preservation should be paid for, and as such, would have greater face validity. Tax increases are perceived to be objectionable by many. Although this alternate approach does not provide an estimate of consumer surplus for inclusion in a CBA, it still provides potentially useful information to decision-makers. As noted in the previous chapter, a consumer
surplus interpretation of CV results may require a leap of faith when citizen responses are prevalent. In contrast to some of the other alternatives suggested in Chapter 5, the approach tested here can still be used in representative samples.

(iii) Modelling the Structure of CV Preferences

According to the consumer-citizen model presented in Chapter 5, CV responses will sometimes reflect little more than the citizen-issue-opinions brought to the valuation situation. These CIO’s evolve from an individual’s core social values, mediated by more domain specific orientations. By influencing perception, such values and attitudes can influence the beliefs individuals bring to the valuation situation, and the way individuals react to information supplied in the CV scenario. Standard multiple regression models are of limited use in modelling such structural relations associated with preference formation, permitting one to estimate only reduced form equations. A more versatile approach, that permits both the horizontal and vertical structure of preferences to be modelled, is that of causal modelling. The third broad objective of the empirical investigation to be conducted here is thus to use causal modelling to model the preference formation in a CV study. The author is unaware of any published studies that have attempted to apply causal modelling in the context of CV. In addition to modelling the influence of core values on CV response, the structural relations involving the influence of specific ethical concerns on CV response are also of interest. Of interest, for example, is the way in which beliefs regarding the intrinsic rights of species influence CV response. Are they mediated by some form of absolutist orientation, or procedural beliefs regarding the desirability of monetary valuation? And how do such structural relations differ between referendum formats and trust fund formats. Given that no published research could be found that applies causal modelling to CV, this third objective is necessarily explorative. It is not entirely clear that CV is well suited to analysis in this way, and an important component of this third objective is thus to evaluate the usefulness of such an exercise. As noted in Chapter 3, an emphasis on structural realism is a central theme of institutionalist economics.

6.3 WHY QUANTITATIVE?

It is clear from these objectives that a quantitative, survey based approach is intended. It is important to note that a qualitative study could equally have been justified. Qualitative research

*attempts to capture people’s meanings, definitions and descriptions of events. In contrast, quantitative research aims to count and measure things (Minichiello et al, 1990).*
The author views qualitative and quantitative research as complements, both offering suitable perspectives from which to address contingent valuation research\(^2\). Ideally, one would have the resources to triangulate, coming at the issues from several perspectives at once.

Qualitative research in contingent valuation is particularly useful when one's objective is to seek a new explanation for, or perspective on, a particular problem, rather than the validation or confirmation of existing explanations. Sufficient hypotheses have, however, emerged from earlier chapters of this thesis to permit us to focus on empirically testing such hypotheses. These hypotheses have emerged from a number of sources, including a review of the quantitative and qualitative literature from a range of disciplines, the econometric re-analysis of existing data, and the author's own qualitative observations of CV responses. Given a desirability to generalise results, and the fact that our audience (the economics profession) is essentially quantitative, quantitative validation of hypotheses should provide useful insights. Since the objective of this study is to provide insights into how people tend to respond in CV studies involving environmental goods of national significance, it is desirable to replicate as much as possible the methodology typically employed in such studies. Although the case study is essentially quantitative, qualitative focus groups are however conducted as a supplement to some of the post-hoc quantitative analysis in Chapter 8.

To a large extent, the statistical methods employed in the case-study will be similar to those used in earlier chapters, namely cross-tabulations and logistic regressions.Introduced in the case-study, however, are the techniques of factor analysis, causal modelling, and structural equation modelling. Appendix D presents a glossary of statistical terms introduced in the case study, and Chapter 9 describes structural equation modelling in detail. Because many of the constructs of interest are abstract and difficult to measure, psychometric techniques are employed to obtain more accurate measures of these constructs, or latent variables\(^3\).

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\(^2\) The qualitative-quantitative distinction is somewhat controversial in the social sciences, with the distinction tending to be over emphasised. It is not my intention to review the debate. Useful discussions of this topic are contained in Minichiello \textit{et al} (1990), Berg (1989), Krathwohl (1993), and Glassner and Moreno (1989).

\(^3\) A latent variable is the underlying phenomenon or construct that a group of variables (or measurement scale) are designed to reflect or obtain a measure of (DeVellis, 1991).
6.4 THE AFAS SURVEY

One copy of the questionnaire, the covering letters and the reminder card appear as Appendix I in the pocket inside the rear cover.

6.4.1 The Environmental Good

The environmental good adopted for the purpose of the CV study was that used in the RAC CV exercise for its forest inquiry (see Chapter 4); that is, the south-east forests. There are several reasons for this. Firstly, the issue of how Australia’s forests should be managed was still topical at the time the questionnaire was to go to field. A moratorium had been placed on logging in old-growth forests, and the Commonwealth Government had recently released a National Forest Policy Statement. Secondly, the forests in question are of potentially national significance, and hence considerable existence values are likely to be attributable to them. Thirdly, public preferences regarding these forests would appear to exhibit citizen characteristics, as seen in Chapter 4. The phenomena of interest is thus likely to be available for further investigation. Fourthly, certain logistical advantages (maps, questionnaire design, pretesting etc.) are associated with using the same good previously investigated by another party. Fifthly, the topical nature of forest management in Australia meant that funding was likely to be forthcoming for a study focussing on forests. And finally, it is possible that some, albeit limited, comparisons can be drawn with the original RAC forests CV study, permitting some insight into what may have gone wrong in a notable recent study.

6.4.2 Pretesting

Pretesting the questionnaire involved two stages. The first stage was a scale and item development stage, focussing on latent factors for which items were to be developed specifically for this study. Several items were drafted for each latent variable, and mixed in with items corresponding to other factors. Some items not relating to latent variables were also included at this stage. A short questionnaire containing mainly 5-point likert scale response options was presented during a third year ANU environmental economics lecture. At the time of completing the questionnaire, students had not covered environmental valuation previously in lectures. Although clearly not representative of the Australian population, for the purposes of scale development, the sample was considered adequate.

Selection of items to be used to obtain a measure of a given latent factor was done mainly on the basis of observation of Pearson bivariate correlations among such
items, and reliability analysis in the form of Cronbach's alpha (see Appendix D). In general, scale items finally selected had bivariate correlations in excess of 0.4, often exceeding 0.5, and occasionally dropping to around 0.3, and all correlations exceeding 0.2. Cronbach reliability coefficients were generally in the range 0.7 to 0.8, and several factors produced figures in excess of 0.8. Final results for any given latent variable generally involved selection of a subset of the original items developed for that scale. Items were dropped on the basis of substantive reasoning in conjunction with the statistical evidence.

A similar scale development process was also undertaken in relation to scales to be ‘borrowed’ from other survey studies, and for which data were available. This involved repeating the above process for several different latent factors represented in a study of community attitudes conducted at the same time as the RAC south-east forests CV study (McAllister, 1990). McAllister's data was obtained from the Social Sciences Data Archives. In all cases, Cronbach alpha's corresponding to final scales were in excess of 0.7, and bivariate correlations were generally in excess of 0.4, with the exception of one scale where they ranged from 0.55 down to 0.19.

The scale items selected at this first stage of pretesting were included in initial drafts of the main questionnaire. In some cases, items or scales were subsequently dropped on the grounds that the importance of the particular item or scale was no longer considered sufficient to justify its place in the questionnaire.

The second stage of pretesting involved getting a small number of individuals to fill out and comment on near-final versions of the questionnaire. Firstly, comments were received from 15 individuals with a professional or academic background. Many of these comments were quite detailed, and a number of the suggestions were taken on board. These individuals represented a range of disciplines, including political science (*2), social psychology (*3), environmental history (*1), environmental science (mineral industry background) (*1), environmental economics (*3), environmental science (forestry industry perspective) (*1), business (*1), and other environmental science (*2).

Such individuals are clearly not representative of the Australian population, and since we are concerned here with pre-testing a near-final version of the questionnaire, some attempt needed to be made to see how individuals from lower socioeconomic groups handle the questionnaire. To fulfil this requirement the author conducted ten in-person interviews with people off the street in the cities of Canberra and Queanbeyan. Only individuals who appeared to be from lower socioeconomic groups, or who were significantly older than the professional/academic individuals, were targeted. These
individuals were offered $10 for their time, and provided with a cup of tea or coffee (in a nearby coffee shop) whilst filling out the questionnaire and answering some follow-up questions. Individuals were told to ask questions if they ran into any difficulty. Qualitative observations by the author enabled some of the more difficult and/or frustrating questions to be identified. After completing the questionnaire, individuals were asked what they liked and disliked, and what they found hard and easy. Individuals were also asked what they thought about when answering the CV question. Several alterations to the questionnaire were made on the basis of these interviews.

6.4.3 Questionnaire Length

All versions of the final questionnaire are 24 pages in length. Although this amounts to a fairly lengthy questionnaire, on the basis of discussion with experts and recent Australian experiences, it was anticipated that this should not present significant problems. Recent evidence in Australia and overseas suggests that although questionnaire length is undoubtedly the reason for a certain proportion of non-responses, other factors tend to be far more significant. In particular, the perceived importance of the issue under investigation, and the nature of the organisation(s) responsible for the study have an important influence on response-rates. In situations where both these aspects are favourable, response-rates may drop off little as questionnaire length increases (Jones, 1994 pers comm, Lievesley, 1994). In Australia, it appears that highest response rates in mail questionnaires occur when, ceteris paribus, university academics are conducting the study, followed by government departments. Sponsors with commercial identities fare somewhat less well (Dillman, 1978). Relatively high response rates are also expected when the topics covered by the questionnaire relate to important social issues, such as voting behaviour at a recent election, or the environment, and when the questionnaire is well presented, typically in the form of a B5 booklet with a graphically designed colour cover. Response rates to some lengthy questionnaires bear witness to the fact that high response-rates in lengthy questionnaires are possible. Response rates in excess of 60% , for example, are typically obtained with the 60+ page (Australian) National Social Sciences Survey (NSSS), and also the Australian Electoral Survey (AES). Response rates were 66% for the RAC community attitudes study (McAllister, 1990), and slightly over 50% for the RAC south-east forests CV study.

In terms of response-rate, the current study benefits from many of the advantages listed above. Firstly, it is conducted by academics, and funded by a government agency, as was made clear in the covering letter and the front cover of the
questionnaire. Secondly, the environment is a social issue that most Australians view as important (Lothian, 1994). Thirdly, and taking the lead of the studies referred to above, the questionnaire was presented in the form of a B5 booklet with a glossy and graphically designed colour cover. Given these factors, it was anticipated that a reasonably lengthy questionnaire would be acceptable.

It is important to realise that for the purposes of the thesis, we are interested in how individuals respond to typical CV questionnaires. Response biases should thus only present a problem to the extent that they differ to typical (mail) CV studies. This could potentially arise from either the greater length of the questionnaire, or the effect of the slightly different nature of the additional information. Mitchell and Carson (1989) list response rates for a number of well-conducted CV studies. The average for these studies is 48%, with about one-third falling below 40%, one-third falling from 40 to 60%, and one-third falling above 60%. Mitchell and Carson (1989, p.280) note that many of the studies had lower response-rates than the “60% benchmark noted earlier for studies that use state-of-the-art mail survey techniques”. Overall, a response rate for this study of 40% or more is considered acceptable. Below that, some concerns might be raised that responses are not typical of Australian national CV surveys conducted by mail.

6.4.4 Funding and Division of Responsibility

Funding for a study into determinants of CV responses to the amount of $18000 was obtained from the Commonwealth Department of the Environment, Sports and Territories. The environmental good in question was agreed to be the south-east forests. The grant was to be used only for the administration of the questionnaire by a market research company. This includes the costs of printing, extracting the sample, mailing, and coding of the response data.

Several quotes from market research companies were obtained. The company providing the cheapest quote was also the one preferred by the principal investigators, Mick Common and myself, on the basis of the reported experiences of other government agencies and academics. The successful company, Datacol Pty Ltd, which targets government and academic research of this nature, has been involved in several of the studies mentioned above. For example, the 1990 AES, the 1990 and 1994 NSSS, and both of the RAC’s south-east forest survey studies. Datacol was not required to advise on any aspects of the conduct of the study. Some advice typically results during the course of such an undertaking, however, since a great many logistics have to be arranged (colour of paper for map, format for reminder card etc).
Datacol, had no input to the design of the questionnaire itself, with the exception that a last minute suggestion to swap the order of two questions was accepted.

6.4.5 Sampling Strategy

The sample size required was established largely on the basis of the number of different versions of the questionnaire to be circulated (twelve versions, arising from three bid values in each of four CV scenarios)\(^4\), and the statistical methods to be employed. The statistical method expected to be most demanding in this respect was structural equation modelling when applied to just one of the four scenarios. The minimum number of responses for a given scenario required to permit a basic SEM analysis was 300. On the basis of a worst case response-rate of 35%, this requires an initial sample of approximately 3500 (ie \((3500/4)*0.35=306\)). Higher response rates are clearly preferable in order to permit greater flexibility at the data analysis stage.

The sample was drawn from the state electoral rolls, supplied on microfiche by the Australian Electoral Commission. The total number of electors was calculated and a sample of 3500 electors was chosen. A simple random sample within each state was drawn, with size proportional to state population. Lists showing the state, panel number and line number were printed. The Datacol data processing staff then used the microfiche to find each sample point and key the names and addresses into a computer. The 3500 electors in the sample were then randomly allocated to each of the twelve sub-samples, resulting in approximately 292 electors per subsample.

6.4.6 Covering Letters and Follow-Ups

In order to minimize biases arising from non-response, it is desirable to follow-up individuals not responding to the first mail-out, and to try and encourage such individuals to complete and return the questionnaire. With mail questionnaires, the most preferred methods of following-up involve the use of reminder cards (or postcards), follow-up letters, and questionnaire re-mails (Dillman, 1978). The present study involved sending one reminder card approximately two weeks after the initial mailing, followed by a remail of the questionnaire, accompanied by a new covering letter, approximately two weeks after that. Only individuals failing to return a questionnaire, and for whom a return to sender or indication of refusal had not been received, advanced to the next stage\(^5\). A phone line was also set up, so that

\(^4\) In this thesis, the term 'scenario' is used to refer to all parts of the CV question, including information supplied prior to the CV question, and the CV question itself.

\(^5\) In the Australian Election Survey, the reminder card is sent to the entire sample, serving as both a thankyou and a reminder.
individuals could ring in if they desired further information, wished to register protests, report deaths or other reasons for non-completion etc. The presentation of the questionnaires, covering letters and reminder card was modelled on that of Australian Election Survey. The covering letter described the importance of the study, the confidentiality of responses, and the phone-in ‘hotline’.

6.4.7 The Questionnaire

Before systematically presenting and discussing each question in the questionnaire, it is best to first describe the nature of the twelve different versions of the questionnaire. This involves jumping ahead to the CV question.

The Twelve Versions

The twelve versions of the questionnaire correspond to four different scenarios and three different prices or Sc amounts for any given scenario. The three different prices were once off payments of $10, $50 and $200. The use of different prices in different subsamples is in accordance with the dichotomous-choice CV method, previously discussed in Chapter 2 (see also Appendix B).

To put the three bid values in perspective, consider how high average WTP would have to be for total WTP to exceed the net benefits from timber harvesting (ie the switching value). The relevant estimate is $1.55 (present value) for each adult Australian resident when no compensation package for loggers is included (Streeting and Hamilton, 1991). When a compensation package to loggers is added to the estimated financial value of timber harvesting, the switching value becomes $6.05 per head (Streeting and Hamilton, 1991). Inclusion of higher prices than $200 was ruled out on the basis of previous observations regarding protest responses to ridiculously high prices. It was felt that a price range of $10-$200 should be more than adequate to pick up the degree of price sensitivity in the population. All payments are once-off, in accordance with the conclusions reached by Carson (1993, p157).

Given the objectives of the study (see Section 6.2), four different CV scenarios were employed, each being sent to 875 electors. Consider each of the four scenarios in turn. As in the original RAC study (Chapter 4), Options A and B again refer to the Wood Production and Conservation Reserve management options.

Scenario 3 Modified RAC Original

Although Option B involves a higher level of environmental preservation than Option A, it is not without its costs. These costs could take several forms:
with less wood being available the prices of timber products you buy, such as house frames and paper, could rise.

- costs associated with managing the area as Conservation Reserves

The above costs associated with Option B could amount to $50 for each adult Australian. Option B would thus cost you approximately $50.

When you make your choice between options A and B, keep in mind other forests that may cost money in this way, and indeed all other things that you have to spend money on.

B.2. Which Option would you vote for at a referendum?

OPTION A (Wood production in half striped areas on map) ......................... 1
OPTION B (Conservation reserves for all of the striped areas) .................... 2

This scenario is very similar to the scenario originally employed in the RAC's south-east forest CV study (see Chapter 4). The most notable change is that rather than asking individuals which option they prefer, as in the case of the original, individuals are now asked which option they would vote for at a referendum. The original is in a sense, a mixed-model approach, being based neither solely on a market model, nor solely on a referendum model. Since we are interested in the influence of different question formats on individual responses, a referendum format in scenario 3 (and also scenario 1 and 2) has been adopted, to avoid confusion.

Scenario 1 Modified RAC Original with Jobs and Compensation Included

Although Option B involves a higher level of environmental preservation than Option A, it is not without its costs. These costs could take several forms:

- with less wood being available the prices of timber products you buy, such as house frames and paper, could rise.

- costs associated with managing the area as Conservation Reserves

- the forgone value of the timber that would have been produced

- the economic and social costs of increased unemployment, the latter of which may be offset via a compensation package that recipients agree to.

When such a compensation package is included, the above costs associated with Option B could amount to $50 for each adult Australian. Option B would thus cost you approximately $50.

When you make your choice between options A and B, keep in mind other forests that may cost money in this way, and indeed all other things that you have to spend money on.

B.2. Which Option would you vote for at a referendum?

OPTION A (Wood production in half striped areas on map) ......................... 1
OPTION B (Conservation reserves for all of the striped areas) .................... 2
As seen in earlier chapters, the importance the individual places on jobs and other aspects of the opportunity costs of preservation is likely to be an important determinant of a citizen CV response. For individuals bringing such considerations to the valuation situation, presenting them with the jobs-free scenario 3 may not cause them to forget or omit such considerations in formulating their response, and indeed, for some individuals may result in a protest response. The latter arises from the lack of face validity associated with only presenting individuals with a portion of the issues seen to be important.

The purpose of scenario 1 is thus to investigate the effects of increasing the face validity of scenario 3, through specifically mentioning jobs. Although this might result in fewer protest responses among individuals likely to bring employment considerations to the valuation context, it will almost certainly prime such thoughts among those not already making such considerations, which from the cost-benefit-analysis point of view, is undesirable. As noted previously, however, telling individuals that payment (option B) would involve fully compensating loggers for jobs lost, should to some extent help individuals put such employment considerations aside; that is, if the loggers are happy, then I need think no more about them, and hence I can focus on other aspects of the tradeoff. We have seen that this adjustment is unlikely to be completely eliminate the contingency of CV responses on the perceived importance of the economic benefits from logging. Interest thus lies in comparing the relative explanatory power of certain variables (such as importance of jobs) in relation to Scenario 1 and Scenario 3 responses.

Scenario 2 Citizen Type Question

Although Option B involves a higher level of environmental preservation than Option A, it is not without its costs. These costs could take several forms:

- costs associated with managing the area as Conservation Reserves
- the forgone value of the timber that would have been produced
- the economic and social costs of increased unemployment, the latter of which may be offset via a compensation package that recipients agree to.

When such a compensation package is included, the above costs associated with Option B could amount to $500 million. If the Government decides in favour of Option B, it is most likely these costs would be met by redirecting expenditure from some other area of government expenditure.

Although the Government would not decide where expenditure would be cut until after the decision is made, to help put the cost in perspective, $500 million represents approximately 0.25% (or 1/400th) of total Australian government expenditure for one year (or approximately $50 for each adult Australian).
When you make your choice between options A and B, keep in mind other forests that may cost money in this way, and indeed all other things that the Government (and taxpayers) have to spend money on.

B.2. Which Option would you vote for at a referendum?

**OPTION A (Wood production in half striped areas on map) ..................... 1**

**OPTION B (Conservation reserves for all of the striped areas) .................. 2**

Scenario 2 is intended to represent the sort of scenario that would be appropriate for seeking the views of individuals as citizens to provide input to political decision-making. Individuals are effectively being asked what they think the government should do with a tradeoff the government faces, rather than being asked whether they would pay $c themselves (market), or whether they would vote for an option that would cost them $c (referendum CV). It is hypothesised that this scenario should bring less objections in terms of the first particular of dimension 1 of the citizen-consumer divergence, outlined in Chapter 5. In order to facilitate comparability across scenario’s, and to help individuals ‘get their head around’ the sizeable sums of money involved, these figures are brought back to the individual level in the statement in brackets. The price sensitivity of responses to this scenario in relation to the others (particularly scenario 1) is clearly of interest.

**Scenario 4  Market Based Trust Fund Format**

As noted above, it is possible that some of the forests in the striped areas could be preserved rather than used for wood production. One way of deciding what should be done with these forests is for the management of these forests to be placed in the hands of a specially formed trust. The trust would be monitored by an independent board.

If the trust could raise sufficient funds to cover the costs associated with taking these forests out of the wood production areas and managing them as conservation reserves, then the trust would preserve all of the forests in the striped areas. If however, this amount of money could not be raised, the forests would be managed according to Option A (and the money would be refunded to those from whom it originated).

When you answer Question B2, keep in mind other forests that may cost money in this way, and indeed all other things that you have to spend money on.

B.2. In order to bring about Option B, would you be prepared to make a payment of $50 to such a conservation reserve trust fund?

Yes ........................................ 1

No.......................................... 2

In contrast to the first three scenarios, which are based on a referendum format question, this scenario is based on a market format, in which the future of the forests effectively depends on market forces. If the trust can raise sufficient money, the forests will be preserved. Alternatively, they will be logged.
It is hypothesised that this format will raise the greatest number of protests amongst respondents. This would be reinforce the previously noted speculation of Mitchell and Carson (1989), regarding the appropriateness of different formats, and would be consistent with the objections of Sagoff (1988). Also of interest is the extent to which individuals make citizen considerations when responding to this scenario, and how this compares with the other three scenarios. Scenario 3 provides the greatest opportunity for comparison with scenario 4, since neither mentions jobs or compensation.

The Questions

We are now ready to systematically work through the questionnaire, one question (or sub-question) at a time, discussing the construct of interest and why it is important, and then indicating how it is measured. Appendices will be used to reference relevant literature and overview the theoretical perspectives influencing the design of the questionnaire. Of particular importance are Appendix C, which refers to relevant literature pertaining to environmental attitudes and attitudes and behaviour in general, and Appendix E which concerns measures of held values.

SECTION A: GENERAL ISSUES

Environmental Concern

As Appendix C indicates, environmental concern has been measured using a variety of measures, each differing in terms of the substantive issues they address (eg pollution, logging of native forests etc.) and/or the theoretical conceptualisation employed (Van Liere and Dunlap, 1981). Although the questionnaire contains a number of items relating to different aspects of environmental concern, the opening questions focus on measures pertaining to substantive environmental issues. Questions A.1 and A.2 are taken from McAllister (1990), slightly modified on the basis of pre-testing. This permits comparison of levels of environmental concern among the population with that of 1990*. The substantive issues employed by McAllister still seem to be relevant to pressing concerns amongst society, and to preserve comparability, no changes in this respect were made. Pre-testing indicated that some individuals were unfamiliar with the term ‘land degradation’, hence a couple of bracketed examples were added to this item in A.1. In order to remove any possible double-barrel effects arising from asking ‘how worried or concerned are you ...’, the word ‘worried’ was removed in both A.1 and A.2. The first item in A.2 had the reference to world extinction

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* Sampling methods of McAllister (1990) were very similar to those employed here.
removed, and the phrase 'world as a whole' was instead bolded. Item 1 in A.2. is slightly less ambiguous as a result.

Postmaterialism

It has been suggested in previous chapters that values have an important influence on environmental preferences, mediated largely by attitudes. Values are central to the framework presented in Chapter 5, and also the theoretical model to be presented and empirically explored in Chapter 10. Values can influence cognitive processes such as perception, and the amount of deliberation or reasoning justified in regard to a particular choice or decision (Chapter 3, Appendix E). As a consequence, the measurement of value-orientations forms a major component of the questionnaire. As Appendix E indicates, values can be approached from a number of disciplines and perspectives, with each discipline or perspective offering its own method of measurement.

Given our interest in citizen and voter preferences, an obvious choice of value-scale is the materialism-postmaterialism, since this is one of the key political science scales. Originally advanced by Inglehart (1977), this value-orientation is most commonly measured using a four item scale, although a twelve item scale in which respondents are required to respond to three sets of four items, is also quite common. Another approach that has been employed in the literature (see Inglehart, 1979) is use of a four item sub-question followed by an eight item sub-question. There are problems with the basic four item scale. The issues involved in the four items, although still important, are somewhat selective and no longer as topical as they may once have been. People may thus respond by saying 'But why is there no mention of these other important issues'? A second, related problem is that no context is supplied for the required tradeoffs. It can be argued, for example, that values themselves are not traded off in the absence of a context (Braithwaite, 1994 pers comm). This is exacerbated by the infrequency with which some of the tradeoffs in the four item scale are encountered in real life. Consider, for example, the question of what is more important, 'fight rising prices' or 'protect freedom of speech'. Such a tradeoff will be unfamiliar to many. The remaining eight items appear to be less problematical in this respect, since they include items such as 'maintain a stable economy', and 'try to make our cities and countryside more beautiful'. Because of the widespread use of postmaterialism scales in the literature, such a scale was included in the questionnaire, and for the reason outlined above, all twelve items were included.

The reason postmaterialism was measured early in the questionnaire, was that during pretesting, several individuals commented that it was inappropriate to ask individuals
in a subsequent question (the CV question) whether they preferred wood production or cessation of logging, when all questions prior to that question related to environmental concern. The implied argument is that the environmental concern questions would prime 'green' responses, resulting in biased responses to the CV question. This is an example of one of the major dilemmas encountered in designing the questionnaire, the tradeoff between the face validity and unbiasedness of the questionnaire, and the implications of the theoretical concerns of the thesis. If questions and information prior to the CV question focus purely on the environmental side of the issue under investigation, one could be accused of biasing CV results in an upward direct. This is a well-grounded argument, since research in psychology suggests that all questions can be seen to have some priming effect, and given that all aspects of a problem are unlikely to be equally accessible in memory at a given point in time, green questions can clearly prime green responses. The tradeoff arises when we consider the desired CV-consumer response. Since CV responses are supposed to be independent of perceptions regarding development benefits, it is clearly undesirable to prime such considerations prior to the CV question, since this may produce results that are more problematical, in terms of the CBA use for CV results. The result is that environmental concerns are primed and economic (development) concerns are ignored or greatly downplayed. If it was true that individuals bring only a CV-consumer perspective to the valuation situation, this may present no problem, since the environmental concern questions could be viewed as providing information, or priming more thorough consideration of environmental problems. The problem with this is that individuals bringing a citizen issue-opinion to the situation, particularly pro-development opinions, are likely to reject the questionnaire as being biased, thereby potentially resulting in a protest response.

Inclusion of the postmaterialism question between the environmental concern measures and the CV question is a response to this dilemma. It is hoped that without making specific reference to either jobs or forestry issues, the individual is made aware that the researchers are aware of a range of conflicting goals facing society. It is hoped that protests will be minimized as a result.

SECTION B: THE SOUTH-EAST FORESTS

After the postmaterialism question, Section B of the questionnaire is encountered, relating specifically to the south-east forests. Although a more natural progression may be to work from general environmental attitudes to issue-specific attitudes, many of the more general questions refer specifically to the opportunity costs of preservation. Including such questions prior to the CV question may thus prime
individuals to think about such costs when formulating their CV response. To minimize this effect, the specific CV question was included toward the front of the questionnaire, with the questions becoming more general as the questionnaire progresses. It is important that items to be used in explaining CV response, and which relate to constructs that challenge the CV-consumer model, are included in the questionnaire after the CV question. Otherwise, it could be argued that the question primed its own statistical significance in the valuation function. Had it been left out, the constructs of interest may no longer have been statistically significant. It is acknowledged that some individuals will quickly flick through the questionnaire before answering the first question, and that some individuals may not work through the questionnaire from start to finish. There is little that can be done about this in a mail questionnaire. Although I believe that problems arising from such factors should have little bearing on the general thrust of the results obtained, it is acknowledged that, to some extent, results may be infected by such factors. To avoid this problem entirely, one would have to conduct in-person interviews, at a considerable increase in expense. Alternatively, one could use telephone surveys at considerable informational loss, or focus on smaller scale interviews or experiments, at a loss of statistical representativeness. Overall, I feel that the approach adopted here is acceptable, given the constraints faced and the limitations of alternatives.

Section B begins with an introduction that is drawn from the original RAC south-east forest CV questionnaire. Individuals are referred to a map, and the area of forests in question is identified as the striped areas on the map. Printing and graphics costs (and the unavailability of the original colour plates) prevented inclusion of the same map used by the RAC within questionnaires. Instead, a graphic artist was consulted to provide a black and white version of the RAC original, to be printed on yellow A4 paper and inserted within questionnaires.

Question B.1 asks individuals if within the past twelve months they have made any trips to, or travelled through the south-east-forests area marked on the map. The purpose of this question is to provide a dummy variable that provides an indicator of actual use value.

Page 4 of the questionnaire is labelled the ‘Information Page’. This contains information regarding two possible management options for the striped area of forests on the map. This draws on the original RAC questionnaire, but is modified in several respects. Option A is again labelled ‘Wood Production’ and Option B again labelled ‘Conservation Reserves’. The first modification is that the number of points mentioned was reduced. Pretesting suggested that the RAC version was a bit of an
'eyeful' and the amount of information on the one page was too much for some individuals to handle, or bother with. The points eliminated were those that appeared to add the least to the overall description of that management regime. The second modification involved the inclusion of a picture showing the state of the forests under each management regime. This should facilitate comprehension of the difference between the two options. This was taken from the questionnaire of Loomis et al (1993), which related to the Victorian component of the south-east forests, and modified on the basis that logging in the NSW component would leave a small proportion of older trees. A compromise was made by adding one tree to the post-logging picture. Explaining the precise differences would have required adding more points, which on the basis of pretesting, could not be justified.

The reference to the information page was at the top of the page facing it. Although this creates a small problem in that some individuals may not know what to do with the information page when they first see it, it avoids a potentially more significant problem associated with individuals being told to read the next page and then come back to the current page to answer the CV question. Comments received during pretesting, when pages 4 and 5 were in the opposite order to that of the final questionnaire, suggested that some individuals may accidentally skip the CV question after reading the information page.

After the CV question, which has been previously discussed, respondents are presented with a series of debrief, or follow-up questions, as recommended by Stevens et al (1991). The lead in statement is as follows:

People answer questions in different ways. We are interested in knowing which factors were important to you in answering Question B2. There are no right or wrong answers. Questions B3 to B7 are concerned with how you responded to Question B2.

Because four different scenarios and CV questions were used, as previously discussed, the follow-up questions had to be modified accordingly. The twelve versions of the questionnaire thus varied on more than just the CV page, and a matrix containing questionnaire version by page version had to be presented to Datacol for printing purposes. The fact that the printing process involves using plates rather than a photocopying like process made this quite complex, but thankfully no problems in either printing or collation were encountered.

In the three referendum scenarios, Question B3 was as follows:

How strongly do you feel about your choice between options A and B?
Seven response categories were included, ranging from ‘strongly favour option A’, through ‘fairly indifferent between options A and B’, to ‘strongly favour option B’. This question has several possible uses. Firstly, Ready et al (1992) argued that providing such response options better allows individuals to express any ambivalence they have, which may result in lower protest responses. It certainly gives individuals a greater opportunity to express the strength of their values, or their indifference, than the dichotomous version. Responses to the question can be related to later questions regarding difficulty of answering the CV question, and other questions. Secondly, the question provides more information about an individual’s preference than a simple yes/no response, and as such, may be a useful alternate to the CV response in structural equation modelling.

The above version of B.3., is not appropriate in the case of the trust fund scenario. In order to maintain the same pagination and data-entry set-up, a replacement question was required, it being:

If no trust fund was to be set up, and the government was to decide what to do with the forests, which option would you prefer?

It seems reasonable to assume that in this instance individuals would see the costs associated with option B as being paid for through taxation revenue. Since additional issue-specific taxes are uncommon in Australia, individuals will probably view any such expenditure as a redirection of existing revenues.

Question B.4. asks individuals whether the costs ($c) associated with option B influenced their response. The question was slightly varied across scenarios in order to maintain consistency with the CV question. This self-report question clearly relates to an important issue: Did respondents pay much attention to the bid value? Being measured via a single self-report question, this construct will clearly be subject to some degree of measurement error.

Question B.5. is designed to serve two functions. Firstly, it is designed to obtain a self-report measure of the significance of the opportunity costs of preservation in response formulation (B5b). Secondly, it provides an initial measure of difficulty with (B5c) and/or dislike (B5d) of, the CV question. It also serves as a lead-in to the more detailed debrief questions in B6. Question B5a was included to provide a comparison with B5b, and to maintain face validity (for many respondents, it is probably a more sensible inclusion than the other three items, especially in scenarios 3 and 4 where jobs are not mentioned).
Question B.6. begins with a filter, requesting only those individuals finding the CV question difficult, or disliking it for some reason, to complete it. The question provides 13 items to which respondents can either agree or disagree on a 5 point likert scale, followed by an open-ended question regarding any further difficulties respondents might have had. The thirteen items relate to: lack of confidence/don’t know; refusal to consider tradeoff; lack of information; biased information; and failure to see why option B should cost money in the way specified. Concerning the latter, a range of items relating to different aspects of the payment vehicle are included. These items vary across scenarios in accordance with the precise specifications of that scenario. In scenarios with fewer reasons given for a payment being required (scenarios 3 and 4 in particular), fill-in questions had to be developed in order to maintain the same data-entry structure and pagination. These fill-in questions are of lesser interest. The items of primary interest, however, allow us to break down an important source of protest or objection. Designing CV scenarios that seem realistic to the vast majority of respondents is difficult, if not impossible in some cases, since face validity requirements may conflict with the theoretically preferred option(s). Rejection of the CV question on the grounds of perceived poor face validity is most likely among respondents bringing citizen issue-opinions and related beliefs to the valuation situation, who will tend to be those who are most knowledgeable about the actual conflict in question.

Several of the above self-report questions clearly relate to ethical objections to the CV question, pertaining to dimension 1 of the consumer-citizen divergence, and one involves a self-report of dimension 2 (consideration of logging benefits) of that divergence. Question B.7. is an attempt to use self-reports to explore the abstract and difficult to measure construct of impartiality. It asks for whom was your response preferable. A number of candidates are explored, from individuals close to the respondent (e.g. loyalties regarding family and friends), through to the nation and world as a whole. In order to maintain face validity, two items had to be directed at individuals employed in the timber industry, and the species of biota living in the forests. In order to extract maximum information from this quite difficult question, both ratings and rankings were sought. The latter offers the advantage of making yea-saying impossible. The individual cannot simply agree with all 8 items, but must chose those that are most important. Question B.7. is the last of the 'CV debrief' questions.

Question B.8. provides attitudinal measures corresponding to the classic CV-consumer taste variables. The first item relates to option-value, the second to existence value, and the third to quasi-option value. As discussed in relation to the
Kakadu re-analysis, such variables permit us to control for CV-consumer tastes, when investigating the effects of other variables on CV responses. It should be noted that the existence value variable can be seen as representing either CV-consumer, and/or citizen tastes.

Question B.9. relates to the perceived consequences of logging for the environment, and the consequences of preservation for the economy. Individuals’ awareness of consequences has been shown to be an important determinant of norm activation, and hence altruism (Schwartz, 1977, Heberlein, 1972, see also Appendix C). This is important as it provides an understanding of the reasons why individuals have adopted the stances reported earlier. When considered in relation to psychological findings that values can influence perception (see Chapter 3), however, it is hypothesised that responses to this question will be largely a function of more general attitudes and values, and fairly independent of information supplied in the questionnaire. That is, individuals’ beliefs regarding consequences will be updated little, upon entering the valuation context. The items in Question B.9. were chosen on the basis of perusal of open-ended comments in a sample of approximately 200 of the original RAC south-east forest questionnaires. A few of the items were added as a result of comments made by individuals during pretesting.

SECTION C: AUSTRALIAN FORESTS IN GENERAL

Question C.1. is drawn from McAllister’s (1990) questionnaire, with a few modifications. Firstly, the item ‘Maintaining logging communities’ has been added to account for a benefit of logging not previously included, and which pretesting suggested may be important. Secondly, the ‘Don’t Know’ response category was dropped. Because the question is a likely candidate for use in causal modelling, such responses would either have to be treated as missing values or combined with the fourth ‘Not at all important’ response category. Since neither of these alternatives is highly desirable, it was decided to drop the ‘Don’t Know’ category for the purposes of pre-testing, and observe whether this created any problems. Since individuals, including those of lower socioeconomic status, appeared to have no problems with this version of the question (based on comments made by the individuals and qualitative observations), this version was adopted for the final questionnaire. The percentage of useable responses to this question should be maximized as a result. It is, however, acknowledged that some degree of measurement error may be introduced to the data as a result.

A further change to the McAllister version of Question C.1. is that a follow-up question requesting individuals to identify the things on the list that they feel are most
Important in deciding about the future use of Australia’s forests, was left out. This was not adopted because the information obtained was not seen to be of net benefit, given the constraint of questionnaire-length and respondent fatigue. Some further, minor, changes were also made to Question C.1., including replacement of ‘our governments’ with ‘the Australian Government’, ‘you feel’ with ‘you think’ etc.

Questions C.2 to C.4 were included in order to obtain information pertaining to the individual’s general attitude to logging native forests. Together, these questions provide a measure of the individual’s domain specific orientation. Questions C.2. and C.3. were taken from McAllister’s (1990) questionnaire. Pretesting indicated a quite high correlation (0.59) for these variables. Question C.4. was included in order to provide a third item to be used in the measurement model for the latent orientation referred to above. Pretesting suggested that some individuals did not like being forced to choose between the environmental benefits and the logging benefits in these three questions, with several individuals commenting that we ‘should seek more of both’. In order to reduce the likelihood of such protests, the word ‘closest’ was bolded in each question, and the following lead-in to the three questions was added:

Although you may not agree totally with any of the statements listed below in Questions C2 to C4, we are interested in knowing which comes closest to your own view. Please circle the corresponding number.

Question C.5. involves a number of attitudinal and belief items relating to forest issues, some designed to load on a common latent variable, and others to be used as single indicators. Pretesting suggested that the following items load well on the latent variable, ‘belief in intrinsic value’ (bivariate correlations all exceeding 0.56, Cronbach’s alpha=0.86):

Wilderness has value only in so far as it can ultimately benefit humans

Wildlife has as much right to exist as humans

Species should be preserved, for their own sake, and not ours

I look upon nature as if it were there in itself, and for itself, and not simply as a resource for human use

Similarly, the following items were shown to load on ‘Absolutist Preference for Preservation’(Cronbach Alpha=0.78):

Wildlife has the right to be protected irrespective of what this costs society

This country has lost too many native forests already; all remaining old-growth forests must be preserved
So much of Australia's natural environment has now been altered, that we must protect all that remains.

All logging in native forests should be phased out within five years.

Related, but distinct from the above latent construct is a notion of absolutism more directed toward individual behaviour, and less toward social preferences:

I would never favour a proposed environmentally damaging development.

The following two items loaded well on 'Moral Wrongness of Environmental Degradation':

- Harming nature for the sake of development is morally wrong
- Logging is wrong and should be stopped

The following single item, which reflects a fairly common view amongst environmentalists, and which can be expected to correlate to varying extents with the above items, was included:

- Humans have a duty to protect nature

A single item reflecting spiritual/symbolic value of nature was included:

- Nature is spiritual or sacred

The following single items were also included, largely to add balance to the general thrust of the other questions:

- Too much of Australia's forests are locked up in national parks and other reserves
- Logging should be permitted anywhere that it is economically viable
- In the long-term, logging generally does little harm to Australia's environmental resources
- Logging can be ecologically sustainable

Question C.6. was included as a measure of the individual's knowledge of forest management in Australia. This variable may clearly relate to a wide range of variables contained in the questionnaire, such as interest in forest management, price responsiveness etc.

SECTION D: THE ENVIRONMENT GENERALLY

Questions D1 to D4, and to a lesser extent D5, are designed to provide a latent measure of individuals' general environment/development orientation. For the same
reasons as outlined above with respect to Questions C2 to C4, these questions were preceded by the following lead-in statement:

When conflicts in the use of our natural resources arise, it is not always possible to make compromises, or to satisfy both environmental and economic objectives. Questions D1 to D4 refer mainly to situations where compromises are not possible.

Questions D1 and D5 were developed for the purposes of this study, and questions D2 to D4 were drawn from previous questionnaires. Slightly different versions of D1 were included in the questionnaires of both of the RAC's CV studies discussed in Chapter 4, and D4 was included within both of the RAC south-east forest questionnaires and also the 1990 Australian Election Study. D3 was included within the south-east forest community attitudes questionnaire (McAllister, 1990). Results of the scale development phase involving the environmental economics class suggested that D3 and D4 correlate well.

Question D1 was designed to give an item that more closely aligns with the generalities of the latent variable of interest, and which would perhaps provide the best single-item measure of the construct.

Although Question D5 clearly picks up a degree of the general orientation sought in the questions preceding it, its purpose is different. D5 has the advantage of not requiring individuals to make tradeoffs with which they may be uncomfortable, and focuses on how individuals think environmental protection should be funded, which has implications for how the individual reacts to different payment vehicles and scenarios. The second statement reflects a belief that can be problematical for the purposes of CV, and which forms the basis of payment in the citizen scenario.

Question D.6. seeks to identify how important the natural environment is to the individual, both in general, and specifically in relation to forests. The first and third items relate to the former, and the second and fourth relate to the latter. Either or both of these pairs could be used to represent their respective latent variables. Interest in, or centrality of, a given issue is likely to have an important moderating effect on many of the primary relationships of interest.

Question D7 involves items relating to a range of procedural aspects of environmental decision-making. The only latent variable targeted here using multiple items is 'Desirability of Monetary Valuation of the Environment'. The following items were developed and tested accordingly (bivariate correlations all exceeding 0.21, Cronbach's alpha=0.72):
It would be good if the monetary value of preserving certain wilderness areas could be accurately estimated.

Some things, such as rare wildlife species, should not be valued in dollar terms.

It is wrong to put a price on nature.

Economists should not try to calculate the value of preserving rare species.

Other items relate to a range of procedural issues:

In principle, referendums are a good way to make decisions about the most important matters facing society.

Public inquiries are a good way to make decisions about such matters.

Government should keep out of environmental decision making and leave such matters to markets.

Environmental decisions should be made mainly on the basis of government consultation with experts.

It should be up to those favouring preservation to buy out, or compensate would-be developers.

Environmental decisions can be made mainly on the basis of comprehensive economic analysis.

In general, industry can be relied on to not seriously damage the environment.

There is too much money spent on bureaucracy in this country.

The public must be consulted before any important environmental decisions are made.

Questionnaires such as this are a good way of consulting the public.

Question D8 represents an attempt to measure the individual’s personal norms regarding four areas of environment-related behaviour; product purchase, donations, voting and recycling. Personal norms are an important determinant of behaviour (see Appendix C). Pre-testing indicated minimum bivariate correlations of 0.21, with a Cronbach’s alpha of 0.74 for the four-item scale.

How personally obligated do you feel to purchase environmentally friendly products?

If a representative from an environmental group was to approach you in the street tomorrow, how obligated would you feel to donate some amount of money?

How personally obligated do you feel to take into account the environmental policies of different political parties?

How personally obligated do you feel to recycle papers, plastics and glass?

Question D9 asks individuals whether they think Australian households should recycle papers, plastics and glass. In contrast to their responses to the above personal
norms question, and their self-report of recycling behaviour in Section F, this question asks individuals to reflect on what they think is in society’s best interests. As such, this question may involve citizen considerations that may diverge from norms/behaviour that are more self-interested. Of course, many factors may explain why individuals who think households should recycle, do not do so themselves.

Question D10 involves 10 likert scale items relating to how the costs of environmental management should be borne. The first item relates to user pays. The second item refers to the argument that only those who care about environmental management should pay:

- Where possible, those who visit wilderness areas should pay for the management of such areas through entrance fees
- Those who think conservation is important should pay most of the associated costs

The next three items are designed to ascertain the extent to which individuals believe that environmental costs should be shared amongst all taxpayers:

- The cost of managing wilderness areas should be shared amongst all taxpayers
- The cost of compensating loggers for jobs lost when areas are preserved should be shared amongst all taxpayers
- The cost of cleaning up and rehabilitating the environment should be shared amongst all taxpayers

Harris and Brown (1992) found that the majority of respondents (53%) to a Idaho mail survey thought that wildlife preservation should be shared in this way. Nearly one-third (32%), however, thought that only those responsible for the specified environmental loss should pay. As noted in Section 5.2.1, ascription of responsibility for both cause and treatment of a problem are important determinants of behaviour (see also Schwartz, 1977, Heberlein,1972, and Appendix C). In the present study, the next two-items relate to the notion that those responsible for causing a problem should pay the costs of treating it.

- The cost of cleaning up and rehabilitating the environment should be paid for by industry and consumers of the products being produced.
- As a consumer of products such as paper, plastics and wood, I am in part responsible for some environmental impacts.

The final three items are concerned with the individual’s willingness to bear costs associated with environmental management. These relate to the CV payment vehicles. This personal responsibility may arise from any source, be it shared or specific to the individual.
I am prepared to bear some of the costs of cleaning up and rehabilitating forests or waterways damaged by logging.

I am prepared to bear some of the costs of managing conservation reserves.

I am prepared to bear some of the costs of compensating loggers for jobs lost due to preservation decisions.

SECTION E: SOCIAL ATTITUDES AND VALUES

Social attitudes and values are an important component of the framework outlined in Chapter 5, and measures were included in the questionnaire as a consequence. Because such attitudes are expected to be causally prior to attitudes and preferences more specific to the south-east forests, they are included after the more (forest) domain specific questions in an attempt to prevent them from having a priming effect on responses to questions.

Question E1 presents 9 items corresponding to sociopolitical liberalism. Some of these items refer to anti-laissez faire liberalism and some to welfare-state liberalism (Buttel and Flinn, 1978a, 1978b). These measures of liberalism tend to be related to environmental concern, and cannot necessarily be explained by party preference (Buttel and Flinn, 1978a, 1978b, Samdahl and Robertson, 1989). These measures are included as they have been shown to be important determinants of environmental attitudes, and can be contrast with the more traditional measures of held value such as postmaterialism. Items 1, 7 and 9 relate most obviously to welfare-state liberalism. Pre-testing (scale-development) indicated favourable bivariate correlations (all exceeding 0.4) and a Cronbach’s alpha of 0.74 for the three items. Items 4 and 8 appeared to best related to anti-laissez faire liberalism, but several other items are clearly relevant. Some items, such as the third which relates to faith in science and technology are clearly of interest in and of themselves. Several of the items were drawn from, or based on those of Samdahl and Robertson (1989), McAllister (1990), and the Australian Election Survey (1990, 1993).

Question E2 measures environmental concern (3-items) and economic concern (3-items), and as such, may be used to explain general environment/development orientation. Environmental concern measures are repeated here in order to overcome the problems associated with measuring the two constructs in quite different parts of the questionnaire.

Question E3 involves the Social Value Inventory (SVI) of Braithwaite and Law (1985). As noted in Appendix E, the SVI is a psychological scale, developed to elicit social rather than personal value orientations. It is a descendant of the approach to
value measurement, advanced originally by Rokeach (1973) and others. Since the questionnaire is concerned with social rather than private issues, it seemed more appropriate to elicit social rather than private values. Pretesting of an early version of the questionnaire which also contained a personal value scale along the lines of Rokeach, indicated that items relating to personal values were of less immediate relevance to the (social) issues at hand, and as a result, seemed prone to protests or statements of the form 'What does this have to do with the environment?'. As a result, the personal values scale was dropped.

Two alterations were made to the original SVI scale. Firstly, one item, 'Upholding Traditional Sexual Moral Standards' was dropped in response to some questions during pretesting regarding its relevance. According to Braithwaite (1994, pers com), this should raise no problems because this item is marginal in terms of its contribution to the values measures obtained using the SVI. Secondly, given the lengthy nature of the questionnaire, the task-description in the lead-in statement was shortened, with care being taken to not cut out essential elements of the information. A small typographical error was present in the final introductory statement, respondents being told that there were 14 rather than 17 goals listed.

Question E4 investigates alienation or disillusionment with western society in general. The eight items originally developed for the purposes of this study were reduced to 5 at the scale development pre-testing stage. For the final five items, all bivariate correlations exceeded 0.37 and Cronbach's alpha was 0.84. The purpose of this construct is to distinguish among environmental concerned individuals who are disillusioned (or alienated) with western society, and those who are not. It is suggested that alienation may have an effect on many of the relationships of interest here.

SECTION F: PERSONAL BACKGROUND

This section begins with several questions pertaining to environmental involvement and behaviour. Such questions may be of use in predicting environmentally conscious behaviour in other areas. As noted in Appendix C, studies in consumer behaviour have drawn up profiles of ecologically concerned consumers (ECC) and socially concerned or responsible consumers (SCC) (Anderson and Cunningham, 1972, Kinnear and Taylor, 1973). Antil and Bennett (1979) developed a scale to measure socially responsible consumption behaviour. More recent attempts by consumer behaviour scientists to investigate the impact of environmental concern on consumption (and voting) behaviour has focussed around Ajzen's and Fishbein's Theory of Reasoned Action (Appendix C). This has been applied in other areas of
environmental involvement such as recycling behaviour (Jones, 1989-90, Goldenhar and Connell, 1992-93) and water conservation (Kantola et al, 1982).

Although individuals with a high level of social responsibility may be more likely to take account of procedural notions when formulating a CV response, individuals exhibiting high levels of environmental concern are entirely consistent with the model of the CV-consumer. A high degree of environmental involvement thus does not necessarily tell us anything regarding the influence of citizen considerations on CV response.

Question F1 asks individuals how likely they are to join a group campaigning to protect the environment. Five response options were included in order to avoid crudely coding individuals as either ‘member’ or ‘non-member’.

Question F2 asks individuals whether they regularly recycle their newspapers. Four response categories were included, including ‘facilities not available’ and ‘don’t buy newspapers’.

Question F3 asks individuals whether they would like to spend some of their holidays in the next 12 months increasing their understanding and appreciation of nature. Although this question can also be used as a measure of interest in environmentally orientated activities, its primary purpose concerns developing a profile of the potential ecotourist, for purposes unrelated to the present study.

Question F4 concerns environmentally responsible consumption. A middle category was included in order to represent the individual who has tried environmentally products, but does not generally purchase such items.

Question F5 asks individuals whether they think they should do more to help protect the environment than they currently do. As with Question D9, this question is normative and involves reflecting on one’s actual involvement. In terms of the discussion of Chapter 3, it could be said that this question attempts to stimulate the higher-order preferences of the individual. Individuals responding yes to Question F5 would seem to be more likely to respond yes to the CV question, all other factors held constant. If it is appropriate to view respondents as having good cause accounts, where they are prepared to allocate a portion of their budget to causes such as the environment, then ‘yes’ responses to this question may provide some indication of unspent good-cause budget. It is noted, however, that responses to this question may be influenced to some extent by the information contained earlier in the questionnaire.
Following up on the notion of a good-cause account, Question F6 seeks the respondent’s level of agreement with a number of statements regarding donations to good causes:

1. It makes little difference which cause I contribute to since nearly all are worthwhile

2. I tend to only make donations when approached by representatives at home, shopping centres etc.

3. There is some proportion of my total income that I am prepared to pay to good causes.

4. By the time the needs of my family have been met, there is little money left over for donations to charitable causes.

5. I should contribute more to charities each year than I currently do.

6. Most of my friends would be prepared to contribute to environmental campaigns.

The first item relates to the substitutability among different good causes. As noted in Chapter 2, a high degree of substitutability among good causes can produce substantial order effects. A high degree of substitutability suggests that individuals will have a tendency to off-load their good cause account on those that get in first and for which transaction costs are minimal. The second item relates to transaction costs. Although the individual may truly be willing to pay the amount they state they would, the value ascribed to that individual may be little related to specifics of the resource in question (beyond that required to give it good-cause status), and more related to whether other good causes have gotten in first, and the transaction costs associated with the various good causes. Order effects may be consistent with the axioms of consumer behaviour, but undesirable in environmental decision-making. This is discussed in the final chapter of this thesis, and also Appendix H.

The third item seeks information relating to the appropriateness of the above good-cause model of donation behaviour. The fourth item relates to the size of the individual’s good cause account, or at least the amount of money the individual believes he or she can afford to allocate to good causes. The fifth item is a more specific version of Question F5. In this instance, it seeks the individual’s reflective view regarding whether he or she should contribute more to charities than he or she currently does. If agreeing with this statement, and if CV responses have something in common with charity donations, then all other factors aside, a ‘Yes’ response to the CV question may be likely, if, of course, the individual brings a similar level of reflection to the CV question.
The sixth item provides a crude approximation to the ‘social norms’ component of the Theory of Reasoned Action (see Appendix C) as it relates to donation behaviour. According to this theory, individuals agreeing with this statement are, ceteris paribus, more likely to adopt personal norms in favour of such behaviour. Items 3 and 5 should give some idea of donation-specific personal norms. An earlier, more comprehensive version of this question was dropped on the basis of pretest findings. Individuals seemed to have difficulty answering the question, and the time it took them to answer it did not justify its inclusion in the questionnaire.

Questions F7, F8 and F9 involve voting behaviour/political ideology. Question F7 contained three self-report questions relating to the degree of impartiality exhibited in electoral preferences. The first is normative and concerns the voting populace as a whole:

Should people vote in their own interests or in the interest of society as a whole?

- own best interest ...................................... 1
- best interest of society ................................ 2
- combination of the two .............................. 3

The second asks individuals ‘How do you think people usually vote?’ and presents the same response categories. The third asks individuals ‘How do you usually vote?’ According to our consumer-citizen distinction, we would expect those making citizen considerations to more frequently fall within the middle category, for the first and third items.

Question F8 is a typical party alignment question, similar to those employed in the RAC Community Attitude Survey, and the Australian Election Survey. On the basis of pretesting, a ‘Green Party’ response category was added. The second part of Question F8, relating to strength of support, will clearly have a moderating effect on relationships between party alignment and other variables or constructs of interest.

Question F9 involves a classic political left-right self-placement, as employed in the RAC Community Attitudes Survey and the Australian Election Survey. This completes the political science measures of values/ideology. Left-right self-placement, party alignment, sociopolitical liberalism and postmaterialism provide measures of a range of held values that are known to be related to preferences in the environment domain.

Questions F10 to F18 provide a range of socioeconomic indicator variables likely to underlie environmental attitudes, beliefs and behaviour. F10 is a standard age question, and F11 a standard question indicating sex of respondent.
Question F12 begins with a simple question asking if the respondent has any children. For those indicating that they have children, the number of children, and of these the number that have left home and become financially independent is sought. The purpose of these two follow-ups is to provide an indicator of the demand on respondent’s income of children. For a given income, more financial dependants, suggests, ceteris paribus, less income available for good cause donations. The purpose of Question F12 is thus to serve mainly as a supplement to the income constraint question.

Question F13 concerns highest educational achievement. This question is based on similar questions used in the two RAC south-east forest questionnaires (particularly the CV one), and the RAC Kakadu CV questionnaire. Pre-testing suggested some minor modifications to the original RAC forests (CV) version. Firstly, the category ‘Tertiary degree/diploma or certificate’ was split into the two categories ‘Tertiary degree’ and ‘Diploma or certificate’, and secondly, a category labelled ‘Currently doing tertiary studies’ was added.

Question F14 provides a fairly crude measure of whether the individual lives in a rural and/or urban area. Sociologists have long debated the existence and nature of differences in environmental attitudes and beliefs of rural and urban residents. Rickson and Stabler (1985), and Van Liere and Dunlap (1980), for example, found that urban residents tend to be more concerned about environmental issues and to support actions to protect the environment. Others, such as Fortmann and Kusel (1990), challenge the notion of such rural/urban differences. Question F14 may help shed some light on such differences, as recorded in a representative national sample. In the event that such differences are apparent, they can be represented in models using this variable.

Question F15 concerns the respondent’s income, and if applicable, the combined income of respondent and partner. Although the CV questions are directed at the individual rather than household level, including the combined income sub-question permits greater flexibility in model estimation. In both cases, gross incomes are sought, with respondents being requested to circle the income ranges applicable to them.

Question F16 requests information pertaining to the individual’s current work status. This question was based on similar questions used in the two RAC forest questionnaires. Two further categories were added, permitting the self-employed/employee nature of individuals’ work to be ascertained. Individuals with a self-employed background may be expected to have a greater financial dependence on
wealth creation than others, and hence a greater tendency to permit logging in the striped areas on the map.

For similar reasons, Question F17 seeks to classify individuals according to whether most of their work has been in the private or public sector. Examples were included in brackets to assist those unfamiliar with such terms.

Question F18 provides a crude measure of social class, an important social structural variable often used by sociologists. This measure, taken from the Australian Election Survey (1990, 1993) provides only an approximation to that obtainable via occupational codings using the Australian Bureau of Statistic's (ABS) ASCO (Australian Social Class Occupation) coding system. Obtaining a measure of social class using this ASCO procedure requires careful coding of open-ended questions concerning occupation and job activities, best conducted using a computer assisted coding system, available on loan from the ABS. Coding using this system is still somewhat time-consuming, however, and given that a measure of social class is not of central importance to this study, it was decided to opt for the cruder closed-ended version.

This brings us to the end of the background variables. Question F19 is the last question in the questionnaire, and is quite unusual for a questionnaire such as this. This question is discussed in Chapter 10, after the relevant theory has been presented. The questionnaire finishes with a thankyou, and an offer to respondents to make any further comments.

It should be noted that the extensive nature of the variables included in the AFAS questionnaire permits many opportunities for analysis, and an exhaustive analysis of the data is not possible in this thesis. As a consequence, some variables included in the questionnaire are not used in any analysis reported in this thesis.

6.5 RESPONSE RATE AND NON-RESPONSE BIASES

6.5.1 Response Rate

At the cutoff date, 1680 valid questionnaires had been returned, corresponding to 48% of the original sample of 3500. If the 262 return to senders are excluded from

---

7 A valid response is defined here as one where more than one-half of the returned questionnaire had been filled in.
this calculation, the response rate increases by 4% to 52%. A further 200 non-valid responses were obtained, leaving 1358 (38.8%) unaccounted for.

Of the non-valid responses 59 were refusals, 57 couldn’t be completed due to language difficulties or illness, 42 were received less than half completed, 42 were returned blank, 8 couldn’t be completed due to the person being away, overseas or in gaol, and 5 people had died. Table 6.1 indicates response rate by state.

### Table 6.1 Response Rate by State

<table>
<thead>
<tr>
<th>State</th>
<th>Sample</th>
<th>Valid n</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>62</td>
<td>24</td>
<td>38.7</td>
</tr>
<tr>
<td>NSW</td>
<td>1169</td>
<td>542</td>
<td>46.4</td>
</tr>
<tr>
<td>NT</td>
<td>29</td>
<td>10</td>
<td>34.5</td>
</tr>
<tr>
<td>QLD</td>
<td>602</td>
<td>283</td>
<td>47.0</td>
</tr>
<tr>
<td>SA</td>
<td>309</td>
<td>165</td>
<td>53.4</td>
</tr>
<tr>
<td>TAS</td>
<td>99</td>
<td>50</td>
<td>50.5</td>
</tr>
<tr>
<td>VIC</td>
<td>911</td>
<td>445</td>
<td>48.8</td>
</tr>
<tr>
<td>WA</td>
<td>319</td>
<td>148</td>
<td>46.4</td>
</tr>
<tr>
<td>ALL</td>
<td>3500</td>
<td>1667*</td>
<td>47.6*</td>
</tr>
</tbody>
</table>

* 13 valid responses not included here because ID numbers had been removed.

#### 6.5.2 Non-Response Biases

Non-responses result from either a failure to locate or contact respondents, or a failure to get cooperation from those that are located. A range of factors have been identified that influence survey participation, such as societal-level factors (e.g., legitimacy of social institutions in the society, degree of social cohesion, legitimacy of surveys, frequency of requests to participate) attributes of the survey design (e.g., mode of contact, presentation, length, sponsor) characteristics of the sample person (e.g., sociodemographics such as age, income, health status, and interest in the survey topic and personal relevance), attributes of the interviewer (e.g., age, gender) and respondent-interviewer interactions (Groves et al, 1992).
Groves et al. (1992, p487) note that “the act of participation in a survey is rarely of sufficient personal relevance to cause potential respondents to want systematically to review and incorporate all of the available information into their decision. Consequently, they are likely to base their decision on one or two highly prominent and normally diagnostic considerations”. The decision to participate is hence typically heuristic rather than systematic. With respect to the AFAS, diagnostic features are likely to include the sponsor, the institution actually conducting the study, questionnaire appearance and length, and interest value. Although certain procedures, such as outlined by Dillman (1978), can help reduce non-response biases, they cannot eliminate them. Follow-up analyses can be conducted on order to get some idea of the magnitude of non-response biases.

Two such analyses are conducted here. Firstly, sociodemographics of the respondents are compared with that of the nation (adults) as a whole. Secondly, the coded return dates are used to test whether earlier respondents differ to later respondents in terms of key constructs of interest.

(i) Comparison of Demographics

Now consider how selected demographic statistics for the AFAS population compare with those of the Australian population. Demographic data for the Australian population was obtained from the Australian Bureau of Statistics (ABS) Census 1991 and more recent demographic characteristics (ABS, 1993, 1995). Table 6.2 presents selected sex, age, education and household income statistics for both the AFAS sample, and the Australian population as a whole. The population data concerning age and sex is based on 1994 data (ABS, 1995), whereas the education and income data is based on the 1991 Census (ABS, 1993). Some recoding of the AFAS variables was required in order to facilitate comparisons with the population data. Unfortunately the household income variable could not be recoded so as to permit proper comparisons. Qualitative observations, however, suggest that the percentage of individuals having incomes below $30000 is not markedly different in the AFAS and population.

In order to test the hypotheses that each of the AFAS sample proportions shown in the Table (with the exception of income proportions) are not significantly different to their respective population proportions, t-tests were conducted*, with the T-statistics

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* Following Wonnacott and Wonnacott (1972), the t-statistics for these hypotheses can be calculated as \( T = (p' - p)/(pq/n)^{0.5} \), where \( p \) is the population proportion, \( q = 1-p \), \( p' \) is the sample proportion, and \( n \) is the sample size involved in calculation of \( p' \).
included in Table 6.2. When compared with the critical value of 1.96 for a two-tailed test and a 95 percent significance level, it is apparent that males are no more or less frequent in the AFAS sample that the population as a whole. Individuals with degrees are, however, overrepresented in the AFAS sample, this result holding for all age groups. Results for age are mixed, with the 50-59 age group being overrepresented and the 20-29 age group being underrepresented. Significant differences were not found with the other age groups. Overall, it is concluded that non-responses in the AFAS study are particularly common among individuals with lower education qualifications, and individuals in the 20-29 age group. The latter result may be due to the more active and mobile nature of individuals in this group.

TABLE 6.2 COMPARISON OF AFAS AND POPULATION DEMOGRAPHICS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>% in popln</th>
<th>Observed AFAS</th>
<th>Expected AFAS</th>
<th>% in AFAS (valid sample size</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (age 20+)</td>
<td>Male</td>
<td>49.20</td>
<td>772</td>
<td>770</td>
<td>49.5 (1466)</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>50.80</td>
<td>794</td>
<td>796</td>
<td>50.5</td>
<td>-</td>
</tr>
<tr>
<td>Age</td>
<td>20-29</td>
<td>22.12</td>
<td>260</td>
<td>346</td>
<td>16.5 (1571)</td>
<td>-5.35</td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>22.44</td>
<td>375</td>
<td>353</td>
<td>23.9</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>40-49</td>
<td>19.86</td>
<td>314</td>
<td>312</td>
<td>20.0</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>50-59</td>
<td>13.44</td>
<td>274</td>
<td>211</td>
<td>17.4</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td>60-69</td>
<td>10.96</td>
<td>196</td>
<td>172</td>
<td>12.5</td>
<td>1.95</td>
</tr>
<tr>
<td></td>
<td>70+</td>
<td>11.16</td>
<td>152</td>
<td>175</td>
<td>9.7</td>
<td>1.84</td>
</tr>
<tr>
<td>Education: have degree</td>
<td>age 25-34</td>
<td>13.3</td>
<td>67</td>
<td>190</td>
<td>22.0 (304)</td>
<td>4.46</td>
</tr>
<tr>
<td></td>
<td>age 35-44</td>
<td>13.7</td>
<td>77</td>
<td>196</td>
<td>21.9 (352)</td>
<td>4.47</td>
</tr>
<tr>
<td></td>
<td>age 45-54</td>
<td>9.3</td>
<td>53</td>
<td>133</td>
<td>17.7 (299)</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>age 55-64</td>
<td>5.3</td>
<td>27</td>
<td>76</td>
<td>11.5 (235)</td>
<td>4.24</td>
</tr>
<tr>
<td></td>
<td>age 65+</td>
<td>3.5</td>
<td>15</td>
<td>50</td>
<td>6.2 (241)</td>
<td>2.28</td>
</tr>
<tr>
<td>Income</td>
<td>50 (NB:&lt;$29200)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>55 (1462) (NB:&lt;$30000)</td>
<td>-</td>
</tr>
</tbody>
</table>
(ii) The Effect of Return Date

Individuals who have the greatest interest in a questionnaire are likely to require the least prompting before a valid response is obtained. In the context of the AFAS, it thus possible that earlier respondents have greater interest in forest management than later respondents. If this is the case, it suggests that non-respondents may have even less interest in forest management which in turn may involve lower values for the forests and hence lower willingness to pay. Estimates of mean or median WTP based on the AFAS data would then overestimate the true population values.

To test this, the date questionnaires were returned was coded as a variable in the dataset, enabling respondents to be classified into various categories of “earliness” or “lateness”.

The first analysis to be reported below involved splitting the dataset into four groups of approximately equal size. The variable rdquartile was defined as follows:

\[
\text{rdquartile} = \begin{cases} 
1 & \text{for first 25\% of valid responses received;} \\
2 & \text{for the second 25\%;} \\
3 & \text{for the third, and} \\
4 & \text{for the final 25\%.}
\end{cases}
\]

One way ANOVA’s were used to test whether the mean values for various key variables vary significantly with different values of rdquartile. Perhaps the most obvious variables to test first are those relating to interest in forest management-variables D6b and D6d.

Results of an ANOVA indicated that the means of the variable D6b (involving agreement with the statement “Forests issues are not important to me”) were not significantly different across the four levels of the treatment (Fratio=1.67, Fprob=0.17). The results of a least significant differences (LSD) multiple comparisons test, however, indicate that the earliest of the four groups of respondents disagreed more with this statement (on average) than did the latest group of respondents (95\% significance level). The LSD test is effectively equivalent to conducting multiple t-tests, which raises problems regarding the familywise error rate.

---

9 Using ANOVA’s on likert scale data requires the assumption that the data has interval properties. Whether to make this assumption and use ANOVA’s rather than less powerful non-parametric tests such as the Kruskal-Wallis test is the subject of some controversy. ANOVA’s are, however, commonly used on likert scale data. The author can see no obvious reasons why the interval assumption will not hold with likert scale data, and hence parametric ANOVA’s are used here.
when the number of treatments and hence comparisons is large (Howell, 1995). For this reason, LSD tests are not generally used when F-statistics are not significant. In the case of only four treatments, as is the case here, the test can however be used to provide qualified insights. A more conservative Scheffe test can be used without qualification, when F-statistics are not found to be significant (Howell, 1995). In the current example, the Scheffe test detects no significant differences at the 95% significance level. At this stage, some indication of the likely presence of response biases would appear to be apparent.

The qualified LSD result is strongly supported by the ANOVA results for the dependent variable D6d which measures degree of disagreement with the statement “I have a strong interest in how forests are managed in this country”. These results indicated a statistically significant F-ratio (3.00, Fprob=0.0297), with the LSD results indicating that the earliest group of respondents has significantly greater interest in forest management than either the second or fourth groups. The more conservative Scheffe test again failed to detect any differences. At this stage, it does however appear that later respondents generally have less interest in forest management than earlier respondents. Given that this result is significant (according to some tests) for those who did actually respond, one might expect that those who did not respond would, on average, have considerably less interest in forest management.

The fact that non-response bias with respect to interest in forest management, appears, to be present does not necessarily mean that CV results will provide overestimates of true WTP although one might expect this to be the case. When testing for non-response biases, it is best to analyse the constructs of primary interest, in this case responses to the CV question. For this reason, a dichotomous variable, was created:

\[ rddum = 1 \] for the first 50% of returned questionnaires, and 0 for the last 50% to be returned.

10 The familywise error rate is the probability of making a Type 1 error in at least one of the multiple comparisons. Keeping this error rate low is one of the primary considerations in running a set of multiple comparisons (Howell, 1995).

11 As Howell (1995, p309) puts it, in the case of four treatments “the familywise error rate is nearly 0.10. But I would submit that this is not an outrageous error rate given four means, and I would not cringe at using such a test”.

12 The above ANOVA test was also performed for a number of other variables of less direct relevance to the general thrust of the questionnaire, such as c6, d6c, d8c and f9a. None of these gave a statistically significant ANOVA result.
This variable was subsequently entered into a logistic regression for scenarios 3 and 4, with CV response as dependent variable, and independent variables rprice, bal1 and bal2, defined as follows:

- **rprice** = (bid value)/10
- **BAL1** = dummy coded as 1 if respondent believes Australia needs to concentrate more on protecting the environment; 0 otherwise.
- **BAL2** = dummy coded as 1 if respondent believes Australia needs to concentrate more on developing the economy; 0 otherwise. Control response option is 'currently have a reasonable balance'.

The following multiplicative terms were also included: (rddum*price), (rddum*BAL1), and (rddum*BAL2). This permits a test of the hypothesis that the behavioural relationship between CV and price, BAL1 and BAL2 differs for early respondents as compared to late respondents and allows the variables involved in any such differences to be traced.

Scenario 3 results indicated that none of the interaction terms were statistically significant at the 95% level. These variables were subsequently dropped, and the model re-estimated, producing the following results:

\[
\text{log(odds)} = -0.5005 - 0.0643 \times \text{rprice} + 1.1608 \times \text{BAL1} - 2.7722 \times \text{BAL2} + 0.5356 \times \text{RDDUM}
\]

\[
(0.230) (0.016) (0.253) (1.0334) (0.2427)
\]

NB: (i) standard errors are shown in brackets; (ii)-2logL=404.002, %correct predict=69

Note that all coefficients are statistically significant at the 95% level and have the expected signs.

Of particular interest is the statistically significant \(p=0.0273\) coefficient for rddum, indicating that "late" respondents have a significantly lower likelihood of responding yes than the "early" respondents. To further investigate the sensitivity of CV results to the rddum variable, the mean values for bal1 and bal2 can be substituted into the above regression equation, yielding the following equation:

\[
z = -0.38 -0.0643 \times \text{rprice} + 0.5356 \times \text{rddum}
\]

where, in the logistic case,

\[
\Pr(\text{yes}) = \frac{1}{1 + e^{-z}}
\]

By substituting in various combination of rprice and rddum, the sensitivity of \(\Pr(\text{yes})\) to such changes can be ascertained. If we set price = $50 \ (\text{rprice}=5) \ and \ rddum=0, \ we \ find, \ for \ example, \ that \ \Pr(\text{yes})=0.33. \ If \ instead, \ we \ substitute \ rddum=1, \ we \ find
that \( \Pr(\text{yes}) = 0.45 \). Later respondents are thus 12% less likely to respond Yes to $50 than earlier respondents. Another way of looking at it is to compare estimates of the median. To calculate the median, we set \( \Pr = 0.5 \) in (ii) above and solve for \( z \), and then price, obtaining 
\[
\text{Median} = \frac{-0.380 + 0.536 \text{rddum}}{-0.0643}.
\]

For early respondents, solving for the median gives an estimate of median WTP = $24. The corresponding estimate for late respondents is -$59. This corresponds to the fact that if we substitute price = $10 (\( \text{rprice} = 1 \)) and rddum = 0 (late respondent) into (I) and (ii) above, we find that only 39% of respondents are predicted to respond Yes to this lowest price figure. This compares with 52% for early respondents.

The implication of these findings is quite worrying. If early respondents to CV questionnaires are say 10% more likely to respond Yes than late respondents, then non-respondents might be considerably less likely than late respondents to respond Yes. Estimates of mean and median WTP will be biased upwards as a result. The extent to which (parametrically estimated) median WTP is biased upwards will depend largely on the price sensitivity for the particular study, as indicated by the estimated coefficient for the price variable. When price sensitivity is low, a 10% difference in estimates of \( \Pr(\text{yes}) \) may correspond to large differences in median WTP.

One way to handle non-response bias, that avoids the costs associated with extensive (probably in person) follow-ups, is to downwardly adjust WTP estimates, based on analysis for some weighting variable, that is expected to be closely linked to CV response. Candidates here include measures of environmental concern, and measures such as \( d_6b \), and \( d_6d \) relating to interest in forest management. If the results for such questions could be obtained for a study with a near 100% response rate (for example, from one of the Australian Bureau of Statistics questionnaires), and the same question included in a mail CV survey for a similar population, at the same point in time, a weighting factor could be derived by comparing responses across the two samples. This weight could then be used in future CV studies.

Although these results may be of concern to those attempting to estimate total WTP as an input to CBA and/or policy purposes, they are of less concern for present purposes, where most interest lies in investigating respondent behaviour in a typical mail CV study.
CHAPTER 7

JUSTICE, FAIRNESS AND CV RESPONSES

Justice is a central problem in everyday life. We often assess the fairness of individual, interpersonal, and institutional acts (Mellers, 1993).

7.1 INTRODUCTION

It has previously been noted that a range of ethical considerations, or beliefs regarding what is fair or just, may influence an individual's decision to participate in a particular questionnaire, and his or her response (or non-response) to any given question, such as the CV question. Although both consumers and citizens will make ethical considerations in formulating their responses, we have previously distinguished between them on the basis that (i) overall, citizens will tend to do so to a greater extent, and (ii) citizens think more about procedural notions of justice than the desired CV-consumer. Although this might suggest that an assessment of procedural notions of justice is most relevant to our discussion of our citizen-consumer model, distributive notions of justice are also important, since it is these that will often lie behind lexicographic responses. Citizens, not being restricted to the utilitarian model of rational economic man, may handle their ethical commitments by using non-compensatory decision strategies. This type of lexicographic response is distinct from committed-no responses that are motivated by protesting to some aspect of the CV scenario. The latter is procedurally motivated whereas the former is motivated by notions of distributive justice.

This chapter is concerned with perceptions of justice, or subjective justice\(^1\), focussing on those that might have a bearing on CV responses. The objective is straightforward: to obtain an inventory of CV-relevant notions of justice, as they exist in a typical Australian mail CV sample, and to consider the implications of these findings, in the light of discussions in previous chapters. The chapter is structured as follows. Section 7.2 briefly expands on the discussion of Chapter 5 regarding concepts of justice, and their relevance to CV. Section 7.3 presents results and

\(^1\) An important distinction regarding discussions of justice is that of subjective versus objective justice. The latter concerns the capacity to conform to the normative standards of justice, and the former is concerned with perceptions of justice (Lind and Tyler, 1988).
discussion pertaining to CV-relevant notions of distributive justice, and Section 7.4 presents the procedural justice equivalent. Section 7.5 presents some conclusions.

7.2 OVERVIEW OF LITERATURE ON JUSTICE

Psychologists studying justice have typically identified three main notions of justice.

_Distributive justice_ is concerned with the fair allocation of scarce resources. As such, it is concerned with identifying fair outcomes. Adam (1965) and Homans (1961) are among the notable early writers in this area, the former being most known for his 'equity theory', according to which, social behaviour is seen to be profoundly influenced by the belief that outcomes should be proportional to inputs. Other notions of distributive justice include norms of equality (equal share amongst all) and norms of needs-based allocation. Notions of fairness are closely related to the ethical theories adopted by the individual. Some individuals adopt utilitarian-based philosophies, for example, and others adopt more rights-based or deontological philosophies. Falling under the rubric of distributive justice are the issues of efficiency versus equality, and self-interest versus co-operation. Wenz (1988) discusses principles of distributive justice in the environment sphere.

_Procedural Justice_ is concerned with establishing fair procedures with which to make decisions. Notions of fairness are held to be a "major factor in determining how people evaluate dispute resolution experiences in general, and dispute resolution procedures in particular" (Lind and Tyler, 1988). In their influential works, Thibaut and Walker (1975, 1978) studied individual evaluations of the fairness of various procedures (subjective procedural justice), and also the issue of which procedures are best in given circumstances (objective procedural justice), and proposed a theory of procedural justice, based mainly on the latter.

Considerable evidence suggests that perceptions of procedural and distributive justice are to some extent independent (Lind and Tyler, 1988). "If individuals do not feel that the prevailing principle of justice or fairness has been decided on by the proper procedures, a sense of injustice can arise independent of the particular principle that was selected" (Karniol and Miller, 1981).

Other studies have found that the opportunity to express one's values or attitudes is also an important component of procedural justice (Lind and Tyler, 1988). Tyler _et al_ (1985b), for example, found that ratings of procedural justice were higher when individuals had a chance to express their views, and that this still held when influence
on outcomes was reduced to zero. In Chapter 10, a model of value-expressive CV responses is presented that links such expression to voter and citizen CV responses.

Studies such as that of Tyler et al (1985a) suggest that perceptions of both distributive and procedural justice are significant determinants of respondent satisfaction ratings in the political arena, including taxes. Correlations between the two justice ratings were not particularly high \( r=0.24 \), suggesting a degree of independence. Such assessments were also found to be distinct from those that favoured the individuals on narrow self-interest grounds.

Finally, Retributive Justice is concerned with identifying fair punishments and compensations (Mellers, 1993, Hogan and Emler, 1981).

Closely tied to notions of justice is the issue of responsibility. Heider (1958) identified five levels at which individuals assign responsibility for events:

- **association with the deed or the doer**, responsibility by simple commission of the act, responsibility through the foreseeability of the consequences, responsibility through intentionality, and, finally, responsibility through valid justification of intended acts.

Specific notions of justice will be differentially relevant in different social contexts, and will of course also vary on an individual and cultural basis. Ordonez and Mellers (1993, p152-153) found that:

- factors that determine fairness at the individual level differ from those that describe fairness at the societal level. Micro and macro-justice can come into conflict whenever we think it is fair to treat individuals and groups differently. It may be one thing to vote for overall cuts in welfare programs, and another thing to refuse assistance to a homeless person who lost his job due to illness.

Consider now the context of CV responses. The notions of subjective justice most relevant to CV responses in Australia are those relating to distributive and procedural justice, although retributive justice may be relevant to payment vehicles involving compensation to individuals employed in the environmentally threatening project. In the USA, where CV is used in conjunction with damage assessment, retributive justice will clearly be more relevant. CV results that are motivated in part by punitive considerations would appear to be problematic according to an economic cost-benefit interpretation.

Table 5.1 listed a number of specific notions of justice that may have a bearing on CV responses. Although many of the CV-specific notions of justice listed in Table 5.1 have been discussed in the CV literature, studies that have empirically investigated
such notions are less common. In a study of WTP for bald-eagle restoration, Stevens et al. (1994) found that 29 percent of respondents indicated ‘duty to do my share to protect wildlife’ as the most important influence on why they would pay for restoration, and 13 percent indicated the same factor as the most important in considering how much to pay. The authors note that WTP associated with a fair share will not necessarily be a function of the resource itself, although for some it will represent a lower-bound estimate of resource value. In another study, Harris and Brown (1992) found that a notion of shared responsibility for payment (payment by the State of Idaho using tax dollars), was the most preferred method of paying for a reduction in loss of non-game wildlife in that State.

Results of questions in the AFAS survey relating to respondent beliefs concerning CV-relevant notions of justice are considered next. Four general areas of ethical belief are of particular interest, and these are discussed in turn, beginning with those of a distributive nature.

7.3 SUBJECTIVE DISTRIBUTIVE JUSTICE AND CV

7.3.1 Intrinsic Value of Species

One ethical belief that is CV-relevant is the individual’s belief regarding the existence of what are often referred to as intrinsic values. Here we are referring to the notion that species may have rights, or ‘value’, independent of their value to humans. Because any such value is independent of humans, it is not appropriate to estimate intrinsic value by asking humans how much they value the rights of species, since in the pure sense, intrinsic value is independent of human valuers. It may, however, be possible to measure people’s perceptions of intrinsic value, and to establish the value that they attribute to species rights. The extent to which this perceived (or subjective justice notion of) intrinsic value, coincides with the pure notion of intrinsic value is difficult, if not impossible to establish, and raises numerous philosophical questions that are beyond the scope of this work.

What are the implications of perceived intrinsic value for CV responses? Some authors, such as Sagoff (1988), would argue that protest responses are a common consequence of such ethical considerations. Edwards (1986, p.147) draws on Sen’s (1977) notion of commitment, stating that “choices based on commitment to others [including non-humans] are rooted in what one thinks as being right or wrong from a

---

2 If one accepts that any form of value requires a valuer, this pure sense of intrinsic value may be seen to be problematic.
moral, or ethical point of view, regardless of how one’s own welfare might be affected”. In the context of dichotomous choice CV responses, commitment implies a ‘yes’ response to any bid value. Although this may be true for many respondents, this is not necessarily the case. The fact that an individual believes that species have rights does not necessarily mean that the individual will never trade such rights. There is of course the possibility that the rights of other entities (eg loggers’ rights, the rights of humans to use wood products, the rights of the individual to utilise personal income in a private manner) may also be at stake, and that the individual may have to somehow take these into account when formulating a response. In reality, some individuals will respond with considerations of a utilitarian nature, and others may adopt a more absolutist duty or rights-based approach. Individuals may employ any of a number of ethical theories in formulating an opinion regarding what is right, and it is by no means clear that any one individual will reject the notion of trading off species rights for other gains.

As with CV responses generally, the influence of perceived intrinsic value on CV responses will also be the result of psychological processes employed by the individual. Individuals feeling strongly about species rights may tend to avoid exposure to information that is dissonant with such beliefs, since such exposure may create cognitive imbalance. The result can be CV preferences that reflect only part of the story, and which may be of a seemingly lexicographic nature. In psychology, we are talking here of theories of cognitive dissonance (Festinger, 1957) and cognitive consistency (Heider, 1944, 1946). The desire to avoid cognitive dissonance leads individuals to be selective in the information to which they expose themselves, and to modify beliefs in order to reduce dissonance arising from inconsistent beliefs, attitudes and/or behaviour (Hewstone et al, 1988).

A further point regarding the influence of perceived intrinsic value on CV responses is that the likelihood of protest is dependent on the nature of the valuation context. For many, the issue of species rights can only satisfactorily be handled through certain institutional arrangements. Some individuals will see a referendum as an appropriate procedure for dealing with important ethical issues such as these, and some may not. Some may see monetary valuation of the environment as appropriate, but many may not. Referendum CV formats will be less prone to protest responses than trust fund formats, if individuals see referendums as a more appropriate way of making decisions pertaining to the environment than trust funds, or if individuals are more likely to perceive the true valuation purpose of trust fund questions in comparison to referendum questions. Distributive notions of justice will thus often be linked to specific procedural notions.
It is important to realise that procedural beliefs regarding the monetary valuation of the environment are distinct from procedural beliefs regarding actual donations to environmental good causes. As noted above, some individuals who believe in intrinsic values may reject the notion of trading off species for anthropocentric gain, or the notion of monetary valuation of the environment. This does not necessarily mean that they would not pay anything to help preserve the environment. Indeed, many individuals who believe in intrinsic values may already be making payments of this kind, through donations and memberships to environmental organisations. If CV questions can be framed in terms of WTP for an environmental improvement (or WTP to avoid an environmental loss), then individuals with high perceived intrinsic value may have no reason to protest on ethical grounds unless they perceive the question to involve environmental valuation or some other unacceptable procedural means. Individuals may be WTP $2 to help the environment, but refuse to accept $100 to allow it to be destroyed.

Table 7.1 presents results for AFAS questions pertaining to belief in intrinsic species rights (C5f, C5m, C5o, and C5d). The majority of respondents appear to believe that species have rights independent of humans, suggesting that perceived intrinsic value may be quite substantial. This result is weakest for the fourth, reverse coded item, indicating that some degree of measurement error may be associated with these responses, possibly due to social desirability factors. Nonetheless, the basic result remains.

**TABLE 7.1** RESPONDENT BELIEFS REGARDING THE INTRINSIC RIGHT OF SPECIES

<table>
<thead>
<tr>
<th>Statement</th>
<th>S. Agree</th>
<th>Agree</th>
<th>Neither A Nor D</th>
<th>Disagree</th>
<th>S. Disagree</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wildlife has as much right to exist as humans</td>
<td>43.5</td>
<td>39.9</td>
<td>10.2</td>
<td>5.2</td>
<td>1.2</td>
<td>1624</td>
</tr>
<tr>
<td>2. Species should be preserved, for their own sake, and not ours</td>
<td>37.7</td>
<td>41.9</td>
<td>14.3</td>
<td>5.4</td>
<td>0.6</td>
<td>1617</td>
</tr>
<tr>
<td>3. I look upon nature as if it were there in itself, and for itself, and not simply as a resource for human use</td>
<td>32.5</td>
<td>35.9</td>
<td>18.8</td>
<td>11.6</td>
<td>1.3</td>
<td>1619</td>
</tr>
<tr>
<td>4. Wilderness has value only in so far as it can ultimately benefit humans</td>
<td>7.1</td>
<td>18.9</td>
<td>20.5</td>
<td>34.0</td>
<td>19.5</td>
<td>1597</td>
</tr>
</tbody>
</table>
The implication of a majority of respondents believing in intrinsic value is that the number of potential protesters or lexicographic respondents is very high. It is clearly important that CV questions employ formats that the majority of respondents see as appropriate.

### 7.3.2 Morals Absolutism and Related Beliefs Regarding Cessation of Logging

As noted earlier, some individuals' personal philosophies are rights or duty-based, and may involve moral imperatives or an absolutist moral stance. Other individuals may adopt utilitarian philosophies, where there are no imperatives, and any good or service could, in principle be traded for goods or services bringing greater utility. Empirically, it is difficult to isolate individual philosophies, since any given set of stated CV preferences may be consistent with several underlying philosophies. This has made the study of lexicographic preferences particularly difficult.

As an example, consider the individual who would say yes to any of the bid values employed in a dichotomous-choice CV study. Does this reflect a moral imperative in which any amount of money would be paid to the environmental cause in question (perhaps above a minimal basic needs income), or does this individual simply have a particularly high value for this particular cause, and the bid values are not high enough to produce a no response?

Although some empirical insights can be gained by including specially designed questions relating to moral absolutism in self-administered questionnaires (Common et al., 1994, Stevens et al., 1991), most progress here can perhaps be made through means other than surveys.

Moral stances are clearly linked to core values. Scott (1965, p.15), for example, notes that a "person may be said to entertain a value to the extent that he conceives a particular state of affairs as an ultimate end, an absolute good under all circumstances, and a universal ‘ought’ toward which all people should strive" (italics added).

Although a particular state of affairs may be seen as an absolute good under all circumstances, it is difficult to accept that any but a small minority would forgo everything to see that state of affairs come about. As Scott (1965, p.14) states:

> the absolute character of a value may be a matter of degree. This would seem to present a contradiction in terms, but after all, the very notion “absolute” is a human conception which need not function psychologically in the way one defines it logically. With sufficient imagination one could conceive circumstances in which almost any value would be over-ridden by conflicting considerations. The fact that such
circumstances are hypothetical rather than actually expected by the individual justifies the label "absolute," but again a gradation is suggested: the fewer the circumstances that (subjectively) would suspend it, the more absolute is the value.

Recognising that extreme moral absolutism is unrealistic, Edwards (1986) considers the case where lexicographic orderings are bounded by a constraint on personal welfare. The protection of whales, for example, would then always be preferred when income is above some threshold, whilst preferences for personal welfare would always be preferred when below this threshold (see section 5.2.1). For a given number of whales, more income would be preferred to less. Some interesting implications for CV responses follow from such preference maps. As long as the individual is in excess of the threshold standard of living, WTP for any improvement in the species population will be the same, and equal to that required to bring him or her down to the threshold. Results that exhibit perfect embedding may thus arise, although given the choice between various levels of species preservation, the individual would always opt for maximum protection. Zero WTP responses will similarly occur when the individual is on or below the threshold standard of living.

Although the notion of bounded lexicographic preferences is a useful advance, it is not clear that such preferences are particularly problematic from a neoclassical perspective. It is, for example, conceivable that such preferences might represent a rule of thumb used by strongly pro-environment individuals when considering income-environment tradeoffs in a steep part of that individual's indifference curve. The question that arises is 'Do motivations matter in economics?' Chapters 10 and 11 briefly address this question. Irrespective of the answer, it is apparent that an adequate understanding of lexicographic responses requires indepth investigation into the motivations behind CV responses. In Chapter 10, a motivational model is presented that may explain a proportion of seemingly lexicographic responses.

Table 7.2 presents results for AFAS questions pertaining to moral absolutism and related constructs (see question C5 of questionnaire). The first two items relate to the belief that all logging in native forests should be stopped. Although 61 percent agreed or strongly agreed with the first statement, with less than 15 percent disagreeing, results for the second question indicate a fairly even split between those who agree (38 percent summed over the two agreement categories) and disagree (33 percent). It is possible that the difference in results for the two questions is attributable to the two-part nature of the first, although it is not immediately apparent why this would produce greater agreement. It is possible that the first statement, being longer, may be more prone to measurement error. The first part of this statement may be more prone to social desirability biases, and the second part may
have been given less attention by respondents than the second statement, which is rather similar. Overall, the appropriate conclusion here is that a significant proportion of respondents favour a complete phasing out of logging in native forests, despite the social opportunity costs associated with such a decision. If this issue was to come to the vote, it is possible that such a proposal would be favoured by the majority. The third statement is similar to the first, but relates to the environment in general. Results are similar to that of the first statement.

TABLE 7.2 RESPONDENT BELIEFS RELATING TO MORAL ABSOLUTISM

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (cell entries-row %)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>1. This country has lost too many native forests already; all remaining old-growth forests must be preserved</td>
<td>33.0</td>
<td>27.8</td>
</tr>
<tr>
<td>2. All logging in native forests should be phased out within five years</td>
<td>19.9</td>
<td>18.0</td>
</tr>
<tr>
<td>3. So much of Australia's natural environment has now been altered, that we must protect all that remains</td>
<td>31.5</td>
<td>30.9</td>
</tr>
<tr>
<td>4. Wildlife has the right to be protected irrespective of what this costs society</td>
<td>26.2</td>
<td>34.5</td>
</tr>
<tr>
<td>5. I would never favour a proposed environmentally damaging development</td>
<td>37.8</td>
<td>32.6</td>
</tr>
<tr>
<td>6. Harmsing nature for the sake of developments is morally wrong</td>
<td>26.5</td>
<td>36.3</td>
</tr>
<tr>
<td>7. Humans have a duty to protect nature</td>
<td>40.7</td>
<td>50.3</td>
</tr>
<tr>
<td>8. Logging is wrong and should be stopped</td>
<td>10.5</td>
<td>10.3</td>
</tr>
</tbody>
</table>

The fact that a respondent thinks that logging should be phased out, given the opportunity costs at stake, does not imply that the respondent would favour preservation at any cost. Items 4 and 5 involve an attempt to identify individuals having a truly absolutist attitude to environmental preservation. Results indicate that the majority of respondents agree with the two absolutist statements, the first of which is framed in terms of societal decisions, and the latter in terms of the individuals own decisions. Interestingly, less than 20 percent of respondents disagreed with item 4 and less than 10 percent disagreed with statement 5. Although non-response and social desirability biases may have caused these results to be exaggerated, they do
indicate cause for concern. If the majority of respondents agree with such statements, we might expect that price sensitivity will be significantly lower than we would like for the purposes of estimating mean and/or median WTP. Of course, if these variables are found to be statistically significant determinants of CV response, it can still be argued that they reflect little more than strength of preference.

As noted above, a belief in intrinsic species rights, may cause some individuals to have an absolutist attitude with respect to environmental preservation. Presumably, some notion of moral betrayal mediates this influence. That is, individuals who believe in intrinsic species rights, are more likely to exhibit absolutist or lexicographic preferences if the individual’s belief in intrinsic rights causes the individual to believe that it is morally wrong to harm nature. Individuals who believe that it is wrong to harm nature are likely to feel morally obligated to help preserve the environment, which may result in (bounded or unbounded) lexicographic preferences. Items 6, 7 and 8 tap different aspects of this moral obligation construct. As we would expect on the basis of the other results in Table 7.2, the majority of respondents agree with the first two of these statements. Indeed, 91 percent agreed that humans have a duty to protect nature. It is comforting to see that the percentage agreement drops dramatically to 20 percent, when the statement is no longer specific to nature, or native forests, but rather forest logging in general. Individuals presumably see logging in native forests as morally wrong, but have no such problems with logging of plantation areas.

7.4 PROCEDURAL JUSTICE BELIEFS

7.4.1 Procedural Beliefs Bearing Indirectly on CV Question

In order to obtain information regarding CV-relevant procedural beliefs, the following question was included in the AFAS questionnaire:

D.7. How do you think decisions regarding the environment and other matters facing society should be made? Please indicate how strongly you agree or disagree with each of the following statements:

Responses to these questions, recorded on 5-point likert scales, are presented in Table 7.3 below.
### TABLE 7.3 CV-RELEVANT PROCEDURAL BELIEFS

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (cell entries-row %)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>1. Some things, such as rare wildlife species, should not be valued in dollar terms</td>
<td>39.3</td>
<td>43.2</td>
</tr>
<tr>
<td>2. It would be good if the monetary value of preserving certain wilderness areas could be accurately estimated</td>
<td>12.6</td>
<td>50.8</td>
</tr>
<tr>
<td>3. It is wrong to put a price on nature</td>
<td>35.9</td>
<td>41.6</td>
</tr>
<tr>
<td>4. Economists should not try to calculate the value of preserving rare species</td>
<td>26.2</td>
<td>39.8</td>
</tr>
<tr>
<td>5. Environmental decisions can be made mainly on the basis of comprehensive economic analysis</td>
<td>2.8</td>
<td>15.1</td>
</tr>
<tr>
<td>6. Government should keep out of environmental decision making and leave such matters to markets</td>
<td>2.0</td>
<td>5.2</td>
</tr>
<tr>
<td>7. Environmental decisions should be made mainly on the basis of government consultation with experts</td>
<td>13.8</td>
<td>44.8</td>
</tr>
<tr>
<td>8. There is too much money spent on bureaucracy in this country</td>
<td>42.2</td>
<td>36.5</td>
</tr>
<tr>
<td>9. In general, industry can be relied on to not seriously damage the environment</td>
<td>3.0</td>
<td>14.4</td>
</tr>
<tr>
<td>10. Public inquiries are a good way to make decisions about the most important matters facing society</td>
<td>11.5</td>
<td>50.6</td>
</tr>
<tr>
<td>11. The public must be consulted before any important environmental decisions are made</td>
<td>30.6</td>
<td>50.8</td>
</tr>
<tr>
<td>12. Questionnaires such as this are a good way of consulting the public</td>
<td>24.3</td>
<td>48.6</td>
</tr>
<tr>
<td>13. In principle, referendums are a good way to make decisions about important matters facing society</td>
<td>22.9</td>
<td>48.1</td>
</tr>
<tr>
<td>14. It should be up to those favouring preservation to buy out, or compensate would-be developers</td>
<td>5.3</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Items 1 to 4 clearly relate to the perceived appropriateness of environmental valuation. This is important in two respects. Firstly, if individuals object to monetary valuation of the environment, they will tend to protest to a CV question if they perceive that question to involve such a procedure. Of course, it is quite conceivable that the majority of CV respondents will not perceive the true nature of the question. Using the dichotomous-choice referendum format should minimise associated
problems. Secondly, public perceptions regarding the appropriateness of techniques such as contingent valuation are clearly relevant to the costs and benefits of the technique itself. If, for example, the majority of the public does not support the use of contingent valuation, its use in future studies might be questioned. Given the controversial and often costly nature of CV studies, this would be an understandable view. Of course the public may not understand the true nature of valuation methods, just as they may not understand ecosystem components.

Results for the first four items appear to indicate that the majority of respondents are not in favour of attempts at environmental valuation, although if accurate estimates could be ensured, the majority would then support it. It is possible, however, that the different result for item 2 is due to measurement considerations. It may be that respondents do not have well constructed views on this matter, and as a result, may be particularly susceptible to question framing, and in this case, whether the statement is positively or negatively worded, and the length of statement. It is not possible to establish the extent to which the different result for item 2 reflects a belief that it is not possible to value the environment, compared to the measurement error explanation. If statement 2 was simply too long to be well comprehended, then it would appear that the results for the other three items are most accurate. These results highlight the problems associated with drawing conclusions from single item measures of complex and abstract constructs. As a consequence, the results of studies such as Stevens et al (1991, 1994) involving self-reports of motivations should be interpreted with caution.

One might expect that individuals exhibiting an absolutist stance toward environmental protection are more likely to reject monetary valuation of the environment. Firstly, they are likely to reject it on the basis that it involves tradeoffs, and secondly, those more committed to social justice may object to dollar valuation because ‘one-dollar-one-vote’ is not an appropriate basis for social choice. Stevens et al (1994, p.59) appear to summarise the former:

some individuals concerned about wildlife may refuse to respond because contingent valuation asks them to make a choice between income and a moral principle.... For example, the animal rights literature argues that wildlife should not be valued in dollar terms.... Choices between income and wildlife might therefore produce significant conflict and ambivalence, culminating in non-response.

Stevens et al (1994) found some support for such protest, with 20 per cent of respondents not contributing to coyote protection indicating that “Coyote preservation is important, but I refuse to place a dollar value on it”.
Items 5, and 6 in Table 7.3 involve broader procedural concerns, relating to the general role of economics and markets in environmental decision-making. Results indicate that only a minority (18 percent) of respondents believe that environmental decisions can be made mainly on the basis of comprehensive economic analysis, and only 7 percent of respondents think that government should leave such matters to markets. The public clearly supports government intervention, and sees a limited role for economics in environmental decision-making. Results indicate that only a minority (18 percent) of respondents believe that environmental decisions can be made mainly on the basis of comprehensive economic analysis, and only 7 percent of respondents think that government should leave such matters to markets. The public clearly supports government intervention, and sees a limited role for economics in environmental decision-making. Consistent with these results are those for items 7, 9 and 10. The results for item 7 in Table 7.3 indicate that the majority of respondents (58.1 percent) agree that environmental decisions should be made mainly on the basis of government consultation with experts (with a further 21.5 percent neither agreeing nor disagreeing). Results for item 9 indicate that the majority of respondents (66.6 percent) believe that industry cannot be relied on to not damage the environment (16.0 percent undecided or unsure). The results for item 10 indicate strong support (62.1 percent) for the use of public inquiries in decision-making regarding important matters facing society, and presumably, this includes environmental decision-making. Only 14.9 percent of respondents disapprove of public inquiries, probably because they see them as waste of public money.

Items 11 and 12 relate to public consultation. Results indicate that 81.4 percent of respondents see public consultation as important in the environment sphere, with only 5.7 percent disagreeing. Seventy-three percent of respondents believe that questionnaires such as the AFAS are a good way of consulting the public, with only 8.7 percent disagreeing. Of course, some individuals who disagree with this statement have failed to return the questionnaire as a result. These results do however appear to indicate considerable public support for the use of questionnaires such as the AFAS.

The results for item 13 indicate that 71 percent of respondents agree that, in principle, referendums are a good way to make decisions about important matters facing society. With 13.2 percent disagreeing, we might expect that few respondents are likely to protest to the referendum CV format. The last item in Table 7.3 concerns the appropriateness of a particular type of market forces solution to environmental decision-making. A minority of respondents (18.7 percent) agreed that it should be up to those favouring preservation to buy out, or compensate would-be developers. Note that the procedures referred to in this statement have affinities with the trust

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3 The focus of welfare economics on the desirability of outcomes implies that it is concerned with distributive justice. An outcome is held to be just if the Kaldor-Hicks principle is satisfied. Individuals can, of course, have preferences over such procedures.
fund CV format employed in the AFAS. It thus appears that respondents see a trust fund as substantially less appropriate than a referendum (in principle).

7.4.2 Procedural Beliefs Directly Related to Payment

(i) Responsibility for Payment

In order to gain insight regarding respondent perceptions of who should pay for environmental management, a series of items (Question D10) 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.

Results are presented below in Table 7.4.

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 7.4 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 any 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 would face in the event of preservation outcomes. This could be because they are aware of unemployment benefits, and/or the fact that people are loosing jobs all the time.
TABLE 7.4 PROCEDURAL BELIEFS RELATING TO PAYMENT RESPONSIBILITY

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (cell entries-row %)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>1. Where possible, those who visit wilderness areas should pay for the</td>
<td>20.1</td>
<td>45.9</td>
</tr>
<tr>
<td>management of such areas through entrance fees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Those who think conservation is important should pay most of the</td>
<td>4.4</td>
<td>12.3</td>
</tr>
<tr>
<td>associated costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The cost of managing wilderness areas should be shared amongst all</td>
<td>23.8</td>
<td>50.5</td>
</tr>
<tr>
<td>taxpayers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The cost of compensating loggers for jobs lost when areas are preserved</td>
<td>10.5</td>
<td>29.1</td>
</tr>
<tr>
<td>should be shared amongst all taxpayers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. The cost of cleaning up and rehabilitating the environment should be</td>
<td>15.0</td>
<td>39.0</td>
</tr>
<tr>
<td>shared amongst all taxpayers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The cost of cleaning up and rehabilitating the environment should be</td>
<td>28.9</td>
<td>47.5</td>
</tr>
<tr>
<td>paid for by industry and consumers of the products being produced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. As a consumer of products such as paper, plastics and wood, I am in</td>
<td>18.1</td>
<td>63.6</td>
</tr>
<tr>
<td>part responsible for some environmental impacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I am prepared to bear some of the costs of cleaning up and</td>
<td>10.7</td>
<td>38.0</td>
</tr>
<tr>
<td>rehabilitating forests or waterways damaged by logging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I am prepared to bear some of the costs of managing conservation</td>
<td>10.7</td>
<td>45.1</td>
</tr>
<tr>
<td>reserves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I am prepared to bear some of the costs of compensating loggers for</td>
<td>5.5</td>
<td>22.3</td>
</tr>
<tr>
<td>jobs lost due to preservation decisions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 such a notion than agreeing with it (46.3 percent compared with 27.8).

The results in Tables 7.3 and 7.4 clearly have relevance to the choice of format and payment vehicle in Australian CV studies. It follows that a referendum format will, ceteris paribus, be less objectionable than a trust fund format, where the latter does not entail compulsive payments. 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.

Question D5 was included within the AFAS questionnaire in order to shed light on precisely this possibility. The question, and the quite striking results, are presented below:
D.5. 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% (293 respondents)

Additional protection of the environment through redirecting taxes from other areas .................................. 62.3% (1047 respondents)

Protect the environment as well as we can without additional expenditure .................................. 49.4% (830 respondents)

Reduce expenditure on environmental preservation .................................. 3.0% (51 respondents)

Percentages refer to the percentage of the entire sample of 1680 individuals who indicated each payment mechanism as 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 allocation may have considerable promise. Scenario 2 in the AFAS is an example of such a question. As hypothesised in Chapter 6, scenario 2 would appear to align most closely with citizen beliefs.

(ii) Extent of Rejection of Various Payment Vehicle Components used in AFAS Questionnaire

Respondents who indicated that they either found the AFAS CV question difficult or they disliked the question, were asked to indicate their extent of agreement or disagreement with 13 statements relating to the CV question, most involving the payment vehicle. Table 7.5 presents the results for these questions.
TABLE 7.5 REASONS WHY RESPONDENTS FOUND THE CV QUESTION DIFFICULT OR DISLIKED IT.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response (cell entries-row %)</th>
<th>N (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Agree Agree Neither A nor D Disagree S. Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I don't see why option B should cost money in the way specified (all scenarios)</td>
<td>15.0 30.6 28.8 19.6 6.0</td>
<td>546 (32.5%)</td>
</tr>
<tr>
<td>2. I don't think that option B should cost money in the form of costs of managing the area as conservation reserves (all scenarios)</td>
<td>13.5 25.8 30.5 23.6 6.7</td>
<td>535 (31.8%)</td>
</tr>
<tr>
<td>3. I don't think that taking the striped areas out of wood production should cost money (scenario 4 only)</td>
<td>21.4 33.8 26.9 13.8 4.1</td>
<td>145 (34.2%)</td>
</tr>
<tr>
<td>4. I thought the question should have referred to the value of the timber that would be produced under option A (scenarios 3 and 4 only)</td>
<td>10.5 25.7 42.0 14.8 7.0</td>
<td>257 (30.6%)</td>
</tr>
<tr>
<td>5. I don't think that option B should cost Australians money via the forgone value of the timber that would have been produced (scenarios 1 and 2 only)</td>
<td>12.3 39.6 27.2 17.9 3.0</td>
<td>268 (31.9%)</td>
</tr>
<tr>
<td>6. I don't think that option B should cost Australians money in the form of compensation to loggers (scenarios 1 and 2 only)</td>
<td>22.2 34.2 23.3 17.5 2.9</td>
<td>275 (32.7%)</td>
</tr>
<tr>
<td>7. The costs associated with option B should be paid out of additional taxes rather than by redirecting government expenditure (scenario 2 only)</td>
<td>5.4 14.3 20.4 35.4 24.5</td>
<td>147 (36.1%)</td>
</tr>
<tr>
<td>8. The costs associated with option B should be paid for by current taxes (scenarios 1, 3 and 4 only)</td>
<td>18.2 35.5 27.1 11.3 7.9</td>
<td>391 (30.7%)</td>
</tr>
<tr>
<td>9. I don't think that option B should cost me money through higher prices for timber products (scenarios 1 and 3 only)</td>
<td>11.5 25.8 30.3 23.4 8.6</td>
<td>244 (28.7%)</td>
</tr>
<tr>
<td>10. The costs associated with option B seemed unrealistically high or low (all scenarios)</td>
<td>7.2 17.8 64.6 7.4 3.1</td>
<td>517 (30.8%)</td>
</tr>
<tr>
<td>11. I thought option B might cost money in ways other than those mentioned (scenarios 2, 3 and 4 only)</td>
<td>19.3 27.0 49.8 13.9 4.2</td>
<td>404 (32.4%)</td>
</tr>
</tbody>
</table>

The main cell entries in Table 7.5 are percentages for individuals giving a valid response to the particular item. Since respondents were only asked to answer these questions if they found the CV question difficult or objectionable in some respect, the percentages must be interpreted accordingly. It is also important to remember that no one version of the questionnaire contained all of these items, since the items had to be varied so as to correspond to the particular CV scenario included in the questionnaire. The scenarios for which an item was included are indicated in brackets in the left hand
column of the table. The percentage of respondents presented with a given item and who gave a valid response is indicated in brackets in the far right column of the table. As an example, the first item in Table 7.5 was included in all versions of the questionnaire, and 32.5% (546) of the 1680 respondents gave a valid response. Note that for most of the items, about one-third of the relevant sub-sample gave such a response, indicating that overall, approximately one-third of respondents either disliked the CV question or found it difficult.

Item 1 in Table 7.5 is a general statement relating to acceptance of the payment vehicle. Results indicate that 46 percent of respondents giving a valid response to this item [or 15 percent of all respondents] indicated that they did not see why they should have to pay money in the way specified, and a further 29 percent were not sure. Only 26 percent of item 1 respondents disagreed with the statement. The nature of the filter question and the fact that we are dealing with self-reports means that we can only use the broader 15 percent finding as a rough approximation of the proportion of all respondents questioning the payment mentioned in their respective scenario. Many respondents will not have thought about all of the issues addressed in question B6 at the time of formulating a CV response, but after the fact, and on reflection, may agree with some of the items relating to specific concerns. Other respondents may have questioned certain aspects of the CV question, but not bothered to answer all of the items in question B6.

Of particular interest is the relative acceptability of various aspects of the CV scenario relating to payment. Comparing the results for items 2, 5, 6, and 9 for example, indicates that 39 percent of item respondents did not think that option B should cost money in the form of conservation reserve management costs, 51 percent did not think that forgone timber value should cost money, 56 percent did not think that compensation to loggers was a valid cost, and 38 percent did not think that higher prices for timber products was a valid cost. The results for items 2 and 6 are consistent with results presented previously: the public appears to be less willing to pay for the costs of compensating loggers than for the costs of managing conservation areas. This will to some extent reflect a perception of some that the property rights for the forests in question lie with the public and not the forest industry. Some individuals will simply have little empathy for the loggers, for various reasons. It is also less apparent to respondents that forgone economic benefits represent a cost that must be paid for, than the management costs associated with preservation, or higher prices for timber products. This is as one might expect, since having to pay for forgone future benefits is a rather unusual concept. It is noted that the RAC Kakadu CV study employed these two payment justifications (see Chapter
4). These results suggest that the costs listed in scenarios 3 and 4 (management costs and higher prices) are perceived to be the least objectionable of the four types of costs employed across the four scenarios.

Results for item 4 indicate that 42 percent of respondents disliking scenarios 3 or 4 or finding them difficult, neither agreed nor disagreed that the CV scenario should have referred to the value of timber that would be produced under option A. 36 percent agreed with the statement.

Items 7 and 8 involve the question of whether additional taxes rather than redirected taxes are perceived to be a more appropriate way of financing the costs associated with preservation. Note that 20 percent scenario 2 respondents agreed that the costs associated with option B should be paid for by additional taxes rather than current taxes. This can be compared with the 54 percent of scenarios 1, 3 and 4 respondents who thought that current taxes are an appropriate way to finance environmental conservation. This is consistent with the results reported above that indicate that current taxes are a more appropriate way of meeting such costs that tax increases.

Item 3 results indicate that 55 percent of respondents disliking the trust fund scenario, or finding it difficult for some reason, did not think that taking the striped areas out of wood production should cost money. Note that this is higher than the proportion of respondents in all scenarios indicating that they didn’t see why option B should cost money in the way specified, suggesting that the payment aspects of the trust fund scenario may have been particularly objectionable.

7.5 CONCLUSIONS

The main conclusions to be drawn from the discussion in this chapter are as follows:

(i) A large proportion of respondents appear to believe in the intrinsic rights of species. Such beliefs are likely to lie behind the prevalence of absolutist moral stances regarding the preservation of nature, and the rejection by many of the idea of monetary valuation of the environment. This implies a causal link between distributive and procedural notions of justice. Furthermore, these notions of justice may have direct and indirect effects on CV responses. If individuals perceive CV questions to involve environmental valuation, they are likely to protest. Belief in intrinsic rights may have both direct and indirect influences on CV response, the former relating to its expected correlation with environmental concern, and the latter by producing an absolutist moral stance. Chapter 9 presents a structural model involving precisely these relationships.
(ii) The majority of respondents believe that the costs associated with managing conservation areas, and to a lesser extent the costs associated with compensating loggers for jobs lost, should be shared amongst all taxpayers. This implies that payment vehicles will be least prone to protest when they involve compulsive payments for all taxpayers. In this respect, we would expect scenario 4 in the AFAS to be most prone to protest. This is consistent with other results that indicate that the majority of respondents do not favour leaving environmental decisions to market forces, and the majority think that referenda and public inquiries are an appropriate way of making such decisions.

This suggests that the optimal CV format may involve a referendum dichotomous choice question with a uniform tax increase as payment vehicle. Unfortunately, this is not the case. Although referendum formats are unlikely to be prone to significant protest, payment vehicles involving tax increases are seen as far less appropriate than redirections of public expenditure. This strengthens the case for more citizen orientated questions such as that employed in Scenario 2 of the AFAS, and creates a dilemma for Australian CV practitioners. The requirements of economic theory as it relates to CV are in direct conflict with the need to maximize face validity.

Comparison of scenarios is discussed in more detail in the next chapter.
CHAPTER 8

COMPARISON OF DIFFERENT CV SCENARIOS

8.1 INTRODUCTION

In this chapter the CV results for the four different scenarios employed in the AFAS are compared. Although the comparisons are made within the general framework of citizen-consumer divergences, and in particular, the dimensions outlined in Section 5.2, the comparisons are of considerable interest in their own right. To the author’s knowledge, there has, for example, been little systematic testing of the differential effects of trust fund and referendum CV scenarios on respondent behaviour. A priori considerations suggest that the trust fund format will raise the greatest number of protests amongst respondents, as discussed by Mitchell and Carson (1989). Such a result would also be consistent with the objections of Sagoff (1988). Some comparisons of particular interest are as follows.

Scenarios 3 and 4 provide the greatest opportunity for comparison of referendum and trust fund formats, since neither mentions jobs or compensation.

Scenarios 1 and 2 provide a comparison of the additional cost payment vehicle and the tax revenue redirection payment vehicle. Both these questions involve referendum formats and specifically mention jobs.

Scenarios 1 and 3 provide a comparison of referendum scenarios with and without specific mention of the opportunity costs of preservation.

The chapter is structured as follows. Section 8.2 compares estimated valuation functions for each of the four scenarios, the discussion focussing on standard consumer variables such as price and income. Section 8.3 focuses on how the four scenarios prompt different responses to questions pertaining to dimension 1a. Section 8.4 has a similar purpose, but in relation to dimension 1b, and Section 8.5 similarly focuses on the second dimension. Section 8.6 discusses reasons why the trust fund scenario produced greater price sensitivity than the other three scenarios, and Section 8.7 applies consistency checks to the data and estimates median WTP for each scenario. Finally, Section 8.8 draws together conclusions for the chapter. First, consider the basic regression results for each of the four scenarios.
8.2 LOGISTIC REGRESSION RESULTS

Following some initial exploratory analysis, a set of independent variables was selected for inclusion in logistic regressions involving dichotomous yes/no CV response as the dependent variable (1=yes, 0=no). This includes key consumer variables such as price and income, and several attitudinal, belief, behavioural and socioeconomic variables considered to be candidates for explaining CV responses. These variables are defined in Table 8.1 below, and Table 8.2 presents logistic regressions estimated for each of the four (scenario) treatments, followed by log-likelihood values for a number of other regressions involving the same specifications, but estimated over different subsamples.

### TABLE 8.1 DEFINITION OF VARIABLES USED IN ECONOMETRIC ANALYSIS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housinc</td>
<td>household income in thousands of dollars (Question F15)</td>
</tr>
<tr>
<td>rprice</td>
<td>stated cost of preservation (option B) Three prices (or bid values) have been employed: $10, $50 and $200. In the case of scenario 2, these prices are the individual’s share of the total costs for all Australians as outlined in the scenario. All prices have been scaled down by a factor of ten, to reduce the number of decimal places needed in results tables.</td>
</tr>
<tr>
<td>Used</td>
<td>dummy taking on the value 1 if the respondent has made trips to, or travelled through the south east forests in the last 12 months, 0 otherwise (Question B1).</td>
</tr>
<tr>
<td>OptionV</td>
<td>5 point Likert scale indicating the extent to which the respondent agrees with the statement “My family or I might one day visit the South East Forests”. Numbers increase with disagreement (Question B8a).</td>
</tr>
<tr>
<td>Wildlife</td>
<td>5 Point Likert scale indicating extent of disagreement with the statement “The impact on wildlife would be minimal since animals can make new homes and move to safer areas if necessary” (Question B9h).</td>
</tr>
<tr>
<td>Jobs</td>
<td>5 Point Likert scale indicating extent of disagreement with the statement “Logging in the striped areas would provide much needed job opportunities” (Question B9j).</td>
</tr>
<tr>
<td>Absolute</td>
<td>5 Point Likert scale indicating extent of disagreement with the statement “Wildlife has the right to be protected irrespective of what this costs society” (Question C5n).</td>
</tr>
</tbody>
</table>
### TABLE 8.2  LOGISTIC REGRESSIONS FOR EACH OF THE FOUR SCENARIO TREATMENTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.8514 (0.935)</td>
<td>0.0000</td>
<td>-4.8617 (1.0407)</td>
<td>0.0000</td>
</tr>
<tr>
<td>Housing</td>
<td>0.0103 (0.005)</td>
<td>0.0390</td>
<td>0.0007 (0.0059)</td>
<td>0.9002</td>
</tr>
<tr>
<td>rprice</td>
<td>-0.0063 (0.017)</td>
<td>0.7097</td>
<td>-0.0098 (0.0195)</td>
<td>0.6134</td>
</tr>
<tr>
<td>Used</td>
<td>-0.8361 (0.4056)</td>
<td>0.0393</td>
<td>0.1663 (0.4707)</td>
<td>0.7239</td>
</tr>
<tr>
<td>Forests</td>
<td>-0.2311 (0.1664)</td>
<td>0.1649</td>
<td>0.0672 (0.1834)</td>
<td>0.7139</td>
</tr>
<tr>
<td>Option V</td>
<td>0.7793 (0.1701)</td>
<td>0.0000</td>
<td>0.7899 (0.1886)</td>
<td>0.0000</td>
</tr>
<tr>
<td>Jobs</td>
<td>-0.5390 (0.1528)</td>
<td>0.0004</td>
<td>-0.6388 (0.1665)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Absolute</td>
<td>0.8262 (0.1609)</td>
<td>0.0000</td>
<td>1.1498 (0.1770)</td>
<td>0.0000</td>
</tr>
<tr>
<td>Wildlife</td>
<td>-2LogL</td>
<td>319.901</td>
<td>263.204</td>
<td>257.481</td>
</tr>
<tr>
<td>%Correct</td>
<td>79.4 (n=344)</td>
<td>81.8 (n=318)</td>
<td>82.3 (n=310)</td>
<td>71.9 (n=331)</td>
</tr>
</tbody>
</table>

Log Likelihoods for Estimation of Same Model over Pooled Scenarios

-2LogL (all scenarios) = 1311.447
-2LogL (S1 & S2) = 595.518
-2LogL (S1 & S3) = 593.047
-2LogL (S1 & S4) = 719.885
-2LogL (S2 & S4) = 680.220
-2LogL (S3 & S4) = 685.296
-2LogL (S2 & S3) = 525.545

First consider the null hypothesis that the above four regressions are not significantly different, and hence that responses to the CV question are unaffected by the
differences in scenarios. The likelihood ratio statistic corresponding to this Chow type test is $LR = 118$ distributed over $(4-1)*8 = 24$ degrees of freedom, which is well in excess of the critical levels of the chi-square distribution at the 95 and 99 percent levels. The null hypothesis that the behavioural relationship between the dependent and independent variables is the same for all four scenarios can thus be rejected.

In order to test which pairs of scenarios produce significantly different regressions, the above Chow type tests can be performed for paired scenarios. Thus, to test the differences between the regressions for scenarios 1 and 2, the likelihood ratio statistic is $LR = 595.518 - (319.901 + 263.204) = 12.413$ distributed over 8 degrees of freedom. Since this is less than the critical value of 15.5 at the 95 percent level, it cannot be concluded that the regressions corresponding to scenarios 1 and 2 are different.

The corresponding LR statistics for the other 5 regression pairs are as follows:

- $S1$ and $S3$: $LR = 15.665$ (marginally significant at 95% sign. level)
- $S1$ and $S4$: $LR = 47.3$ (highly sign.)
- $S2$ and $S4$: $LR = 64.332$ (highly sign.)
- $S3$ and $S4$: $LR = 75.131$ (highly sign.)
- $S2$ and $S3$: $LR = 4.86$ (not sign.)

These results suggest that scenario 4, the trust-fund format, produced a significantly different behavioural relationship to all three other scenarios, all of which were variants of the referendum format. Scenarios 1 to 3 did not differ significantly in terms of the relationships they produced.

The parameter estimates in the above table indicate where the main differences in coefficients lie for the trust fund format. Of particular interest is the fact that only this scenario produced a significant price coefficient, although scenario 3 comes extremely close at the 95 percent level. Note, however than the latter is wrong-signed. The trust fund parameter estimate for price is eight times the magnitude of that of scenario 2 and fourteen times that of scenario 1. It thus appears that the trust fund format created far greater price sensitivity than any of the referendum formats, of which none produced a correctly signed coefficient at the 95 percent significance level.

Variation in price sensitivity across scenarios can be seen in Table 8.3, which shows the number of yes and no CV responses for each combination of price and scenario. In the trust fund format, 52% of respondents were willing to pay the lowest bid value of $10, whilst only 22% were willing to pay the highest value of $200. This can be compared with scenario 3 where the equivalent range is [56%, 57%], scenario 2
where it is [55%, 47%], and scenario 1 where it is [42%, 49%]. The raw data presented in Table 8.3 thus tends to suggest that, in general, individuals were not sensitive to price in the referendum scenarios. For the referendum versions, however, both regression and crosstabulation results suggest that scenario 2 produced the greatest (correctly signed) price sensitivity. This is an interesting result, given that individuals were redirecting government expenditure rather than making additional personal payments. Individuals appear to be slightly less willing to redirect government expenditure than to make payments out of household income. Such comparisons are limited, however, by the fact that price was not statistically significant in any of the three referendum scenarios¹. We return to this question later in the chapter.

**TABLE 8.3 CROSSTABULATION OF PRICE BY SCENARIO BY CV RESPONSE.**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Price (once off)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$10</td>
<td>$50</td>
</tr>
<tr>
<td>1</td>
<td>57/78</td>
<td>72/68</td>
</tr>
<tr>
<td>2</td>
<td>73/59</td>
<td>69/63</td>
</tr>
<tr>
<td>3</td>
<td>79/62</td>
<td>73/64</td>
</tr>
<tr>
<td>4</td>
<td>67/63</td>
<td>56/90</td>
</tr>
<tr>
<td>Total</td>
<td>276/262</td>
<td>270/285</td>
</tr>
</tbody>
</table>

An intriguing result is that only scenario 1 produced a significant coefficient for household income. It is possible that this reflects an attitudinal effect rather than a budget constraint effect. This dual role of income is discussed in the next chapter.

¹ Although scenario 3 comes close, it is wrong-signed. Because it is not apparent as to why this would be the case, little attention is drawn to this near-significant result. One possibility is that mention of jobs in scenario’s 1 and 2 makes these scenarios more realistic, thereby causing the compensation component of the payment vehicles in these scenarios to be treated more seriously.
As expected the variable Wildlife, which indicates respondent beliefs regarding the consequence for wildlife of wood production, is highly significant in all scenarios. This variable falls within the domain of both consumers and citizens.

A measure of the extent to which CV responses in each of the scenarios were influenced by absolutist moral beliefs is obtained in the parameter estimates and significance levels for the variable Absolute in Table 8.2. All four parameter estimates are of the correct sign, the largest in magnitude being in scenario 2, and the smallest in scenario 4. The standard errors indicate than none of the four parameters are significantly different at the 95% significance level. The parameters themselves are all statistically significant at this level, however, indicating that absolutist beliefs have a significant influence on CV response in all scenarios. The significance level is far higher in each of the referendum formats than in the trust fund format. Although these results may indicate that lexicographic respondents were prevalent in each of the scenarios, and particularly the referendum scenarios, the problem of convincingly showing that a variable such as Absolute picks up no more than preference strength remains. Although it would appear that lexicographic motivations are having an important influence on results, this can only be concluded in a qualified sense. It is further noted that the statistical significance of this variable could be the result of the lack of price sensitivity, perhaps because respondents did not think they would really have to make payments. This possibility is discussed later in this chapter, and the next chapter.

Cross-scenario variations in other parameter estimates are discussed in relation to the dimensions of citizen-consumer divergence, to which the analysis now turns.

8.3 RESULTS PERTAINING TO CITIZEN DIMENSION 1A.

In order to investigate the extent to which respondents object to the tradeoffs required in CV questions, in the manner outlined by Sagoff (1988), a number of follow-up questions were included in the questionnaire, as described in Chapters 6 and 7. Responses to Questions B5c and B5d, cross-tabulated by scenario, are presented below in Tables 8.4 and 8.5.
<table>
<thead>
<tr>
<th>CV difficult to answer (B5c)</th>
<th>SCENARIO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cells show: observed count/expected count (col%, observed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>51/44.9</td>
<td>47/41.0</td>
</tr>
<tr>
<td></td>
<td>(14.0)</td>
<td>(14.1)</td>
</tr>
<tr>
<td>Agree</td>
<td>74/86.1</td>
<td>104/78.6</td>
</tr>
<tr>
<td></td>
<td>(20.3)</td>
<td>(31.2)</td>
</tr>
<tr>
<td>Neutral</td>
<td>73/81.1</td>
<td>59/74.0</td>
</tr>
<tr>
<td></td>
<td>(20.0)</td>
<td>(17.7)</td>
</tr>
<tr>
<td>Disagree</td>
<td>123/102.2</td>
<td>75/93.2</td>
</tr>
<tr>
<td></td>
<td>(33.7)</td>
<td>(22.5)</td>
</tr>
<tr>
<td>Strongly Dis.</td>
<td>44/50.7</td>
<td>48/46.3</td>
</tr>
<tr>
<td></td>
<td>(12.1)</td>
<td>(14.4)</td>
</tr>
<tr>
<td>Total</td>
<td>365</td>
<td>333</td>
</tr>
</tbody>
</table>

A likelihood-ratio chi-square test of independence for the two variables in the above table gives a chi-square value of 35.21 on 12 degrees of freedom. If responses to the ‘difficult to answer’ statement and scenario are independent, the probability that a random sample would result in a chi-square value of at least that magnitude is 0.00043. Hence the hypothesis of independence is rejected at the 95 and 99 percent significance levels. Qualitative examination of the results in the above table suggests that scenario 2 produced greater overall agreement with the above statement than expected, and the trust fund scenario produced less overall agreement than expected.

One way to determine the pairs of scenarios that produce significantly different responses to the above question is to assume the likert scale provides interval rather than ordinal data, and to conduct a one-way ANOVA. With responses to the above ‘difficulty’ question as dependent variable, and scenario providing the four treatments, a statistically significant F-ratio of 2.6493 is obtained, at the 95 percent significance level (critical F(3, 1378)=2.6). In terms of multiple comparisons tests, results of a least significant differences (LSD) test, effectively equivalent to conducting multiple t-tests, indicated that scenario 2 was perceived to be more difficult than scenario 4, these being the only significantly different means at the 95

---

2 Refer to Section 6.5 for a discussion of this and other matters concerning the use of ANOVA’s in this thesis.
percent significance level. In terms of the mean values, scenario 4 produced the
greatest disagreement with the ‘difficult’ statement, followed by scenario 3, 1 and
then 2. The results of a more conservative Scheffe test indicated that no two
treatments produced significantly different means for B5c.

Although a greater perceived difficulty with the more citizen-orientated scenario than
the trust fund scenario may in some respects appear surprising, it is important to note
that difficulty in answering a question can arise for reasons other than protest. The
referendum questions may be seen as more appropriate, but may be perceived to
involve more complex decisions. Some individuals may see referendum questions as
involving more factors to consider than trust fund questions. Although the economic
implications of logging may seem an important consideration in referendum questions,
it may seem less central in trust fund questions where the individual is not being asked
to vote for what is perceived to be best for society. In this respect, such a finding is
consistent with the citizen-consumer model. If referendum formats encourage more
complex citizen-like considerations, then it can be expected than individuals might
find the questions more difficult. To shed further light on such speculation, however,
the above results must first be contrasted with those for questions relating more
specifically to protests.

Table 8.5 presents a similar crosstabulation to Table 8.4, but for responses to the
question involving agreement/disagreement with the statement “I Didn’t like the [CV]
question”.

Qualitative examination of this table reveals a tendency of the trust fund format to
produce greater dislike than the other formats. A likelihood-ratio chi-square test of
independence for the two variables in the above table gives a chi-square value of
23.83 on 12 degrees of freedom. If dislike of the CV question and scenario are
independent, the probability that a random sample would result in a chi-square value
of at least that magnitude is 0.0215. Hence the hypothesis of independence at the 90
and 95 percent significance levels is rejected. The results of an equivalent ANOVA to
that used above produced an F-ratio of 2.45 which is significant at the 90, but not 95,
percent significance levels (Fprob=0.0619). An LSD test indicated that scenario 4
was disliked more than scenarios 2 and 3. Scenario 4 had the lowest mean
disagreement with the statement, followed by scenario 1, then 2 and finally 3. The
more conservative Scheffe test again found no significant differences. Because the
ANOVA F-statistic was not significant, however, only qualified support for the
significant differences detected by the LSD test can be concluded (see Section 6.5).
### TABLE 8.5 CROSS-TABULATION OF 'DIDN’T LIKE THE QUESTION' BY SCENARIO

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>cells: observed count/expected count (col %)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
</tr>
<tr>
<td>23/23.8 (6.6)</td>
<td>26/21.7 (8.2)</td>
</tr>
<tr>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>29/35.1 (8.3)</td>
<td>28/32.0 (8.8)</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
</tr>
<tr>
<td>145/138.2 (41.5)</td>
<td>113/125.9 (35.5)</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
</tr>
<tr>
<td>96/90.6 (27.5)</td>
<td>89/82.6 (28.0)</td>
</tr>
<tr>
<td>Strongly Dis.</td>
<td></td>
</tr>
<tr>
<td>56/61.3 (16.0)</td>
<td>62/55.8 (19.5)</td>
</tr>
<tr>
<td>Total</td>
<td>349</td>
</tr>
</tbody>
</table>

The LSD results indicate that the trust fund format was probably disliked by a greater proportion of respondents than some of the referendum formats.

Respondents who didn’t like the CV question or whom found it difficult for some reason, were asked in Question B6 to indicate their extent of agreement or disagreement with a number of further follow-up statements. Consider responses to two of these questions, the statements being ‘I refuse to consider such tradeoffs’, and ‘I don’t see why option B should cost money in the way specified’. Results are presented in Tables 8.6 and 8.7 respectively.

A likelihood-ratio chi-square test of independence for the two variables in the above table gives a chi-square value of 24.54 on 12 degrees of freedom. If refusal to consider the CV tradeoff and scenario are independent, the probability that a random sample would result in a chi-square value of at least that magnitude is 0.017. The hypothesis of independence at the 95 percent significance level is rejected. Close inspection of the cells in the table suggests that much of the dependence may be associated with a greater likelihood of tradeoff objection in the trust fund scenario compared with the other scenarios. Although an ANOVA produced an F-ratio that was not significant (Fprob=0.13), the LSD test again indicated some significant differences at the 95 percent level, which failed to show up in the more conservative
TABLE 8.6  CROSS-TABULATION OF ‘TRADEOFF-REFUSAL’ BY SCENARIO

<table>
<thead>
<tr>
<th>Refuse to consider such tradeoffs (B6b)</th>
<th>SCENARIO cells show: observed count/expected count (col %)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>9/10.1</td>
<td>7/12.0</td>
</tr>
<tr>
<td></td>
<td>(7.3)</td>
<td>(4.8)</td>
</tr>
<tr>
<td>Agree</td>
<td>17/20.4</td>
<td>28/24.2</td>
</tr>
<tr>
<td></td>
<td>(13.7)</td>
<td>(19.0)</td>
</tr>
<tr>
<td>Neutral</td>
<td>57/53.1</td>
<td>58/62.9</td>
</tr>
<tr>
<td></td>
<td>(46.0)</td>
<td>(39.5)</td>
</tr>
<tr>
<td>Disagree</td>
<td>33/27.5</td>
<td>40/32.6</td>
</tr>
<tr>
<td></td>
<td>(26.6)</td>
<td>(27.2)</td>
</tr>
<tr>
<td>Strongly Dis.</td>
<td>8/12.9</td>
<td>14/15.3</td>
</tr>
<tr>
<td></td>
<td>(6.5)</td>
<td>(9.5)</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>147</td>
</tr>
</tbody>
</table>

Scheffe test. The LSD test indicated that the mean objection with the CV tradeoff was higher for the trust fund scenario than both the second and third scenarios. We again have only qualified evidence to suggest that the trust fund format may be more prone to protest responses than the referendum formats. Now consider responses to the statements regarding costs.

Inspection of the results in Table 8.7 indicates a greater tendency of respondents to object to the costs involved in the trust fund scenario than the other three scenarios. A likelihood-ratio chi-square test of independence for the two variables in the above table gives a chi-square value of 57.46 on 12 degrees of freedom. If responses to the above statements regarding costs and scenario are independent, the probability that a random sample would result in a chi-square value of at least that magnitude is less than 0.000001. The hypothesis of independence is rejected at a high significance level. The results of an ANOVA indicate a highly significant F-ratio (F=12.99, Pr<0.0001), suggesting that the mean agreement with the costs statement varies among some scenarios. Both the LSD test and Scheffe test indicate that, on average, respondents are less convinced by the need for payment as specified in the trust fund format than in any of the three referendum formats. The fact that this result holds for scenario 3, for which the stated reason for a payment being required (management of conservation reserves, higher prices for timber products) is closest to that of the trust
### TABLE 8.7 CROSS-TABULATION OF ‘SHOULDN’T COST MONEY IN THE WAY SPECIFIED’ BY SCENARIO

<table>
<thead>
<tr>
<th>Shouldn’t cost money in that way (B6c)</th>
<th>SCENARIO</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cells show: observed count/expected count (col %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td>15/19.1</td>
<td>17/22.5</td>
<td>12/18.0</td>
<td>38/22.4</td>
</tr>
<tr>
<td>Agreement</td>
<td>(11.8)</td>
<td>(11.3)</td>
<td>(10.0)</td>
<td>(25.5)</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>37/38.8</td>
<td>48/45.9</td>
<td>25/36.7</td>
<td>57/45.6</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>(29.1)</td>
<td>(32.0)</td>
<td>(20.8)</td>
<td>(38.3)</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>44/36.5</td>
<td>36/43.1</td>
<td>42/34.5</td>
<td>35/42.8</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>(34.6)</td>
<td>(24.0)</td>
<td>(35.0)</td>
<td>(23.5)</td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>27/24.9</td>
<td>43/29.4</td>
<td>24/23.5</td>
<td>13/29.2</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>(21.3)</td>
<td>(28.7)</td>
<td>(20.0)</td>
<td>(8.7)</td>
<td></td>
</tr>
<tr>
<td>Strongly Dis.</td>
<td>4/7.7</td>
<td>6/9.1</td>
<td>17/7.3</td>
<td>6/9.0</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>(3.1)</td>
<td>(4.0)</td>
<td>(14.2)</td>
<td>(4.0)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>150</td>
<td>120</td>
<td>149</td>
<td>546</td>
</tr>
</tbody>
</table>

fund format (management of conservation reserves), suggests that the above significant differences may be more attributable to the trust fund format, than the costs outlined when justifying to the respondent the need for some sort of payment. This is further supported by the results of other ‘debrief’ questions (B6) that indicate that the higher prices justification was the least objectionable of the four reasons given in the various scenarios. The LSD test also indicated that scenario 1 was prone to significantly greater payment vehicle objection than scenario 3, a result that presumably relates to the compensation to loggers element that is included in scenario 1 but not 3. This result was not supported by the Scheffe test.

In addition to the questions discussed above, respondents indicating difficulty or dislike with the CV question were asked one question (B6k) relating specifically to perceived appropriateness of the institutional arrangement implied in the CV question. Respondents presented with scenarios 1 to 3 were asked to indicate their agreement or disagreement with the statement “A referendum is not an appropriate way of making such decisions”, and scenario 4 respondents were similarly presented with the
statement "A trust fund is not an appropriate way of making such a decision". Crosstabulation results (Table 8.8) indicate that a trust fund appears to be seen as less appropriate than a referendum.

<table>
<thead>
<tr>
<th>A Referendum [trust fund] is not an appropriate way of making such decisions (B6k)</th>
<th>SCENARIO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cells show: observed count/expected count (col %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>12/15.5</td>
<td>12/18.8</td>
</tr>
<tr>
<td></td>
<td>(9.9)</td>
<td>(8.2)</td>
</tr>
<tr>
<td>Agree</td>
<td>28/27.8</td>
<td>39/33.8</td>
</tr>
<tr>
<td></td>
<td>(23.1)</td>
<td>(26.5)</td>
</tr>
<tr>
<td>Neutral</td>
<td>29/33.0</td>
<td>30/40.1</td>
</tr>
<tr>
<td></td>
<td>(24.0)</td>
<td>(20.4)</td>
</tr>
<tr>
<td>Disagree</td>
<td>31/27.3</td>
<td>42/33.2</td>
</tr>
<tr>
<td></td>
<td>(25.6)</td>
<td>(28.6)</td>
</tr>
<tr>
<td>Strongly Dis.</td>
<td>21/17.3</td>
<td>24/21.0</td>
</tr>
<tr>
<td></td>
<td>(17.4)</td>
<td>(16.3)</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>147</td>
</tr>
</tbody>
</table>

ANOVA (F ratio=15.12, p<0.0001) results indicate a greater tendency of scenario 4 respondents to agree with their respective statement than respondents in the other 3 scenarios (LSD and Scheffe tests).

The general finding to come out of these results is that the trust fund produces significantly greater price sensitivity than any of the three referendum scenarios, and yet it is the trust fund format that is disliked the most. There is also some evidence to suggest that the referendum formats, most notably scenario 2, are perceived as more difficult than the trust fund format. At this stage, it is hypothesised that this is a
consequence of the referendum format priming respondents to more fully consider the more complex citizen tradeoffs involved (such as the tradeoff with jobs).

**Determinants of CV Question “dislike”**

As noted above, in question B5d, respondents indicated whether or not they disliked the CV question. It is possible to gain further insight into the factors most prominent in respondents’ minds when they answered this question, by regressing B5d on a range of other variables contained in the questionnaire. A forward stepwise linear regression procedure was used with the following variables included in the selection set:

- C5a (wrong to harm nature)
- D7a (referendums are a good way ...)
- D7e (decisions based mainly on government consultation with experts)
- D7i (decisions based mainly on basis of economic analysis)
- D7k (too much money spent on bureaucracy)
- D7m (questionnaires such as this are a good way ...)
- Dd7n (should not try to value species)
- D10i (I am prepared to bear some of the management costs)
- C5m (Species should be preserved for their own sake ...)
- D10j (I am prepared to bear some of the compensation costs)
- B5c (question was difficult)

A further variable (RRD1) was created and included, taking on a value of 1 if D1=3 (respondent evenly balanced between favouring preservation and development), and 0 otherwise.

Stepwise regressions were run for each of the four scenarios, the results of which are tabulated in Table 8.9.

---

3 Forward stepwise regressions enter variables, one at a time, from a (selection) set of variables specified by the user, with variables only being added if they significantly improve the fit of the model. This procedure is best used when a priori considerations do not dictate which independent variables are appropriate, and there are a number of candidates.
### TABLE 8.9 DETERMINANTS OF "DISLIKE" SELF REPORTS.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Scenario</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>2.9235</td>
<td>2.5523</td>
<td>2.7897</td>
<td>2.6766</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.229)</td>
<td>(0.211)</td>
<td>(0.234)</td>
<td>(0.272)</td>
</tr>
<tr>
<td>D7e</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D7m</td>
<td></td>
<td>-0.1592</td>
<td>-0.1494</td>
<td>-0.2041</td>
<td>-0.2592</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.062)</td>
<td>(0.057)</td>
<td>(0.057)</td>
<td>(0.057)</td>
</tr>
<tr>
<td>D10i</td>
<td></td>
<td>-0.1508</td>
<td>-0.1238</td>
<td>-0.1862</td>
<td>-0.2145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.054)</td>
<td>(0.056)</td>
<td>(0.050)</td>
<td>(0.056)</td>
</tr>
<tr>
<td>D7n</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.1251</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.051)</td>
<td></td>
</tr>
<tr>
<td>B5c</td>
<td></td>
<td>0.3666</td>
<td>0.5207</td>
<td>0.4049</td>
<td>0.4156</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.041)</td>
<td>(0.039)</td>
<td>(0.040)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>D7a</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1287</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.056)</td>
</tr>
<tr>
<td>RRD1</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.2454</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.110)</td>
</tr>
<tr>
<td>R-square %</td>
<td></td>
<td>24</td>
<td>40</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>323</td>
<td>290</td>
<td>287</td>
<td>299</td>
</tr>
<tr>
<td>F signif.</td>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

NB. cell entries are coefficient, and standard error in parentheses.

Of the twelve variables in the selection set, only seven were included in any of the final results. Variables D7m, D10i and B5c were statistically significant determinants of "dislike" in all four scenarios, at the 95% significance level. The results for D7m indicates a general dislike with questionnaires of this nature, and the belief that they are not a good way of consulting the public. The significance and sign of D10i indicates that some respondents disliked the CV question because they did not see why they should have to bear some of the costs associated with managing
solution, and its lower face validity, might cause respondents to express a lower valuation than any of the referendum formats. It is not apparent why D7n was statistically significant only in scenario 3.

It is noted that neither of the variables relating to ethical obligations to nature (C5a, C5m) were statistically significant in any of the regressions. This perhaps suggests that each of the scenarios allowed respondents to express such ethical concerns in their CV and other responses, without this influencing how much they liked the CV question. One might have expected that scenario 4 would have produced a more significant coefficient for these variables. Because they didn’t enter any of the models, such results cannot be observed here.
8.4 RESULTS PERTAINING TO CITIZEN DIMENSION 1B.

This particular, pertaining to the degree of impartiality of CV responses, is difficult to measure, and hence to empirically analyse. As noted above, high degrees of impartiality imply subordination of private interests such as use and option values.

Table 8.2 above reveals that only scenarios 1 and 4 produced statistically significant parameter estimates for the variable relating to use value. The sign of the estimate in scenario 1 is however opposite to that expected on a priori grounds (where use of forests is expected to increase one’s value for them)⁴. It is not apparent why this would be the case. With respect to OptionV, the trust fund format is again the only format to produce a statistically significant parameter estimate with the expected sign. This is surprising, since measures relating to option value generally produce significant parameter estimates (Carson, 1991).

It thus appears that option and use values have been subordinated to a greater extent in the expression of referendum CV responses than in trust fund CV responses. It has previously been observed that such subordination may be seen as problematical from the standpoint of the neoclassical model of individual CV choice, in which TEV is seen to represent the summation of use value, option value, existence value etc⁵.

Another way to gain some insight into the degree of altruism and/or impartiality involved in CV responses is through self-reports. As described in Chapter 6, eight statements were included as follow ups to the CV question in an attempt to obtain such an indicator (B7). Results for all scenarios combined indicate that 41% of respondents agreed or strongly agreed that their CV response was best for them personally, and 59% agreed or strongly agreed that it was best for other members of their family alive today, 75% similarly agreed that it was best for future descendants of their family. In contrast to these family related reasons, 84% agreed that their response was best for Australian society overall. Thus according to these simple likert scale self-reports, collectivist responses appear to be more common than responses reflecting narrower, more personal or family related interests.

⁴ It is possible that visiting an area could reduce one’s value for that area, if, for example, it caused the individual to realise that the area is not as special as previously thought.

⁵ Those responding ‘yes’ in the trust fund scenario may be those that are more likely to use the area in the future, and as seen in the previous Chapter regarding results for D10a, respondents are prepared to pay for use of wilderness areas.
It is of course possible to agree with all or most of the eight statements, making it difficult to infer primary motives. Social desirability biases in self-reports such as these can be expected to add significant measurement error. For this reason, respondents were asked to indicate the three statements that “most resemble the reason for your response to Question B.2”. Forcing individuals to choose between different socially desirable categories may help tease out differences in primary motives. Table 8.10 below presents the corresponding multiple response set crosstabulated against scenario.

It appears that the referendum formats involve slightly greater focus on societal interests than personal or family interests. This is confounded, however, by the fact that the trust fund scenario produced greater price sensitivity than the other scenarios. It is hence not clear whether a greater focus on personal interests is a function of more attention given to the personal costs mentioned in the scenario, or a more collectivist preference being formulated and traded off with price. Exploratory analysis of trust fund results suggested that respondents were more likely to include B7a within their three main reasons, when they were presented with a higher bid value, and hence the former explanation appears most relevant.

The results of Table 8.10 also support the hypothesis that CV responses are motivated to a considerable degree by altruistic considerations regarding members of the current generation, which as noted in Chapter 3 can result in double counting when CV results are aggregated to the relevant population.

8.5 RESULTS PERTAINING TO CITIZEN DIMENSION 2.

The logistic regression results presented in Table 8.2 indicate the extent to which different scenarios appear to prime or trigger individuals to take the economic benefits associated with logging (mainly jobs) into account when formulating their CV response. These results clearly indicate that respondents in the referendum scenarios take greater account of jobs than those in the trust fund scenario. The parameter estimates for Jobs are considerably higher in the referendum scenarios than in the trust fund scenario. They are highly significant in the referendum scenarios, but the trust fund parameter estimate does not reach statistical significance at even the 90 percent level.
### Main reasons for CV response

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Count</th>
<th>Row % of respondents</th>
<th>Col % of respondents (B7)</th>
<th>me personally</th>
<th>other members of family alive</th>
<th>future descend's of family</th>
<th>others alive and future generat.</th>
<th>Aust'n society overall</th>
<th>world as a whole</th>
<th>those employed in timber industry</th>
<th>Aust'n plants and animals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>57</td>
<td>102</td>
<td>121</td>
<td>255</td>
<td>214</td>
<td>163</td>
<td>94</td>
<td>187</td>
<td>405</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.1</td>
<td>25.2</td>
<td>29.9</td>
<td>63.0</td>
<td>52.8</td>
<td>40.2</td>
<td>23.2</td>
<td>48.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.8</td>
<td>27.8</td>
<td>22.7</td>
<td>27.4</td>
<td>28.1</td>
<td>23.9</td>
<td>29.6</td>
<td>26.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>46</td>
<td>78</td>
<td>123</td>
<td>251</td>
<td>202</td>
<td>174</td>
<td>82</td>
<td>164</td>
<td>378</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.2</td>
<td>20.6</td>
<td>32.5</td>
<td>66.4</td>
<td>53.4</td>
<td>46.0</td>
<td>21.7</td>
<td>43.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.6</td>
<td>21.3</td>
<td>23.1</td>
<td>27.0</td>
<td>26.5</td>
<td>25.5</td>
<td>25.8</td>
<td>22.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>85</td>
<td>175</td>
<td>235</td>
<td>175</td>
<td>181</td>
<td>65</td>
<td>180</td>
<td>387</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.5</td>
<td>22.0</td>
<td>45.2</td>
<td>60.7</td>
<td>45.2</td>
<td>46.8</td>
<td>16.8</td>
<td>46.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.5</td>
<td>23.2</td>
<td>32.8</td>
<td>25.2</td>
<td>23.0</td>
<td>26.5</td>
<td>20.4</td>
<td>24.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>102</td>
<td>102</td>
<td>114</td>
<td>190</td>
<td>171</td>
<td>165</td>
<td>77</td>
<td>191</td>
<td>378</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27.0</td>
<td>27.0</td>
<td>30.2</td>
<td>50.3</td>
<td>45.2</td>
<td>43.7</td>
<td>20.4</td>
<td>50.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39.1</td>
<td>27.8</td>
<td>21.4</td>
<td>20.4</td>
<td>22.4</td>
<td>24.2</td>
<td>24.2</td>
<td>26.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>261</td>
<td>367</td>
<td>533</td>
<td>931</td>
<td>762</td>
<td>683</td>
<td>318</td>
<td>732</td>
<td>1548</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the case of scenarios 1 and 2, significant parameter estimates are expected, since respondents are specifically told about employment implications. It is interesting, however, that a similar result applies to scenario 3, where there is no mention of jobs. Indeed, the parameter estimate for scenario 3 is actually greater than that for scenario's 1 and 2. It appears that referendum formats prime thoughts about jobs, whether or not jobs are mentioned in the scenario.

Interest here also lies in the comparison of scenario's 3 and 4, neither of which mentions jobs. The results clearly indicate that scenario 3 stimulates consideration of jobs more than scenario 1. Since neither scenario 3 nor scenario 4 make references to jobs or the timber that would be forgone in the event that logging is not permitted, it appears that the referendum format stimulates citizen dimension 2 considerations to a greater extent than market-based trust fund formats.

Jobs (question B9j) is one of several items in question B9 relating to the opportunity costs of preservation. Others are B9a, B9f and B9m. In order to test whether the above result for B9j also holds for these other variables, further logistic regressions were run, differing in specification to those of Table 8.2 only in terms of the variable used to represent the economic benefits from logging. In each case, B9j was replaced by either B9a, B9f or B9m. The estimated regression coefficients for these variables are presented in Table 8.11 below.

The results indicate that the same general trends occur with B9a, B9k and B9m as for B9j. The parameter estimates for these variables are, in all cases, substantially lower in the trust fund format than in the referendum formats, with lower levels of statistical significance. However, at the 95% level, only B9m fails to reach statistical significance in the trust fund format.

One final measure of the extent to which various formats stimulated consideration of the development benefits at stake is through the self-report question, B5b. Results of a one-way ANOVA indicated that the means of this variable were not equal across the four scenarios (F=4.52, Fprob=0.0037). Results of both LSD and Scheffe multiple comparison tests indicated that scenario 4 produced higher mean disagreement with the "I thought a lot about the economic benefits ..." than both scenarios 1 and 2, but not 3.
### Table 8.11 Parameter Estimates for Various Measures of the Opportunity Cost of Preservation

<table>
<thead>
<tr>
<th>Cell entries: estimated regression coefficient, standard error, and (significance level)</th>
<th>Independent Variable Relating to Opportunity Costs of Forest Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>B9a (Need the wood)</td>
</tr>
<tr>
<td>1</td>
<td>1.8615, 0.2331 (0.0000)</td>
</tr>
<tr>
<td>2</td>
<td>1.1280, 0.1836 (0.0000)</td>
</tr>
<tr>
<td>3</td>
<td>1.1230, 0.1887 (0.0000)</td>
</tr>
<tr>
<td>4</td>
<td>0.4642, 0.1449 (0.0014)</td>
</tr>
</tbody>
</table>

### 8.6 Reasons for Greater Price Sensitivity in Trust Fund Format

It has been observed that the trust fund scenario produced far greater price sensitivity than any of the three referendum formats. In the next section we will see that the trust fund scenario also produces lower estimates of median WTP than the referendum scenario. Section 8.6.1 discusses possible reasons for this result, and empirically investigates the various possibilities, to the extent possible given the AFAS data available. Section 8.6.2 provides a qualitative follow-up to the findings of Section 8.6.1.

#### 8.6.1 Identification and Quantitative Assessment of Possible Explanations

Five possible explanations for the difference in price-sensitivity in trust fund and referendum scenarios are examined here. Consider each in turn.
(1) Individuals are More Prepared to Pay if Responsibility Shared Amongst All Taxpayers.

It has previously been observed that the majority of respondents to the AFAS favour the notion of shared responsibility for payment of the costs associated with preservation. This is consistent with the notion that individuals are willing to pay a fair share of the costs, especially if others do likewise.

It is possible that the lower willingness to pay in the trust fund format of the AFAS compared with the referendum formats is at least partly a consequence of individuals not being willing to pay into a trust fund where the payment is not shared amongst all members of society (or at least taxpaying members).

We might, however, expect that this is unlikely to explain the degree of price insensitivity in scenarios 1 to 3. One might expect that the highest bid value of $200 is too high to conclude that the lack of price sensitivity in referendum formats is simply the result of maximum WTP values generally exceeding the bid values included in the questionnaire (Carson, 1995, pers comm). Although beliefs regarding shared responsibility may account for a portion of ‘no’ responses in voluntary trust fund formats, they are unlikely to account for the lack of price sensitivity in referendum formats.

Question D10c can be used to test this hypothesis. Recall that D10c measures the respondents degree of disagreement with the statement “The cost of managing wilderness areas should be shared amongst all taxpayers”. We are interested both in additive effects that this belief may have on the log(odds) and interactive effects with price. The belief may thus have a curve shifting effect, where the probability of a Yes response is systematically shifted upwards (or downwards) for all bid values, and/or an influence on the price coefficient and hence price sensitivity (see Appendix B for methods involved).

If the shared responsibility belief is to explain the difference in WTP trends between the referendum and trust fund formats, we would expect a more negative price coefficient among trust fund respondents who agree that costs should be shared among all taxpayers, and/or a decrease in the intercept term and hence the likelihood of a no response. Table 8.12 presents the results for logistic regressions involving the scenarios 3 and 4 and the two terms involving D10c.
TABLE 8.12 TESTING FOR THE COMPARATIVE INFLUENCE OF BELIEFS REGARDING SHARED RESPONSIBILITY IN TRUST FUND AND REFERENDUM CV FORMATS

<table>
<thead>
<tr>
<th>Variable</th>
<th>SCENARIO</th>
<th>Table entries are parameter estimate and (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scenario 3</td>
<td>Scenario 4</td>
</tr>
<tr>
<td>rprice</td>
<td>0.0441 (0.036)</td>
<td>-0.0622 (0.041)</td>
</tr>
<tr>
<td>fbal1</td>
<td>1.4630 (0.318)</td>
<td>1.5719 (0.398)</td>
</tr>
<tr>
<td>fbal2</td>
<td>-1.4277 (0.5127)</td>
<td>-0.6410 (0.716)</td>
</tr>
<tr>
<td>D10c</td>
<td>0.0670 (0.7130)</td>
<td>-0.6037 (0.195)</td>
</tr>
<tr>
<td>D10c * rprice</td>
<td>-0.0161 (0.0159)</td>
<td>-0.0039 (0.021)</td>
</tr>
<tr>
<td>-2logL</td>
<td>459.311</td>
<td>425.844</td>
</tr>
<tr>
<td>% correct pred.</td>
<td>71.8</td>
<td>71.4</td>
</tr>
<tr>
<td>n</td>
<td>397</td>
<td>405</td>
</tr>
</tbody>
</table>

The results indicate that in neither scenario do respondents’ beliefs regarding sharing management costs among all taxpayers effect price sensitivity, as indicated by the coefficients and significance levels of the interactive term. Thus in the trust fund scenario, individuals who think all taxpayers should pay are no more price sensitive than those who do not. This contradicts the above hypothesis, where individuals who think that costs should be shared amongst all taxpayers, are presumably more likely to say no as the amount they are asked to pay increases.

The additive shared responsibility term is statistically significant in scenario 4 but not 3, at the 95% significance level. The trust fund coefficient on D10c is negatively signed, indicating that individuals who disagree with the notion of shared responsibility are less likely to respond Yes than those who agree with it. This is the opposite to what is expected according to the above hypothesis, since individuals who agree with sharing costs among all taxpayers are more likely to make a payment. It appears that such respondents may simply be indicating that they are willing to pay their share, even if not all others have to.
Although these results are not sufficient to reject the above hypothesis with certainty it does appear that the shared responsibility explanation for the different price sensitivities in the trust fund and referendum scenarios is unlikely to be playing a major role.

(2) Payment Perceived to Involve Redirection of Existing Tax Revenue Rather than Additional Taxes

An alternative explanation is that the information supplied to respondents was perceived to involve tax redirection and not tax increases. If this is the case, then we would expect an individual's procedural belief regarding the appropriateness of tax increases to be unrelated to CV response, and dislike of the CV question. This hypothesis assumes that respondents are not price sensitive in the case of tax redirections, which appears to be supported by the results for scenario 2 in Table 8.2.

It has previously been observed, in relation to question D5, that additional tax increases to help protect the environment are favoured by far less people than redirections of current tax revenue, which we know more individuals see as acceptable. One way to test the above hypothesis is to regress the 'scenario dislike' variable, B5d, on a dichotomous variable corresponding to D5a (relating to reasonableness of tax increases), and to see if the parameter estimate varies across scenarios 1 and 2. Scenario 1 provides a cleaner comparison with scenario 2 than scenario 3, in terms of the stated reasons for payment, and reference to employment considerations.

Given that scenario 2 employs, and makes specific reference to, tax redirection as the 'payment vehicle', and given that far more individuals prefer tax redirection to tax increases, one would expect respondent dislike of the CV question arising from objection to tax increases to be greater in scenario 1 than scenario 2. Failure to find such a statistically significant difference would imply that the costs referred to in scenario 1 were perceived to involve tax redirections more than cost increases. To perform this test two new variables were created:

\[ SC12 = \text{dichotomous variable taking on the value 1 for scenario 1 cases and 0 for scenario 2 cases;} \]

\[ DD5a = \text{dichotomous variable taking on a value of 1 if respondent indicated that additional tax increases are appropriate in question D5a; 0 otherwise;} \]
The use of a multiplicative term involving these two variables also permits the regression to be estimated over the pooled dataset for scenarios 1 and 2. The estimated model is presented in the last column of Table 8.13.

**TABLE 8.13 INVESTIGATING DIFFERENTIAL INFLUENCE OF TAX-INCREASE APPROPRIATENESS IN SCENARIOS 1 AND 2.**

<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLES</th>
<th>DEPENDENT VARIABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CV response (logistic)</td>
</tr>
<tr>
<td>constant</td>
<td>-0.072 (0.66)</td>
</tr>
<tr>
<td>SC12</td>
<td>-0.323 (0.16)</td>
</tr>
<tr>
<td>DD5a</td>
<td>1.4484 (0.0006)</td>
</tr>
<tr>
<td>rprice</td>
<td>-0.0101 (0.46)</td>
</tr>
<tr>
<td>DD5a*SC12</td>
<td>0.1099 (0.86)</td>
</tr>
<tr>
<td>DD5a*rprice</td>
<td>-0.0241 (0.49)</td>
</tr>
<tr>
<td>rprice*SC12</td>
<td>0.0164 (0.38)</td>
</tr>
<tr>
<td>rprice<em>SC12</em>DD5a</td>
<td>-0.0188 (0.71)</td>
</tr>
</tbody>
</table>

Although there are clearly many factors contributing to dislike of the CV question, the hypothesis that equal proportions of scenario 1 and scenario 2 respondents interpreted costs as involving tax redirections cannot be rejected at the 95 percent significance level. This is indicated by the non-significant parameter estimate for dd5a*SC12.

Now consider the differential influence of the same belief (DD5a) on CV response for the same two scenarios. Results for a logistic regression, again estimated over the pooled sample, are shown in the middle column of Table 8.13. Note that although DD5a has an additive effect in the index function, none of the multiplicative terms involving it are statistically significant at the 95 percent significance level.
Because the main difference between scenarios 1 and 2 is that the former involves additional expenditure and the latter involves redirected expenditure, one might expect that if respondents overwhelmingly see tax redirection as most realistic and most appropriate (as appears to be the case), then scenario 2 will provide a less ambiguous question than scenario 1, potentially producing smaller standard errors for the price coefficient. Note however that parameter values and significance levels for the price variable do not differ significantly across scenarios 1 and 2 (see Table 8.2).

On the basis of these results, the possibility that the majority of respondents did not think that option B would cost them additional money cannot be ruled out. As a consequence, respondents in scenarios 1 and 3 may have exhibited a sensitivity to price similar to that which actually exists for redirections of current tax revenues.

(3) Perceived as Additional Taxes but not Believed (Implementation Bias)

It is possible that scenario 1 and 3 respondents perceived question B2 to involve additional taxes, but failed to believe that implementation would follow. Tax redirection might be seen as a more realistic outcome. This is difficult to investigate empirically, given the data available. Note that in contrast to what one might expect, this hypothesis implies that payment vehicles with high face validity may be easier to find when using trust fund formats than referendum formats. The extent to which the findings in this study could be reversed through use of a different referendum payment vehicle is unclear.

(4) The actual CV question referred to payment in the trust fund case only.

Because payment is central to the notion of a trust fund, it is likely that the CV question (as distinct from scenario information) will involve reference to payment. In contrast, payment is less central to an institutional arrangement such as referendum, where it can be only one of a number of possible issues to be considered. Indeed, maximum face validity in a referendum CV question is obtained by presenting both sides of the issue at hand, and then asking ‘Which option would you vote for?’. To ask ‘Which option would you vote for, remembering that Option B will cost $c?’ is to run the risk of being accused of a loaded question. It is not dissimilar to asking someone ‘Which political party do you intend on voting for, given that labour will put more people out of jobs?’.

In referendum formats we thus have a tradeoff between maximizing respondent focus on the payment issue, and preservation of face validity. It is possible that by endeavouring to maximize face validity in the design of the three referendum CV
questions, respondent focus on the payment issue was sacrificed. This is a question of both comprehension and memory retention. Some respondents may not have comprehended the payment information in the referendum scenarios due to either lack of understanding or having skipped over such information for reasons discussed previously, and others may have simply forgotten about it by the time the actual CV question was reached.

One way of investigating the memory retention and comprehension possibility is to test whether respondents with higher levels of education exhibit greater price sensitivity. Note that we would expect the more postmaterialist values of such individuals to produce a systematically higher likelihood of a yes response, which will be reflected in the intercept term.

A further test of the retention/comprehension hypothesis, and in particular the possibility of payment information having been skipped over, is to see whether price sensitivity is higher for individuals with more evenly balanced environment/development orientations. Expressed preferences may be more dependent on information supplied in the questionnaire for such individuals.

Table 8.14 presents results for logistic regressions run for various subsets of the sample. In each case, the model has been estimated over both scenarios 1 and 3, since these are the two most similar referendum scenarios. Although all combinations of multiplicative terms were initially included in each regression, those not coming close to statistical significance have been omitted from the final regressions.

The first results column thus corresponds to the specified logit model, estimated over scenarios 1 and 3, for respondents with tertiary degrees. The second set of results are also estimated over scenarios 1 and 3, but only for those individuals who tend to favour preservation and development with approximately equal frequency. The third set of results are estimated over scenarios 1 and 3, but only for those respondents who don’t know if the protection of native forests is more important than timber worker’s jobs.

---

6 The reason for pooling the data for scenarios 1 and 3 here is simply to increase the sample size for estimation. The hypotheses do not specifically relate to differences in the two scenarios.
TABLE 8.14 LOGISTIC REGRESSION RESULTS FOR SELECTED SUB-SAMPLES OF SCENARIO 1 AND 3 RESPONDENTS.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Respondents selected for model estimation if satisfy following conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Scenario 1 or 3) AND (F13=8 or 9)</td>
</tr>
<tr>
<td></td>
<td>(Scenario 1 or 3) AND (D1=3)</td>
</tr>
<tr>
<td></td>
<td>(Scenario 1 or 3) AND (C3=3)</td>
</tr>
<tr>
<td>constant</td>
<td>-1.7573 (0.049)</td>
</tr>
<tr>
<td></td>
<td>-2.5250 (0.0000)</td>
</tr>
<tr>
<td></td>
<td>-1.0539 (0.0019)</td>
</tr>
<tr>
<td>rprice</td>
<td>-0.0095 (0.730)</td>
</tr>
<tr>
<td></td>
<td>0.0237 (0.1210)</td>
</tr>
<tr>
<td></td>
<td>-0.0173 (0.4980)</td>
</tr>
<tr>
<td>SC13 (dummy=1 if scen 3; 0 otherwise)</td>
<td>0.8876 (0.062)</td>
</tr>
<tr>
<td></td>
<td>1.5498 (0.0055)</td>
</tr>
<tr>
<td></td>
<td>0.6486 (0.0903)</td>
</tr>
<tr>
<td>FBAL1 (dummy=1 if C4=2; 0 otherwise)</td>
<td>2.8758 (0.001)</td>
</tr>
<tr>
<td></td>
<td>2.1916 (0.0000)</td>
</tr>
<tr>
<td></td>
<td>na</td>
</tr>
<tr>
<td>FBAL2 (dummy=1 if C4=1; 0 otherwise)</td>
<td>-0.2544 (0.8236)</td>
</tr>
<tr>
<td></td>
<td>-1.4807 (0.0135)</td>
</tr>
<tr>
<td></td>
<td>na</td>
</tr>
<tr>
<td>FBAL1*SC13</td>
<td>na</td>
</tr>
<tr>
<td></td>
<td>-1.5381 (0.0144)</td>
</tr>
<tr>
<td></td>
<td>na</td>
</tr>
<tr>
<td>n</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>349</td>
</tr>
<tr>
<td></td>
<td>135</td>
</tr>
</tbody>
</table>

NB Cell entries are parameter estimate and statistical significance in brackets.

Results indicate that rprice is statistically significant in none of the three regressions. This suggests that referendum respondents with tertiary degrees are no more price sensitive than those without, and that referendum respondents who can go either way on environment-development issues are no more price responsive than those who have a more certain, or predetermined, preference. Overall, these results do not support the hypotheses that referendum respondents (i) forgot about payment when formulating their CV response, (ii) skipped over the payment information without reading it, and (iii) did not understand what they read because it was too complicated.
Greater tendency for protest ‘No’ responses in trust fund format, with this tendency increasing with price

A greater tendency for protest ‘no’ responses in the trust fund scenario could explain the lower WTP estimates for this scenario. It is also conceivable that this tendency for protest no responses might increase as price increases. Individuals may object mildly to a $10 trust fund question, but be outraged by a $200 trust fund question.

This explanation suffers the same limitation as the first, namely that it can only explain why price sensitivity might be higher in the trust fund format, and not why the referendum format exhibits price insensitivity.

Some simple crosstabulations were however run to verify these claims. Dislike of CV question (B5d) was first crosstabulated against price, for scenario 4. Results (table not shown) indicated that 19.0 percent of respondents presented with a bid of $10 either agreed or disagreed that they disliked the CV question, compared with 25.4 percent for the $50 bid value, and 21.8% for the $200 bid value. This suggests that protests did not increase significantly with bid value, and hence that protests are unlikely to explain the different price sensitivities between scenarios 3 and 4. Next, question B6e responses (don’t see why option B should cost money ...) were crosstabulated against bid value, for scenario 4. Results indicated that 47.4% of respondents presented with a bid value of $10, and who did not fall out at the question B6 filter, agreed or strongly agreed that they did not see why option B should cost money in the way specified. This can be compared with 63.5 percent for the $50 bid value, and 74.6 percent for the $200 bid value. The corresponding percentages for scenario 3 are 24.3, 31.1 and 39.5 respectively. Thus it appears that amongst respondents who found the CV question either difficult or objectionable, protests do become more frequent as bid values increase. Although protests are more common in the trust fund scenario, they do not appear to increase with price at a greater rate than in the referendum scenario. The difference in price sensitivity in scenarios 3 and 4 must thus be due to other factors.

8.6.2 Qualitative Follow-Up

On the basis of the above discussion, the most plausible explanation for the greater price sensitivity in trust fund scenarios compared with referendum scenarios is that payment in the referendum scenarios was perceived to involve redirection of current taxation revenue rather than additional costs to the individual. Although the empirical analysis did not reject this hypothesis, it cannot be concluded with a high degree of certainty that this is the appropriate explanation. For this reason, it was
decided to conduct follow-up focus groups, in which small samples of individuals are brought together for the purpose of focussed discussion (see Krueger, 1988 for a thorough discussion of this procedure). In this case, the focus of discussion was the part of the referendum and trust fund CV questions pertaining to payment.

**Methods**

In conjunction with a formalised procedure within the Psychology Department at the Australian National University, students studying first year Psychology A01 were awarded points towards their first year grade if they participated in the exercise. Although the initial intention was to run three focus groups, the clear trends emerging from the first two groups meant that a third group was not considered necessary.

Although the author facilitated the focus group discussions and ensured that discussions did not deviate from the desired topic, great care was taken not to be the first person to raise matters pertaining directly to any of the hypotheses considered in Section 8.6.1. The author’s comments were thus restricted to a predetermined set of focus questions, and probes such as ‘Would you explain further?’, ‘What do others feel about this?’, and ‘Are there any other comments on this matter?’.

At the beginning of the focus groups, individuals were thanked for coming, and told that the exercise did not involve any manipulations or ‘tricks’, as do the experiments which they more commonly participate in. Individuals were told that the author was ‘simply interested in discussing certain aspects of a questionnaire that was conducted last year’. The author then stated ‘Before explaining any further I’d like you all to fill out the questionnaire. I’m not going to collect it from you afterwards - but please try and take it as seriously as you would if you received it in the mail and had decided to respond’. Once all participants had completed the first five pages of the scenario 3 (referendum) questionnaire, the author made a statement to the following effect:

I’d like to discuss some aspects of the questionnaire, focussing on question B2. There is a very specific aspect of this question I’m interested in. But I don’t want to tell you what it is at this stage because it could influence your comments. I will however attempt to guide the discussion in the direction of the topic I am interested in. So if I change the focus of the discussion, it’s not because what your saying is wrong or uninteresting. Rather, I’m simply trying to get discussion back on to the topic I’m interested in, which you don’t know. I’d like to emphasise that we’re interested in how individuals perceive question B2. As such, there is no right perception. Everyone’s view is equally valid. Indeed, the reason we are conducting this group is

---

7 At the time the group discussions were held, only enough students for two groups had signed up. Given that classes had finished for the semester, and that little time was available for this exercise (conducted 17 and 18th June 1995), a third group may also have been difficult to assemble.
because people did not respond to this question as we expected. Hence it is little use to
us if you tell us what you think we meant by the question.

Discussion then began, with the author prompting individuals with the following
questions:

1. What did you understand question B2 to mean?
2. What did you understand the reference to costs to mean?
3. Who pays the costs?
4. How are the costs to be paid?
5. How realistic is this?
6. If you received this questionnaire in the mail, would you believe the information
   about costs?

Following this discussion, participants were handed page 5 of the trust fund scenario,
containing the CV question, and asked to complete it. After all participants had
completed the question, discussion recommenced, focussed again on payment aspects
of the question, and prompted by the following questions:

7. How do you think this version of question B2 compares with the first?
8. Would your response be different to this question compared to the previous?
   Can you say why this might be so?

In the first focus group, a bid value of $10 was employed in the referendum question,
and $200 in the trust fund question. In the second focus group, both questions
employed the $50 bid value. This permitted qualitative observations to be made
regarding reactions to different prices. With the permission of participants, sessions
were recorded on audio tape, permitting subsequent transcription.

Results

The first discussion group contained five students and the second contained six. Four
of the eleven participants were mature age students, and only two were men8. Both
sessions lasted slightly over one hour. Although a number of interesting findings
emerged from the focus group discussions, only those that have direct bearing on the
above hypotheses are discussed here.

The most important findings emerged from discussions following the third and fourth
questions listed above. When asked ‘Who do you think would have to pay the

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8 By far the majority of students studying Psychology A01 are women.
costs?’, one individual said ‘the taxpayer obviously’, and another said ‘all of us’. One individual commented ‘general revenue’, and another said ‘I don’t think you would have to give them $10 for it, but taxes, out of taxpayer’s money- instead of going towards budget for something else- it would actually go towards the forest thing’. These latter comments support the hypothesis that referendum scenarios 1 and 3 were price insensitive because they were perceived to involve redirections of current taxation revenue, rather than tax increases. To investigate this fully, each participant in each group was asked how they thought the costs would be paid for. Responses by other respondents provide unanimous support for the ‘redirection of taxation revenue’ hypothesis. Some other comments were as follows:

‘If it was coming from health or education, or something like that, I think people would think pretty seriously about it-compared with if it’s coming from defence or something which people aren’t really worried about’.

‘That was the impression I got. It’ll be $10 out of the tax I already pay going somewhere to ... subsidise it. And I don’t mind it’.

‘It’d probably occur through the same way the general ... - the public service is funded now - I don’t know how that happens-consolidated revenue or whatever.’

The closest to a ‘tax increase’ response was the following: ‘The taxpayer- It would come under some government thing where the government would have to pay for it-so it would take away from other services- or tax increases possibly’. In response to this, the author stated ‘So it could be a tax increase or it would come from some other ... [cut off]’, to which the participant interjected: ‘Well, they probably couldn’t say we’re going to increase taxes coz of this- they’d probably have to reallocate money from some other section or department’.

Interestingly, respondents tended to see the referendum question as involving ‘personal sacrifice’ (this term mentioned in both groups), despite the fact that we know they tend to be price insensitive when it comes to redirections of taxation revenue. On probing, no individuals referred to the magnitude of the sacrifice in dollar terms. Rather, they were concerned with identifying the area of government expenditure from which the redirection would occur: ‘Everyone is going to suffer in some way because its going to get redirected- I don’t know, maybe from health or education, or something like that’. And another respondent: ‘if it’s health of something they might be inclined to say no’.

In addition to redirection of taxation revenue, some participants commented on the component of the payment vehicle relating to ‘higher prices for wood products’. One individual appended his comment regarding redirection of government expenditure as follows: ‘Or perhaps indirectly through increased costs of wood-those people who are
buying/building a house and so on'. A common observation among both groups was that the 'higher prices' aspect of the payment vehicle would affect different individuals differently: 'If your buying a house your going to be paying a damn side more. If you've just gone out and got a job-your legally an adult- first year in workforce -you’re not going to be paying anywhere near that amount'.

The above observations regarding interpretation of the payment vehicle provide considerable further support for the second explanation discussed in Section 8.6.1. On the basis of the empirical results reported in Section 8.6.1, and the qualitative findings discussed here, it is concluded that the reason for general price insensitivity in scenarios 1 and 3 of the AFAS, and probably also the RAC south-east forests CV study (Chapter 4), is that (i) respondents interpreted the payment vehicles employed in these studies to imply a tax redirection rather than a tax increase; and that (ii) individuals are very price insensitive when it comes to redirections, where the source of the redirection is not identified.

Although some other comments made by participants did have a bearing on the other hypotheses listed above, they were not capable of explaining the price insensitivity in the referendum scenario. Participants clearly found the trust fund question more objectionable. One participant commented: 'I thought it was a fairly morally corrupt way of going about it'. Another 'found this version rather smug'. The first of these individuals said that the trust fund question suggests the need to 'mount a very strong media/public campaign to get government to accept its responsibilities for the environment...'. Another commented: 'Government doesn’t want to do it itself, but they’re prepared to set up this body, but they’re not going to put up any funding at all. It’s all-you who are making the noise, you pay for it'. And in the event that the trust fund bid value was $10 rather than $200 (first focus group): 'It’d probably be morally corrupt but more acceptable!'. Participants were generally sceptical about the operation of the trust: 'Less practical.... It’s a dumb option'; 'How much is going to go towards setting up people’s wages'; 'You don’t need a trust to run a forest- that’s just standing there-The forest runs itself'. Several comments also rejected the payment responsibilities implied in the trust fund question, preferring responsibility to be shared among all taxpayers: 'It’s not a fair or

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9 When asked 'what’s more realistic, a tax-increase or a redirection of taxation revenue?', the majority of participants indicated the latter, one stating '... practical difficulties of re-jigging tax scales so that people actually pay this additional money. Redirection is much more practical'. One participant noted, however, that additional taxes to help preserve the environment might be more politically practical in terms of drawing attention to what the government is doing for the environment.
equitable distribution of the costing’. People who don’t care ‘should have to pay too. Those people also breathe. Those people also need an environment’. And from another participant: ‘And they drive through forest and have picnics’. ‘It’s probably those people that don’t care who should pay, coz they’re the one’s making the mess. If you really cared about the lake, then you wouldn’t really dump your rubbish in it’.

With respect to another environmental issue, one participant commented that ‘It’s a national issue and should be tackled that way-And this is exactly the same’.

The most important finding here, however, is perhaps best summarised by the following comment made by one of the participants:

I think the second question [trust fund] finds out more- how many people seriously would be prepared to spend their own money on it-I think that’s good- but I think the referendum’s better in ... ahmmn ... how many people support it when they don’t actually have to put their money in - I mean, I think you’d get a lot more people saying they’d support it [Option B]. It’s kind of like they’ve already spent the money to the government....

8.7 CONSISTENCY CHECKS AND ESTIMATION OF WTP

It is common CV practice to remove outliers from datasets, before mean or median WTP is estimated. This section describes a number of checks that can be implemented with respect to the AFAS data, and presents valuation functions and estimates of median WTP corresponding to several combinations of these checks.

8.7.1 Consistency Check Definitions

In total, 13 consistency checks were applied to the dataset. These are defined below:

Check 1: If C5b<3 and C5c <3, then drop. Justified on the basis that such responses are inconsistent and respondents may have agreed with these statements without properly reading them. For the entire dataset, 87 respondents fell into this category. Dropping such respondents tends to increase WTP\(^10\).

Check 2: If C5b<3 and C5g <3, then drop. Similar justification to Check 1. 49 respondents fell into this category. Increases WTP.

Check 3: If C5b<3 and C5n<3, then drop. Similar justification to above. 110 respondents fell into this category. Little overall effect on WTP

Check 4: If C5b<3 and C5i<3, then drop. Similar justification to the above. 167 respondents fell in this category. Increases WTP.

Check 5: If F15a > 8 and F10 <25, then drop. Unlikely high income for age. No respondents dropped.

\(^{10}\) This last statement is based on a comparison of logistic regression and cross-tabulation results.
Check 6: If $F_{15a}=3$ and $F_{16}=3,6$ or 7, then drop. Unlikely income for reported occupation. 24 respondents dropped. Little effect of WTP. Direction of influence depends on measure of WTP.

Check 7: If housinc <5000 and CV=1 and price=200, then drop. Unlikely payment given income. 14 respondents dropped. Decreases WTP.

Check 8: If $F_{6d}=1$ and CV=1 and price=200, then drop. 36 respondents dropped. Decreases WTP.

Check 9: If $D_{7m}>3$, then drop. Likely protest to questionnaire. 141 respondents. Increases WTP.

Check 10: If $D_{10i}>3$, then drop. Likely protest to payment vehicle. 306 respondents dropped. Increases WTP.

Check 11: If $B_{5d}<3$, then drop. Likely protest to CV question. 223 respondents dropped. Increases WTP.

Check 12: If $C_{5i}=1$, then drop. Possible lexicographic response. 606 respondents. Reduces WTP.

Check 13: If $C_{5n}=1$, then drop. Possible lexicographic response. 428 respondents. Reduces WTP.

Checks 1 to 8 will be referred to as the basic consistency checks. These are the types of checks typically performed in CV studies (See, for example, Carson, 1991). For the total sample of 1680 individuals, 147 respondents were dropped on the basis of just one of these 8 checks, 53 were dropped on the basis of 2, 40 on 3, 26 on 4, 2 on 5, and none on 6, 7 or 8. Overall, 268 respondents are dropped on the basis of at least one check. Note that some of these checks serve to increase WTP and some serve to decrease it.

Checks 9 to 11 will be referred to as the protest consistency checks, since they relate to protests or dislikes with various aspects of the CV question or questionnaire. Such responses tend to be associated with no responses to the CV question, the removal of which, increases WTP.

Checks 12 and 13 will be referred to as the absolutist checks, since they involve the removal of respondents who strongly agreed with the two absolutist items in the questionnaire. This may involve dropping some non-absolutist respondents, and hence is conservative in this respect. The effect of the absolutist checks is to decrease WTP.

### 8.7.2 Influence of Consistency Checks

The effect of the above consistency checks on estimated valuation functions and raw data is now investigated in more detail. To make matters simpler, the analysis focuses
on five combinations of the above 3 groups of consistency checks; no consistency checks in place; basic checks only; basic and absolutist checks; basic and protests checks; and all checks. The analysis is also conducted separately for scenarios 3 and 4, so as to aid our understanding of differences in referendum and trust fund scenarios.

Table 8.15 presents the 10 estimated valuation functions corresponding to these check/scenario combinations, and Table 8.16 and Table 8.17 present the (raw) conditional acceptance or Yes probabilities for these same combinations.

The valuation function results are the results for logistic regressions where CV response is dependent variable and rprice, housinc and fororien are independents. The variable fororien is a composite of the variables C3 and C4, created for the purposes of causal modelling, and providing an indicator of the respondent's general orientation to logging in native forests. The details are contained in the next chapter.

Of particular interest in the valuation function results is the effect of the various checks on the price coefficient (B1).

Consider the effect of introducing basic checks to scenario 4. The estimated price coefficient changes from -0.0730 to -0.0666, indicating that CV responses have become slightly less sensitive to price.

This is confirmed by the results in Table 8.17, where the range of acceptance probabilities, expressed in percentages, drops from 51.5-21.9=29.6 to 51.3-25.2=26.1. The effect on a non-parametric estimate of median WTP would clearly be extremely small, with both sets of results in Table 8.17 indicating a median WTP just over $10.

Parametric estimates of the median can be calculated by solving for the price variable \( x_1 \) in the logit function, \( P_i = \frac{1}{(1+e^{-z})} \), where \( P_i \) is the probability of a Yes response, and the index function is \( z = B_0 + B_1 x_1 + B_2 x_2 + B_3 x_3 \). To do this, we set \( P_i = 0.5 \), and \( x_2 \) and \( x_3 \) to their mean values over the sample. Setting \( P_i = 0.5 \) enables the following analytical solution to be obtained: \( x_1 = \frac{-B_0 + B_2 x_2 + B_3 x_3}{B_1} \). This equation was used to calculate the median values presented in Table 8.15. It is important to note that many of these estimates involve extrapolating beyond the range \([10,200]\) for \( x_1 \), and hence such estimates are of limited use.
TABLE 8.15 VALUATION FUNCTIONS WITH CONSISTENCY CHECKS IN PLACE

<table>
<thead>
<tr>
<th>Checks</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0 (constant)</td>
<td>-4.7095</td>
<td>-4.7724</td>
</tr>
<tr>
<td>B1 (price)</td>
<td>0.0216, 0.0157</td>
<td>-0.0730, 0.0161</td>
</tr>
<tr>
<td>param, stand. err.</td>
<td>0.0015, 0.0045, 33.11</td>
<td>-0.0014, 0.0046</td>
</tr>
<tr>
<td>B2 (household)</td>
<td>1.8259, 0.2529, 2.53</td>
<td>1.9030, 0.3221, 2.53</td>
</tr>
<tr>
<td>B3 (fororien)</td>
<td>389.172</td>
<td>384.974</td>
</tr>
<tr>
<td>param, SE, mean</td>
<td>72.3</td>
<td>70.1</td>
</tr>
<tr>
<td>N (sample size)</td>
<td>343, $19</td>
<td>348, -$51</td>
</tr>
<tr>
<td>Basic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0</td>
<td>-5.4591</td>
<td>-6.8533</td>
</tr>
<tr>
<td>B1</td>
<td>0.0077, 0.0187</td>
<td>-0.0666, 0.0172</td>
</tr>
<tr>
<td>B2</td>
<td>0.0015, 0.005, 34.03</td>
<td>0.0014, 0.0048, 37.51</td>
</tr>
<tr>
<td>B3</td>
<td>2.1561, 0.3327, 2.58</td>
<td>2.5681, 0.497, 2.60</td>
</tr>
<tr>
<td>% corr. pred.</td>
<td>74.6</td>
<td>69.6</td>
</tr>
<tr>
<td>N,M</td>
<td>280, -$200</td>
<td>299, -$19</td>
</tr>
<tr>
<td>Basic + Protest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0</td>
<td>-6.2995</td>
<td>-5.6462</td>
</tr>
<tr>
<td>B1</td>
<td>-0.0115, 0.0216</td>
<td>-0.0738, 0.0195</td>
</tr>
<tr>
<td>B2</td>
<td>0.0040, 0.0065, 34.49</td>
<td>0.0020, 0.0059, 37.50</td>
</tr>
<tr>
<td>B3</td>
<td>2.5250, 0.4831, 2.71</td>
<td>2.2770, 0.5698, 2.68</td>
</tr>
<tr>
<td>% corr. pred.</td>
<td>76.9</td>
<td>68.8</td>
</tr>
<tr>
<td>N,M</td>
<td>199, $590</td>
<td>202, $72</td>
</tr>
<tr>
<td>Basic + Absolutist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0</td>
<td>-5.4207</td>
<td>-6.8410</td>
</tr>
<tr>
<td>B1</td>
<td>0.0239, 0.0237</td>
<td>-0.0706, 0.0272</td>
</tr>
<tr>
<td>B2</td>
<td>0.0011, 0.0070, 35.79</td>
<td>-0.0092, 0.0070, 41.21</td>
</tr>
<tr>
<td>B3</td>
<td>1.9406, 0.3896, 2.42</td>
<td>2.6865, 0.6092, 2.39</td>
</tr>
<tr>
<td>% corr. pred.</td>
<td>72.2</td>
<td>74.4</td>
</tr>
<tr>
<td>N,M</td>
<td>158, $290</td>
<td>156, -$113</td>
</tr>
<tr>
<td>Full Check</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0</td>
<td>-6.5047</td>
<td>-5.6072</td>
</tr>
<tr>
<td>B1</td>
<td>0.0068, 0.0276</td>
<td>-0.0574, 0.0293</td>
</tr>
<tr>
<td>B2</td>
<td>0.0080, 0.0088, 36.20</td>
<td>-0.0047, 0.0083, 40.90</td>
</tr>
<tr>
<td>B3</td>
<td>2.2905, 0.5883, 2.58</td>
<td>2.2150, 0.6914, 2.51</td>
</tr>
<tr>
<td>% corr. pred.</td>
<td>71.3</td>
<td>68.3</td>
</tr>
<tr>
<td>N,M</td>
<td>108, -$450</td>
<td>101, -$41</td>
</tr>
</tbody>
</table>
### TABLE 8.16 EFFECT OF CONSISTENCY-CHECKS AND SUBSEQUENT DROPPED OBSERVATIONS ON RAW ACCEPTANCE PROBABILITIES - SCENARIO 3

<table>
<thead>
<tr>
<th>Consistency Checks in Effect*</th>
<th>None</th>
<th>Basic</th>
<th>Basic + Absolutism</th>
<th>Basic + Protest</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>56.0 (141)</td>
<td>57.6 (125)</td>
<td>45.3 (75)</td>
<td>61.7 (94)</td>
<td>45.5 (55)</td>
</tr>
<tr>
<td>$50</td>
<td>53.3 (137)</td>
<td>58.3 (120)</td>
<td>38.1 (63)</td>
<td>66.7 (78)</td>
<td>45.0 (40)</td>
</tr>
<tr>
<td>$200</td>
<td>57.0 (128)</td>
<td>55.4 (92)</td>
<td>48.2 (56)</td>
<td>62.5 (64)</td>
<td>56.8 (37)</td>
</tr>
<tr>
<td>Overall</td>
<td>55.4 (406)</td>
<td>57.3 (337)</td>
<td>43.8 (194)</td>
<td>63.5 (236)</td>
<td>48.5 (132)</td>
</tr>
</tbody>
</table>

* Cell entries are probability of yes, expressed as a percentage, and number of observations employed in calculation of probabilities.

### TABLE 8.17 EFFECT OF CONSISTENCY-CHECKS AND SUBSEQUENT DROPPED OBSERVATIONS ON RAW ACCEPTANCE PROBABILITIES - SCENARIO 4

<table>
<thead>
<tr>
<th>Consistency Checks in Effect*</th>
<th>None</th>
<th>Basic</th>
<th>Basic + Absolutism</th>
<th>Basic + Protest</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>51.5 (130)</td>
<td>51.3 (113)</td>
<td>36.7 (60)</td>
<td>64.9 (77)</td>
<td>47.2 (36)</td>
</tr>
<tr>
<td>$50</td>
<td>38.4 (146)</td>
<td>39.2 (130)</td>
<td>31.4 (70)</td>
<td>50.6 (79)</td>
<td>40.0 (45)</td>
</tr>
<tr>
<td>$200</td>
<td>21.9 (137)</td>
<td>25.2 (111)</td>
<td>17.5 (63)</td>
<td>32.9 (76)</td>
<td>24.4 (41)</td>
</tr>
<tr>
<td>Overall</td>
<td>37.0 (413)</td>
<td>38.7 (354)</td>
<td>28.5 (193)</td>
<td>50.0 (232)</td>
<td>36.9 (122)</td>
</tr>
</tbody>
</table>

* Cell entries are probability of yes response, expressed as a percentage, and number of observations employed in calculation of probabilities.
The parametrically estimated medians corresponding to scenario 4 with and without basic checks are - $1 and - $19 respectively. These negative estimates are a consequence of the large left-hand tails of the estimated logit distribution. Looking at the other scenario 4 parametric median estimates, we find that the basic plus protest model gives a median of $72, which is consistent with the probabilities shown in Table 8.17, the basic plus absolutist model indicates a median of -$113 and the full consistency check model indicates a median of -$41. The latter two estimates reflect the fact that less than 50% of respondents in these sub-samples responded Yes to the minimum bid value of $10. Little confidence should be placed in the figures themselves.

Close inspection of the intercept and slope (price) parameter estimates in Table 8.15 indicates that price sensitivity does not, in general, increase as more consistency checks are put in place. This is an intriguing result that is confirmed by the raw probabilities shown in Table 8.17. As an example, consider the 1st (no checks) and 3rd (basic and absolutist checks) sets of results for scenario 4. Note that although the consistency checks have resulted in an across the board reduction in acceptance probabilities, the range of acceptance probabilities has reduced from 29.6 (51.5-21.9) to 19.2 (36.7-17.5). In the parametric results, this shows up as a reduction in price sensitivity and an increase in the magnitude of the intercept term. With respect to the relationship between price and Pr(Yes), it appears that the checks shift the curve vertically more than they change its slope. One explanation for this is that the individuals dropped on the basis of their responses to questions C5i and C5n were not actually lexicographically motivated when it came to the CV question. Since lexicographic respondents are (in the unbounded case) completely price insensitive, removing them should increase price sensitivity. The fact that this does not occur may suggest that what is being removed is the more strongly pro-environment individuals, who in the main are still price sensitive.

A further point worth noting is that although the trust-fund format produces a highly significant coefficient for price, the degree of price sensitivity is still quite low. Solving for $P_i$ in the estimated logit model when no checks are in place produces an estimate of $P(\text{Yes}/$20)=45\%$ and $P(\text{Yes}/$200)=19\%$, a difference of 26\%. This can be compared with the difference of 29.6\% indicated in Table 8.17. When basic and absolutist checks are introduced, the corresponding parametric estimates are 30\% and 10\%, the raw data indicating a range of 19.2\% (36.7 and 17.5 respectively). A difference in the probability of acceptance of 20 or 30\% when comparing prices of $10 and $200 is certainly not large. When all consistency checks are in place, 24\% of respondents agree to pay $200, compared with 22\% in the absence of checks.
Now consider the effect of consistency checks on scenario 3. A perusal of the parametric and non-parametric results clearly indicates that the checks produce no significant improvement in price sensitivity. Again, the main effect is in the intercept term, with the absolutist checks producing a reduction in all acceptance probabilities and the protest check producing an increase in probabilities.

8.8 CHAPTER CONCLUSIONS

The major conclusions that emerge from the empirical investigation of this chapter are as follows:

(i) The trust fund scenario produced far greater price sensitivity than any of the referendum scenarios. The referendum scenario with the greatest correctly signed price sensitivity was scenario 2 involving a redirection of public expenditure. The coefficient for rprice in scenario 2 was only 11 percent of that for scenario 4. Rprice was not statistically significant in any of the referendum scenarios, but was highly significant in the trust fund scenario. Of the many possible explanations for the greater price sensitivity of the trust fund format, the one receiving by far the greatest empirical and qualitative support is that referendum respondents interpreted the payment vehicle to involve a redirection of current taxation revenue rather than imposition of an additional tax. This is consistent with the finding of the previous chapter, that respondents see redirection as more appropriate than additional taxes. Although pretesting indicated that respondents understood that Option B would 'cost more money', it appears that the way in which this would occur was not given sufficient attention. Specific reference to a tax increase was avoided in this study due to the controversial nature of the term 'tax increase' in Australia. In retrospect, however, the referendum formats would probably have produced greater price sensitivity if a specific government proposal to increase taxes had been outlined. Sacrificing face validity may have produced results with greater price sensitivity, which for the purpose of estimating consumer surplus, is probably desirable. These results suggest that in terms of price sensitivity, the RAC could probably have obtained more impressive results in the south-east forests study, by designing the CV question differently, perhaps in the form of a trust fund question. The loss in face validity may have been justifiable, given the greater price sensitivity that would have resulted. The AFAS results indicate that more research is required on how to best align payment vehicles with the prior beliefs of respondents. Even though payment vehicles involving trust funds and tax increases may produce greater price sensitivity than that
employed in scenarios 1 and 3 of the AFAS, it is not clear that the impractical, unrealistic and objectionable nature of such vehicles results in estimates of WTP that are sufficiently reliable for the purposes of CBA.

Further exploration of tax redirection questions would appear to be justified. The results for scenario 2 indicate that individuals are actually quite willing to redirect public expenditure to the environment portfolio. This suggests that when realistic tradeoffs are considered, citizens may not be very responsive to changes in the stated costs of preservation. It would be interesting to conduct further comparisons in which specific government portfolios or budgets are identified as being the likely source from which redirection in favour of the environment would occur. Focus group results suggest that redirection from health or education may have quite different implications to redirection from research in defence.

Limited evidence suggests that respondents find referendum CV question more difficult than trust fund questions. This is particularly striking when the general lack of price sensitivity in the three referendum scenarios is considered. It is suggested that this is largely because referendum formats stimulate more complex, citizen-type considerations, than trust fund scenarios.

(ii) Results pertaining to the second citizen dimension suggest that the referendum format primes individuals to take the opportunity costs of preservation into account when formulating CV responses. The most appropriate comparison here concerns scenarios 3 and 4, neither of which mentions employment implications, or the forgone value of timber. The coefficient for the jobs variable is clearly higher in scenario 3 than scenario 4. Results of a confidence interval test indicate that the two parameters are significantly different at the 90 percent significance level, failing to reach statistical significance at the 95 percent level by a small margin (0.006 in parameter value).

(iii) Comparison of scenarios 1 and 3 indicates that including compensation to loggers within the CV payment, does little to reduce the dependency of CV responses on perceptions regarding the opportunity costs of preservation. The priming effect of mentioning jobs does, however, appear to be offset by the inclusion of compensation to loggers within the payment vehicle. This is evident in the logistic regression results, where the influence of the jobs variable on CV response is greater in scenario 3 (where there is no mention of jobs) than scenario 1 (where jobs is mentioned, but to be compensated).
(iv) The AFAS study has confirmed that citizens view referendum CV questions as more appropriate than trust fund CV questions. Paired comparisons (LSD tests) indicate that scenario 4 was disliked significantly more than scenarios 2 and 3. Of individuals expressing a dislike of the CV question, or finding it difficult for some reason, mean agreement with the statement 'I refuse to consider such tradeoffs' was significantly higher for the trust fund scenario than with scenarios 2 and 3 (LSD test results). Similarly, mean agreement with the statement 'Shouldn't cost money in the way specified' was significantly higher in the trust fund scenario than any of the other scenarios (LSD and Scheffe tests). Because this result holds for a comparison of scenarios 3 and 4, for which payment justification was similar, it would appear that this result is attributable to the trust fund format rather than the stated justification for payment (management costs). This is confirmed by further results (B6k) that clearly indicate that the trust funds are perceived to be a less appropriate way of making environmental decisions than referenda. In all four scenarios, procedural beliefs regarding the usefulness of questionnaires such as the AFAS, and preparedness to bear costs of managing conservation reserves, were significant determinants of CV question dislike (95 percent significance level).

(v) Logistic regression results support the hypothesis that referendum formats, by stimulating citizen responses, result in more impartial responses and hence the partial subordination of private interests. This means that an interpretation of referendum CV responses as reflecting the summation of use, option, quasi-option and existence values, in the manner outlined by Pearce et al (1989) may not be appropriate. It also appears that altruism toward members of the current generation is common, which can cause double-counting when CV results are aggregated to relevant populations. A majority voting interpretation of CV responses, rather than a consumer surplus, cost-benefit-analysis interpretation, may be more appropriate. Alternatively, an interpretation of results as 'WTP to prevent logging', or 'WTP to obtain option B' may be appropriate. At best, individuals are expressing WTP for a policy, not how much they value the environment. As noted in Chapter 5, however, CV questions have traditionally not provided the balance of information required for such an interpretation of results.

(vi) CV results can be highly sensitive to consistency checks. When price sensitivity is low, even if statistically significant, small changes in the data produce large changes in parametrically estimated median WTP. In the case of the trust fund format, for example, imposing various checks results in dramatically different
estimates of both parametric and non-parametric median WTP. Perusal of raw acceptance probabilities (Table 8.17) suggests that median WTP is just over $50 when basic and protest checks are in place, but less than $10 and probably less than $0, when basic and absolutist checks are in place. The concern here is that by choosing an appropriate set of consistency checks, the CV researcher can effectively create any estimate of median WTP (within an order of magnitude or two of the raw estimate corresponding to no checks). It appears that even when price is found to have a statistically significant influence on CV responses, we really have little idea of the true median WTP. This result becomes less important as the magnitude of the estimated price coefficient increases, and the sensitivity of estimated median WTP to given assumptions of researcher decreases.

In summary, respondents to CV questionnaires are less likely to object or protest to questions employing a referendum format than a market-based format. It appears that these benefits in face validity may not always be worth the costs that arise from effectively asking individuals to vote on the particular issue in question. Referendum formats may stimulate responses that involve consideration of the nature and extent of opportunity costs of preservation (jobs, etc), responses that are more impartial and hence which may involve subordination of private interests including option and use values, responses that reflect altruism toward other members of the current generation, and responses that reflect a range of procedural considerations. As a consequence, respondents view referendum CV questions as more difficult, even if more appropriate. This increased difficulty, coupled with the limited information processing capabilities of respondents, may also result in a reduced focus on the simple dollar tradeoff required, and as a consequence, budget constraints may become less meaningful. Questions that deviate from standard CV practice, such as the scenario 2 CV question of the AFAS, can be designed that more closely align with the true nature of citizen beliefs, thereby creating results that have a clearer, less ambiguous interpretation than standard CV results. More empirical research exploring alternate methods for the elicitation of citizen preferences is required before the comparative usefulness of such approaches can be assessed.
CHAPTER 9

STRUCTURAL MODELLING OF AFAS DATA

9.1 INTRODUCTION

Logistic regressions are of limited use in modelling the structure of individuals' preferences, since the variables (or constructs) involved must be entered in either a horizontal (or additive) form, or in the form of a moderating relationship using multiplicative terms. A further point is that logistic regressions typically involve the use of single observed variables, which may be subject to a considerable degree of measurement error when abstract constructs that are difficult to measure are involved. A more flexible way to model both the horizontal and vertical structure of preference formation, and one that will be less prone to measurement errors and multicollinearity, is through the use of structural equation modelling, SEM. This allows the direct and indirect (mediated) effects that given variables have on other variables to be isolated, rather than simply the total effects as tends to be the case in multiple regressions.

The objective of this chapter is to use SEM to explore the structure of CV responses, focussing on two general aspects of the citizen/consumer model. The exercise is largely exploratory. The author is unaware of any published studies involving the application of SEM to CV. An important objective of this chapter is also to assess the usefulness of SEM in understanding determinants of CV response.

The first aspect of respondent preferences to be explored relates to the vertical structure of such preferences, focussing on the influence of held values on CV response, and associated mediating factors. The extended assignment of value framework illustrated in Figure 5.2 serves as the basis for analysis here. Of particular interest are the following questions:

- Do values measures have only an indirect influence on CV response, mediated by more domain-specific orientations? What measures of held values are most relevant in the context of CV?¹

¹ Although a comparison of different measures of held values was conducted to supplement the analysis in this chapter, the results are presented in Appendix B. See also Section 9.3.1 of this chapter.
What is the relative influence of the direct (budget constraint) effect of income, compared with the indirect (attitudinal) effect.

To what extent do values drive CV responses? Are CV responses little more than the expression of generalised attitudes or values? To what extent are respondents' assessments of the consequences of Options A and B influenced by information supplied within the valuation context, rather than generalised attitudes brought to the situation?

Does the structure of preferences vary across referendum and trust fund scenarios?

With respect to the latter question, the focus is on scenarios 3 and 4, since they provide the best comparison of referendum and trust-fund formats.

The second aspect of respondent preferences to be explored here involves the relationship between distributive and procedural justice beliefs (outlined in Chapter 7), concerning beliefs in intrinsic species rights, moral absolutism, and the perceived desirability of monetary valuation of the environment. Of interest here are:

- Testing the structural relations hypothesised in Chapter 7, most notably the direct and indirect influences of belief in intrinsic rights on moral absolutism, moral absolutism on belief in monetary valuation, and all such variables on CV response.

- The way in which these structural relations vary across referendum and trust fund scenarios.

- The extent to which moral absolutism has an influence on CV response, when other attitudinal variables capturing strength of preference are included within the model.

The chapter is structured as follows. Section 9.2 introduces SEM, describing its purpose, the notation involved, and some preliminary findings on the application of SEM to CV. Section 9.3 is concerned with modelling the vertical structure of preferences. Following a brief introduction in Section 9.3.1, Section 9.3.2 outlines the proposed structural model, and 9.3.3 presents the measurement models to be used. Section 9.3.4 presents the modelling results.

Section 9.4 is concerned with modelling the structural relations involving beliefs about intrinsic rights, moral absolutism etc. The issues and postulated model are
introduced in Sections 9.4.1 and 9.4.2. Section 9.4.3 contains the measurement models, and 9.4.4 presents the results of the structural equation modelling. Section 9.5 draws together conclusions arising from the analysis.

9.2 STRUCTURAL EQUATION MODELLING

9.2.1 Introduction

Structural equation modelling is essentially a synthesis of simultaneous-equation econometric models and psychometric models of measurement. The former permits structural relations among observed variables to be estimated (discussed in most econometrics textbooks—see, for example, Greene, 1991). The latter permits the variables included in the structural model to be more accurately measured. This is particularly important in disciplines such as psychology, sociology and political science, where researchers are often interested in abstract concepts, relating to attitudes, values, beliefs etc. Because it is difficult to obtain reliable and valid measures of such constructs using only single items included in questionnaires, it is preferable to use several different items to measure a given construct, and to use that part of these items having common variance (rather than variance that is unique to each item) in subsequent structural models. The process is similar to performing a factor analysis of the items in question, and using the factor scores as composite variables in subsequent regressions (Hair et al, 1992). A composite variable is a variable that derives its value from several other variables, or items, whose values are influenced by a common latent construct. We can say that an item in a well-designed composite variable (or scale) loads on or reflects the latent variable of interest. Scale development is discussed in more detail in Section 9.2.6. Appendix D provides a glossary containing many of the terms mentioned in this chapter.

9.2.2 Model Specification

As noted above, the full structural equation model, or LISREL model, is an extension of simultaneous-equation regression models in econometrics, the latter of which is often represented as follows:

\[ y = By + \Gamma x + \zeta \]

\(^2\) Development of the LISREL software has played a central role in the development of SEM, and as a consequence it is common to refer to a model specification as a LISREL model.
where, $B$ and $\Gamma$ are coefficient matrices, $x$ and $y$ are vectors of exogenous and endogenous variables respectively, and $\zeta$ is a vector of errors in the equations.

When measurement models for each of the vectors of endogenous and exogenous variables are simultaneously estimated, three equations are required to specify the model in full:

(i) The structural model

$$\eta = B\eta + \Gamma\xi + \zeta$$

(ii) The measurement model for the endogenous latent variables

$$y = \Lambda_y\eta + \epsilon$$

(iii) The measurement model for the exogenous latent variables

$$x = \Lambda_x\xi + \delta$$

where,

- $\eta$ is a vector of latent dependent, or endogenous, variables.
- $\xi$ is a vector of latent independent, or exogenous, variables.
- $y$ is a vector of observed indicator variables for $\eta$.
- $x$ is a vector of observed indicator variables for $\xi$.
- $\epsilon$ is a vector of measurement errors in $y$.
- $\delta$ is a vector of measurement errors in $x$.
- $\Lambda_y$ is a matrix of coefficients of the regression of $y$ on $\eta$.
- $\Lambda_x$ is a matrix of coefficients of the regression of $x$ on $\xi$.
- $\Gamma$ is a matrix of coefficients of the $\xi$ variables in the structural equations.
- $B$ is a matrix of coefficients of the $\eta$ variables in the structural equations (zeros on diagonal).
- $\zeta$ is a vector of random disturbances in the structural relationship between $\eta$ and $\xi$.

Note that when LISREL models are estimated with observed variables in the structural equations, as in the classical econometric approach, the implicit measurement model is $y = \eta$ and $x = \xi$. 
9.2.3 Path Diagrams

Path diagrams are used in structural equation modelling to provide a graphical portrayal of a system of simultaneous equations (structural model), and typically include the complete set of relationships among the model's latent and observed variables (measurement models). The following rules are used to draw a path diagram:

- Straight arrows are used to depict postulated causal relationships. The arrow emanates from the predictive variable and the arrowhead points to the dependent variable.

- Curved arrows represent correlations between variables, where no causation is specified.

- The observed x and y variables are enclosed in boxes.

- The latent variables $\xi$ and $\eta$ are enclosed in circles, or sometimes ellipses.

- The error variables $\varepsilon$, $\delta$ and $\zeta$ usually appear in the diagrams, but are not enclosed.

A special notation also exists for labelling the different types of path coefficients:

A one-way arrow from $\xi_i$ to $x_b$ is denoted $\lambda_{\xi_i}^{(x_b)}$.

A one-way arrow from $\eta_b$ to $y_s$ is denoted $\lambda_{\eta_b}^{(y_s)}$.

A one-way arrow from $\eta_h$ to $\eta_e$ is denoted $\beta_{\eta_h}$.

A one-way arrow from $\xi_i$ to $\eta_e$ is denoted $\gamma_{\xi_i}$.

Notation for two-way arrows, denoting correlations between two $\xi$'s, $\zeta$'s, $\delta$'s and $\varepsilon$'s also exists (Joreskog and Sorbom, 1989), but need not concern us here.

9.2.4 Software and Notation Used

A number of computer packages now exist that permit the estimation of full structural equation models, of which the most popular is LISREL, another popular package being EQS. Because LISREL is available as an SPSS module, it is used for the analyses presented in this chapter.

Each package requires its own code for specifying the model to be estimated. This code generally involves specifying all elements of the path diagram in matrix form,
according to the above notation. LISREL code requires that specific paths, or coefficients to be estimated, are written as follows:

- LY(a,g) refers to $\lambda^{(y)}_{ag}$.
- LX(b,i) refers to $\lambda^{(x)}_{bi}$.
- BE(g,h) refers to $\beta_{gh}$.
- GA(g,i) refers to $\gamma_{gi}$.

In this chapter, the LISREL matrix code form will be used to refer to specific path coefficients. As an example, [GA 2,1] is used to refer to the structural model coefficient for the path leading from the exogenous latent variable $\xi_1$ to the endogenous latent variable $\eta_2$. Similarly, [LX 3,2] is used to refer to the measurement model coefficient for the path leading from the observed variable $x_2$ to the exogenous latent variable $\xi_3$.

### 9.2.5 Model Estimation and Assessing Model Fit

In contrast to multiple regressions, where regression coefficients derive from the minimization of the sum of the squared differences between the predicted and observed dependent variable for each case, structural equation modelling focuses on covariances, minimizing the difference between the sample covariances and the covariances predicted by the model (refer to Bollen, 1989, for details). Data is consequently input to SEM packages in the form of correlation or covariance matrices for the observed variables $x$ and $y$. When using LISREL, it is common to use a preliminary data processor, PRELIS, to obtain these input matrices from the raw observations. The forms that the LISREL input matrix may take include:

- **PM**: A polychoric-correlation matrix.
- **KM**: A matrix of Pearson product-moment correlations.
- **KM(ordinal)**: A matrix of Pearson product-moment correlations with observations on ordinal variables replaced by normal scores determined from the marginal distributions.
- **CM**: A matrix of covariances.

Several methods of estimation are also available, including Maximum Likelihood (MLE), Generalised Least Squares (GLS) and Weighted Least Squares (WLS). When ordinal variables are being used, the appropriate correlation/covariance matrix to use in LISREL is generally accepted to be the polychoric correlation matrix (Joreskog
and Sorbom, 1989). When some of these variables are also known to be non-normal, being either skewed or kurtosed, it is further recommended that weighted least squares (WLS) rather than maximum likelihood estimation be employed. WLS requires the inverse of the asymptotic covariance matrix of estimated correlations for use in establishing the weights (Joreskog and Sorbom, 1989). Because the observed variables to be used in this chapter are commonly ordinal, and subject to varying degrees of non-normality, the theoretically preferred model estimation involves a PM input matrix with WLS estimation.

Model fit can be assessed in a number of ways in SEM. Here, only the most commonly used indicators are discussed (see Joreskog and Sorbom, 1989, and Bollen, 1989, for further details). Consider first goodness of fit measures. Chi-square values are of only limited use in structural equation modelling because the values are explicitly related to the sample size, becoming very large as the sample size increases. The goodness of fit index, GFI, and the adjusted goodness of fit index, AGFI, do not depend explicitly on sample size, however, and measure how much better the model fits compared to no model at all. The AGFI is the GFI adjusted for degrees of freedom. Both indices typically take on values between 0 and 1, with 1.0 indicating a perfect fit. Values in excess of 0.9 are typically sought.

The Root Mean Square Residual (RMSR) is a measure of the average of the fitted residuals. It works particularly well when comparing the fit of two different models for the same data (Joreskog and Sorbom, 1989). In general, values below 0.1 are desired.

Some idea of how chi-square and goodness of fit indices might be improved even further can be gained through perusal of modification indices, provided as standard LISREL output. These indices indicate the improvement in model chi-square that would result from freeing up each of the parameters currently fixed to zero in both the measurement and structural models. As such, modification indices are linked to sample size, and hence in large samples, modification indices that at first might seem significant, accompany paths that would not be statistically significant if freed up (estimated).

Modifications indices should only be used as a guide in model improvement. It is generally accepted that a change to a model only be made on the basis of modification indices, when the change is consistent with theoretical expectations. Changing a model specification should always be a substantive decision (Joreskog and Sorbom, 1989).
9.2.6 Measurement Models and Path Analysis

Path Analysis is a special case of SEM in which the variables used in the structural model are either observed, and hence measured using only one item and assumed to be free from measurement error, or unobserved, in which case the measurement model is treated as a separate entity to the structural model. The former case is essentially the classical econometric approach described above. In the latter case, the items expected to load on the latent variable in question are typically used to create a composite variable, which is then assumed to be free from measurement error and entered into the path analysis. There are several ways in which composite variables may be created. One way is to simply sum the scores or values for each of the relevant items and to use that sum as the composite variable. This parallel measurement model assumes that each item is an equally accurate indicator of the true latent variable, and that the errors of measurement are assumed to have the same variance. A less restrictive approach is to allow the error variances to vary, but to still assume each item is an equally accurate indicator of the construct of interest. A further improvement over this tau-equivalent approach, is to allow each of the items to contribute to the latent score in varying degrees. Such congeneric models are preferable, since they allow both the error variances and regression coefficients to vary (Joreskog and Sorbom, 1989). Path diagrams are again used to illustrate the structure of path models, and where applicable, the separate measurement models.

An important indicator of a scale’s quality is its reliability, often measured using Cronbach’s Alpha (Cronbach, 1951). Scale reliability is the proportion of variance attributable to the true score of the latent variable. Item reliability refers to the proportion of variance in an item that is explained by the latent construct. LISREL output provides a measure of item reliabilities. Another desirable feature of measurement scales is content validity, which refers to the extent to which a specific set of items reflects a content domain (DeVellis, 1991). This is difficult to assess. Sometimes researchers get individuals not involved in the scale development to comment on what they think the items have in common.

Although path analysis in conjunction with congeneric measurement models goes a long way toward improving the estimation of structural equations beyond that which is possible when observed measures are employed, the result is still a more restricted

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3 Two other measures of validity are criterion-related validity and construct validity. The former is concerned with whether the measure of the construct is related to other measures that may be regarded as criteria (Mitchell and Carson, 1989). Construct validity is concerned with the theoretical relationship of a variable to other variables.
model than when measurement and structural models are both estimated simultaneously in a full structural equation model. The estimated regression coefficients and error variances in the measurement model are not allowed to vary on the basis of other variables in the model, and all composite variables are assumed to be equally reliable; that is, having zero error variance. A correlated error covariance between two items loading primarily on different latents is, for example, unlikely to be picked up, unless the two latents are estimated together in the same measurement model. The assumption regarding the reliability of the composite scales will, to some extent, affect both the parameter estimates and the estimated standard errors. Such effects will often be small, however, especially when compared to the sensitivity of results to other assumptions involved in structural equation modelling. Path analysis can actually offer some advantages, such as greater flexibility in structural model specification. This is possible because path analysis models are typically easier to identify than equivalent structural models estimated in SEM, since fewer parameters need to be estimated (e.g., identify matrices in the x and y measurement models, and zero error matrices in the measurement models.

9.2.7 Preliminaries to Substantive Analysis of AFAS

Since preliminary analysis of the items involved in this study indicated varying degrees of non-normality in the ordinal variables, initial structural models were estimated utilizing a polychoric correlation matrix and WLS. Perusal of the results arising from such estimations, however, revealed some unexpected and indeed worrying results.

In particular, and in strong contradiction with results reported in the previous chapter, the regression coefficient linking bid value to CV response in the trust fund format failed to reach statistical significance. Following a lengthy process of elimination, the source of the problem was identified. The non-normality (kurtosis) in the price (bid value) treatment variable was producing large estimates of the standard errors of this variable.

Joreskog and Sorbom (1989, p205) note that if "the variables are highly non-normal, it is still an open question whether to use ML (or GLS) or WLS with a general weight matrix.... Previous Monte Carlo studies have not given a clear cut answer as to when it is necessary to use WLS rather than ML." In an example of this phenomenon, these authors conclude (p207) that "We started out with the intention of generating variables which are highly non-normal in the hope of demonstrating the superiority of

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4 Related to this is the concept of discriminant (or divergent) validity, which involves the absence of correlation between measures of unrelated constructs (DeVellis, 1991).
WLS over ML. The results do not lead to such a conclusion ... chi squared and standard errors are larger for WLS than for the other methods”.

In order to investigate matters further here, a typical path model (to be introduced in Section 9.3.2) was estimated for a number of different correlation/covariance matrices and estimation techniques. Results (presented in Appendix F) indicated considerable variation across models in the standard errors, chi-square and goodness of fit indices, and to a lesser extent estimated parameter values. Although the polychoric/WLS estimation was the technically correct choice, it is the only such choice that fails to produce a significant price coefficient. Covariance matrices should not be used with ordinal variables (Joreskog and Sorbom, 1989), which probably explains the dramatically different parameter estimates for several of the paths in these models.

When used without WLS, the polychoric correlation matrix produces by far the worst goodness-of-fit (and the modification indices required to improve it made little substantive sense). Since this is the only model to produce such poor results, this is rejected as an option. This leaves the product-moment correlation matrices with observations on ordinal variables replaced by normal scores determined from the marginal distributions (SPSS, 1988).

The results for the models with this matrix choice appear to be free from anomalies. Because many of the observed variables to be used in this chapter are ordinal, it is clearly desirable to use WLS. Thus the product-moment (ordinal) correlation matrix in conjunction with WLS may be the best choice for the data and model at hand. It appears to produce results that are middle of the range in comparison with other choices, and it does address the problems of ordinality and non-normality. Although only the polychoric WLS results are supposed to be asymptotically correct when using ordinal variables, the complications that arise when non-normality in continuous variables is introduced appear to be quite serious (at least in terms of the standard error for the price variable). Joreskog and Sorbom (1989, Example 7.1) compared the results arising from the use of product-moment (ordinal) correlation matrices and WLS with that of polychoric correlation matrices and WLS, and found only slight differences in parameter estimates. The product-moment results produced poorer goodness of fit measures, and smaller standard errors.

Bearing this in mind, the product-moment (ordinal) correlation matrix will be used for the analysis presented in this chapter. Path analysis with composite variables will also be used, instead of the full LISREL model where structural and measurement models are estimated simultaneously. This latter decision is justified on the basis that the improvement in accuracy from estimating these models simultaneously is expected to
be small in relation to the high sensitivity of results to assumed input matrix and estimation method. As noted above, this also permits greater flexibility in model specification. These decisions are clearly subjective. However, they appear to offer the most sensible approach given the nature of the variables and structural models of interest here. Where possible, congeneric measurement models are employed, with subsequent factor score regressions being used to calculate factor scores, or composite variables.

A final point is that SEM assumes linear relationships. As such, it is perhaps best suited to application in open-ended CV studies where a linear relationship is assumed to exist between variables such as price and CV response. The linear probability model (Appendix B) is inferior to logit or probit models when dealing with dichotomous variables. In order to investigate the significance of assuming linear relationships in LISREL analysis of the AFAS CV data, a preliminary comparison of logit and linear multiple regressions was undertaken, focussing on just the relationship between price and CV response. Results (not shown) indicated that the parameter estimate and significance level for the price variable were little effected by the assumed linearity.

9.3 VALUES, VERTICAL STRUCTURE AND CV

9.3.1 Introduction

As noted in Appendix E, a value may be defined as “an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence” (Rokeach, 1973, p5). Values tend to be general rather than specific, and as such, have been referred to as “abstractions concerning general classes of objects “ (Katz and Stotland, 1959, p432), and as “generalised attitudes” (Bem, 1970). While value “refers to a single proscriptive or prescriptive belief that transcends specific objects or situations, ... attitude refers to an organisation of several beliefs focussed on a specific object or situation” (Braithwaite and Scott, 1991, p 663-4). One may envisage a general-specific continuum, with general values at one pole and highly specific attitudes at the other.

Values serve a variety of functions, being motivational, evaluative, proscriptive and prescriptive (Braithwaite and Scott, 1991). Values thus guide attitudes and behaviour. As Brown (1984, p 234) has noted, these held values “provide (at least partially) a basis for the preference relationships which result in the expressed relative importance or worth of objects”. Brown (1984, p244-5) comments that “perhaps the
need for more appropriate assigned values in public resource allocations can be satisfied by placing responsible individuals in a valuation context that includes focus on the appropriate constituency for resource allocation. Brown refers to the likes of Page (1977), who suggested we have an obligation to future generations to act as if we did not know which generation we were to belong to. We are talking here of more ideal forms of assigned value, and hence the type of considerations discussed in Chapter 5 relating to CIP’s.

For current purposes, interest lies mainly in how individuals actually respond to typical CV surveys, and hence the development and influence of CIO’s (again see Chapter 5). In this section, the relationship between held values and CV response is investigated, focussing on the postmaterialism measure of values. Preliminary investigations (presented in Appendix E) suggested that this measure of values appears relevant in the CV context, and is suitable for the analysis conducted here5. Drawing on the work of Maslow (1954), Inglehart (1971) argued that individuals pursue goals in a hierarchial order, giving most attention at any point in time to the most important unsatisfied need at that time. He argues that in post-industrialised societies, many individuals will have passed beyond the ‘materialist’ (or acquisitive) stages in which primary concern is with different aspects of economic security (eg food, shelter, stability in one’s life), and will instead be pursuing ‘post-materialist’ (or post-bourgeois) goals that are not concerned with economic security, such as social bonding, self-esteem and self-actualization. It is argued that a significant proportion of the population will have been socialised during a period of “unprecedently high affluence. For them, economic security may be taken for granted”. Postmaterialists are expected to exhibit higher levels of environmental concern and involvement in environmental matters than materialists. It is noted that the social value inventory (SVI) (Braithwaite and Law, 1985) could equally have been used as a measure of values that has relevance in the CV context. Appendix E discusses these and other measures of held values in considerable detail.

The next section presents the postulated structural equation model, and the following section describes the measurement models for the variables concerned. Results of the estimated structural models are then presented and discussed.

5 Appendix E compares several different measures of values and ideology, both in theoretical terms, and in relation to empirical analysis of AFAS data.
9.3.2 Proposed Structural Model: Values and Vertical Structure

Figure 9.1 presents the structural model to be estimated. This is based on the framework proposed in Chapter 5 where held values were argued to influence CV responses mainly via a series of mediating orientations and attitudes, of intermediate specificity. Although the isolation of these mediating influences is to a large extent arbitrary, it seems appropriate to envisage a general environment-development orientation as providing an important role in the mediation of the held-assigned value relationship. Held values (postmaterialism) are represented by the variable pmideol, and assumed to influence the general environment-development orientation of the individual, to be represented here by the variable envorien, and corresponding to path GA 1 1 in Figure 9.1. The measurement model for envorien is presented in the next section. Envorien in turn influences a range of more domain-specific orientations, of

FIGURE 9.1 PROPOSED STRUCTURAL MODEL
which a general attitude to logging in native forests, fororien, is relevant here (see path BE 2 1). The measurement model for this variable is also presented in the next section. As the specificity of the attitude to the object and context in question increases, the proportion of the populace having constructed such an attitude can be expected to fall. Nonetheless, forest issues have received a good deal of media coverage in Australia in recent years, and one might expect that most individuals have a view on the issue of logging in native forests.

Attitudes relating specifically to the south-east forests dispute are likely to be less well constructed throughout the Australian population than attitudes to forest disputes in general, since many individuals do not follow news coverages very closely, and the political and hence media life of specific issues is limited. For those individuals who have constructed such issue-opinions, it can be expected that these opinions will be relatively salient in memory, and hence easily accessible when entering the valuation context. Such issue-opinions reflect issue-specific assignments of relative worth, which are distinct from other specific CV-relevant attitudes and beliefs, such as many of the procedural beliefs listed in Figure 5.1.

Whatever the specificity of the most issue-relevant attitude that an individual brings to a valuation situation, it is subject to possible modification within the valuation context. Individuals bringing highly specific attitudes to the valuation context may ‘update’ such attitudes on the basis of the new information, in a bayesian manner, or protest at the new information on the basis of disbelief or disapproval. For cognitive reasons, some individuals will tend to skip over some or all information supplied in the valuation context, and for such individuals, the dominant assignment-of-relative-worth attitude will be the most issue-specific attitude that is constructed (and accessible) prior to entering the valuation context. This attitude, along with procedural and other beliefs brought to the valuation context, will provide the default assumptions employed by the individual in responding to the CV question. An individual who fails to pay any attention to the number of hectares of forest mentioned in a CV scenario, will, ceteris paribus, draw more heavily on such default assumptions and the resultant response will indicate a degree of scope insensitivity which can lead to embedding type results (Carson, 1994).

Several paths in Figure 9.1 remain to be discussed. Three of these are the paths linking fororien and CV response, represented as CV. The variable Conseq is a measure of (pro-environmental) beliefs regarding the consequences for the environment and the economy of the final decision regarding the south-east forests. The measurement model for this variable is presented in the next section. Because
Conseq relates only to beliefs regarding consequences, it is clearly not the same as an issue-specific opinion. As such, it is only one input to CV response, and the path from fororien to CV (BE 4 2) is required to pick up the direct influence of fororien. Perceptions of consequences specific to the south-east forests may be influenced by the individual’s general attitude to logging in native forests (BE 3 2). This is discussed in the next section.

Now consider the paths emanating from Income. Income is expected to play a dual role in influencing CV response. First, it is expected to have an attitudinal effect, due to the association between income and social class, and hence values and attitudes (paths GA 1 2, GA 2 2, GA 3 2). Secondly, income acts as a budget constraint, thereby influencing the likelihood of a CV payment (path GA 4 2). In Figure 9.1, income thus has a direct (income constraint) effect on CV response and also an indirect effect via its correlation with attitudes. These effects may actually be of opposite signs, causing the total effect of income to be dissipated. The correlation of income with environmental attitudes may be either positive or negative, depending on the relative magnitude of various constituent effects. In terms of a life-cycle effect (Inglehart, 1979), where income is positively correlated with age and age is negatively correlated with environmental attitudes, a negative correlation between income and environmental attitudes is expected (see, for example, Samdahl and Robertson, 1989).

In terms of the positive correlation between education and income (and also postmaterialism), however, income is expected to be positively correlated with environmental attitudes. The final path (GA 4 3) in the structural equation model of Figure 9.1 is that linking price and CV response.

9.3.3 Measurement Models.

(i) Postmaterialism: pmideol

As noted in Chapter 6, a twelve item postmaterialism scale was chosen, divided into four item and eight item subscales following Inglehart (1979). Depending on their responses to Question A3, respondents were assigned to one of 4 value types, following the procedure of Inglehart (1979). Respondents were classified as either Materialist, Mixed (Materialist), Mixed (Postmaterialist) or Postmaterialist. A

---

6 The awareness and nature of beliefs regarding the consequences of certain actions have long been known to play an important role in the activation of environmental norms. Heberlein (1972) for example, utilized Schwartz’s (1977) norm activation model to explain the activation and generation of environmental norms and the trend of an increasing “environmental ethic”. According to this model, increases in both awareness of consequences (AC) and ascription of responsibility (AR) lead to norm-activation. Refer to Appendix C for further details.
variable, pmideol was created on this basis, taking on values from 1 to 4 respectively. The distribution of postmaterialist value types in the AFAS study is presented in Table 9.1.

TABLE 9.1 DISTRIBUTION OF POSTMATERIALIST VALUE TYPES

<table>
<thead>
<tr>
<th>Value Type</th>
<th>Frequency</th>
<th>Valid Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materialist</td>
<td>450</td>
<td>27.1</td>
</tr>
<tr>
<td>Mixed (Materialist)</td>
<td>604</td>
<td>36.4</td>
</tr>
<tr>
<td>Mixed (Postmaterialist)</td>
<td>372</td>
<td>22.4</td>
</tr>
<tr>
<td>Postmaterialist</td>
<td>233</td>
<td>14.0</td>
</tr>
<tr>
<td>Missing</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1680</td>
<td></td>
</tr>
</tbody>
</table>

These results can be compared with those of previous studies, such as that of McAllister (1990), who reported that around 15% of the population could be considered Postmaterialist, 24% Materialist, and the remaining 61% Mixed. On the basis of these results, it would appear that the distribution of value types is much the same in 1994 as it was in 1991.

(ii) Generalised Environment-Development Orientation: Environ

Four questions (D1-D4) in the questionnaire relate to the general environment-development orientation of individuals, each tapping a different aspect of this construct. These questions were recoded such that higher values are associated with a more pro-environment orientation. Since primary interest lies in whether individuals have a clear tendency to favour preservation or development, when faced with a choice between the two, ‘don’t know’ responses in questions D1 and D2 were

---

7 The procedure of Inglehart (1979) was followed with one exception. The item ‘more beautiful cities’ was treated as postmaterialist rather than neutral. This is in accordance with Australian experiences (Bean, 1994 pers comm).

8 McAllister (1990) conducted a national mail survey, the main topic also being attitudes regarding forest management in Australia. He used the four item PM scale.
lumped together with the middle response option (reasonable balance in D2) and given a value of 2. Individuals giving a 'Reasonable Balance' response are likely to go either way, depending on the circumstances, as are those who indicate a 'don't know' response.

The four recoded items (RD1-RD4) were preprocessed in PRELIS, and entered into LISREL. RD1 was omitted from further analysis because it appeared to produce computational problems when running the models. Results of a 3 item congeneric model are presented in Table 9.2. D2 has the highest parameter estimate and factor score regression weight, presumably since this most closely aligns with the latent variable of interest, not concerning itself with other distractions such as taxes (as in the case of D4). The composite variable, envorien, was subsequently created in SPSS using the factor scores shown in Table 9.2.

### TABLE 9.2 LISREL MEASUREMENT MODEL RESULTS: ENVORIEN*

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD2</td>
<td>0.77</td>
<td>0.40</td>
<td>0.13</td>
</tr>
<tr>
<td>RD3</td>
<td>0.96</td>
<td>0.08</td>
<td>0.77</td>
</tr>
<tr>
<td>RD4</td>
<td>0.78</td>
<td>0.40</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Results indicated a perfect fit for measurement models containing only 2 or 3 items.

(iii) *General Attitude to Logging in Native Forests: Fororien*

Of the three variables originally included (C2 - C4) to provide a measure of this latent, two proved satisfactory measures (C3 and C4). Since there is little point in running a 2 item congeneric model, parameter estimates were taken from the results of a preliminary LISREL model in which both measurement and structural models were estimated simultaneously. These results are presented in Table 9.3. The Factor Score regressions were arbitrarily calculated to be one half of the parameter estimates. This scaling simply brings the scale of the resulting composite variable more in line with that of the others, and should not affect any conclusions drawn. The composite variable, fororien, was subsequently created in SPSS.
TABLE 9.3 LISREL MEASUREMENT MODEL RESULTS: FORORIEN# 

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC3</td>
<td>0.95</td>
<td>0.137</td>
<td>0.475</td>
</tr>
<tr>
<td>RC4</td>
<td>1.000</td>
<td>0.045</td>
<td>0.500</td>
</tr>
</tbody>
</table>

# These results were taken from the output of a full structural equation model that was run as part of the preliminary analyses conducted for this chapter, prior to the decision to use path analysis. When there are this few items, there is little point in running a separate measurement model.

(iv) Awareness of Consequences: Conseq

We are concerned here with beliefs concerning the consequences of pro-environment and pro-logging decisions in the south east forest dispute (Question B9).

Identifying the notion of consequences most relevant to a CV modelling exercise is not as straightforward as in some other studies of norm activation (refer to Appendix C). Rather, in the case of CV responses, several notions of consequences can be relevant. In the case of a forest dispute such as that pertaining to the south east forests of Australia, it is sufficient for present purposes to identify 3 distinct types of consequences:

1. the consequences of logging for the environment (AC4ENV)
2. the consequences of forest preservation for the economy (AC4ECON); and
3. the consequences of one’s response in a CV questionnaire, in relation to whether Option A or B actually eventuates.

The third notion of consequences is perhaps the most important for the purposes of the thesis, and is discussed in detail in Chapter 10. The focus here is on the first two points.

It seems fairly obvious that both of the first two notions of AC are relevant when explaining any environmentally related behaviour that involves a tradeoff between environmental and economic concerns. I may have an “altruistic” norm toward members of the forest industry whose jobs are threatened, just as I may have an
altruistic norm toward the wildlife in the forests threatened by logging. The net result of such norms can be expected to influence my subsequent issue-opinion and CV preference.

To what extent are AC4ENV and AC4ECON related? One might expect that they are quite independent, since a perception regarding the economic benefits at stake should not necessarily be related to a perception of the preservation benefits at stake. I may perceive many jobs to be at stake and few environmental impacts, or many jobs at stake and substantial environmental impacts. Since we are dealing here with perceptions of potentially independent facts, perceptions or beliefs may also be largely independent.

AC is, however, expected to be influenced by personal dispositions. It was noted in Chapter 3 that studies in psychology have identified the important influence values have on perception. Attitudes and values serve a variety of functions, not the least of which concerns the filtering of information (Payne et al, 1992). Individuals employing rose (or green) coloured glasses (or schema) are likely to see little but rose (or green). Individuals bringing a pro-environment orientation to the AFAS questionnaire may not feel the need to read all of the information supplied to them, and as Kahneman (1986) has observed, they may have their issue-opinions and answers ready before reading the question. Individuals with pro-environment orientations may simply agree with beliefs that support the preservation case and disagree with those that support the case for logging. Individuals who agree that displaced loggers could find jobs may tend to disagree with suggestions that displaced wildlife could readily find other homes (and vice versa). To do otherwise would produce conflicting beliefs and hence the potential for dissonance, an undesirable state (see Chapter 5 for a summary of cognitive dissonance, and Appendix C for cognitive consistency theories in general, also see Appendix E in respect to values and cognitive structure).

An individual's environment-development orientation will tend to provide the default assumptions regarding issue-specific beliefs. It is conceivable then, that AC4ENV and AC4ECON will be correlated.

It is thus hypothesised that:

1. Cognitive consistency will tend to result in a significant and strong negative correlation between perceptions regarding AC4ENV and AC4ECON; and
2. Individuals will tend to bring this "unbalanced" or polarised perspective to the valuation context, and skip and/or interpret information supplied to them in accordance with a schema associated with their general environment-development orientation.

The net effect of these considerations is a reduced sensitivity to information supplied in the scenario, with possible consequences such as that encountered in the RAC south-east forests study described in Chapter 4. The second hypothesis can be investigated by looking at the influence that a variable such as fororien has on variables pertaining to consequences. In Figure 9.1, this means looking at the estimated parameter value for BE 3 2. The greater the parameter value, and the higher its significance level, the more the general thrust of responses to items used to measure consequences (see question B9) is being driven by fororien. This is discussed in the next section.

In order to test the first hypothesis, and to provide the most suitable measurement model for use in path analysis, a measurement model was estimated using LISREL, for the results of Question B9. The first hypothesis implies that a two-factor AC4ENV and AC4ECON solution will not be justifiable on the basis of being highly correlated. Because we are concerned here with individuals' beliefs regarding the magnitude and severity of consequences rather than their evaluations of those consequences in terms of importance in decision making, items B9a and B9c were dropped at the initial stage. B9d, B9g and B9n were further dropped due to a lesser focus on the specific consequences.

In order to reduce the number of items to be included in the LISREL measurement model, a principal axis factor analysis was run with oblimin rotation and a two factor solution imposed. This resulted in the desired separation of AC4ENV and AC4ECON items. The factor correlation matrix indicated that the 2 factors were highly correlated, however (r=0.72). This, in conjunction with a perusal of the structure matrix suggested that a one factor solution may be more appropriate. Indeed, when the 2-factor restriction was relaxed, only 1 factor was identified by the factor analysis procedure. A 7 item 2 factor measurement model was then run in LISREL, with B9k having been dropped due to weak performances in the factor analysis. The parameter estimates and t-values for this model are presented in Figure 9.2. The only modification index for this model involved the error covariance for

---

9 The focus here is on the latent variable relating to consequences, and hence the general thrust behind responses to specific items in Question B9, rather than the influence of fororien on specific items of B9.
'jobopp' (B9j) and 'asvirgin' (b9l) but was small in value being 3.72. Most notable, however, is the high correlation between the two latents. It is difficult to justify this two factor solution when the correlation between the AC4ECON and AC4ENV factors is 0.82. Such a correlation suggests that the first of our hypotheses above cannot be rejected.

Note that the reason the correlation is positive is that the items in the AC4ENV and AC4ECON scales were generally worded as pro-development beliefs and scored so as to produce higher values for higher disagreement. Both scales are hence scored such that pro-environment beliefs lead to higher latent scores. The exception is B9m which is coded in the opposite direction. In retrospect more items should probably
have been coded in this direction, and indeed a greater general balance of positively and negatively worded items would have been more in line with standard psychometric practice\(^{10}\).

For the purposes of creating a composite variable for use in path analysis, a one factor solution seems more appropriate. Results for a one factor congeneric model on the same seven items are presented in Table 9.4. Note that B9m is the weakest item, a consequence in part of the pro-environment wording of this item. The factor score regression weights shown in Table 9.4 were used to create the composite variable Conseq, for which higher values indicate more pro-environment beliefs.

### TABLE 9.4 LISREL MEASUREMENT MODEL RESULTS: CONSEQ

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9b</td>
<td>0.81</td>
<td>0.34</td>
<td>0.19</td>
</tr>
<tr>
<td>B9e</td>
<td>0.87</td>
<td>0.25</td>
<td>0.27</td>
</tr>
<tr>
<td>B9f</td>
<td>0.80</td>
<td>0.37</td>
<td>0.17</td>
</tr>
<tr>
<td>B9h</td>
<td>0.81</td>
<td>0.35</td>
<td>0.18</td>
</tr>
<tr>
<td>B9j</td>
<td>0.76</td>
<td>0.42</td>
<td>0.14</td>
</tr>
<tr>
<td>B9l</td>
<td>0.79</td>
<td>0.37</td>
<td>0.17</td>
</tr>
<tr>
<td>B9m</td>
<td>-0.40</td>
<td>0.84</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

**Goodness-of-fit Measures:**
- GOF Index: 0.99
- Adj GOF Index: 0.98
- RMSR: 0.049

\(^{10}\) The work of Kerlinger (1984) is noted, however. Following Kerlinger's (1984) notion of criterial referents, positively and negatively worded times may not be opposites prone to measure error, but may actually tap slightly different constructs. For present purposes, we note that the nature of the items and their coding in question B9 may not be 'optimally balanced' which may have some effect on the content validity of the resultant scale. It is not expected that this will significantly affect any of the conclusions drawn in this thesis, however.
9.3.4 Path Analysis Results: Values and Vertical structure

Preliminaries

Before presenting the path models let us briefly consider whether question order effects could have caused the information supplied in the CV scenario to prime or influence the more generalised attitude measures such as envorien and fororien. Should price have had such an effect, it would show up in the modification indices for the path linking price to fororien, envorien, or conseq.

Checking the output for each of the final LISREL models presented in this chapter revealed that no statistically significant paths between price and these three latents had been omitted. Price thus does not appear to significantly influence these 3 latent measures.

The effects of scenario cannot be tested in the same way, since scenario is not included as a variable within any model. To test for the effects of scenario on envorien, fororien and conseq, one way ANOVAs were conducted. Results indicated that scenario had no significant treatment effect on envorien or fororien (95% significance level $F(\text{prob}) = 0.68$, 0.52 respectively). With respect to conseq, however, a marginally significant ($F(\text{prob} = 0.048)$ treatment effect was detected. Results of a LSD test indicated that scenario 4 was producing significantly higher mean values for Conseq than any of the other 3 treatments. This can be explained by the results of the previous chapter which indicate that respondents in the trust fund scenario thought the least about the opportunity costs of preservation when formulating their CV responses. To a large extent this is due to the fact that no mention is made of jobs in this scenario. Since Conseq is intended to be responsive to information supplied in the scenario, given that it is specific to the south east forests, this result is not viewed as a problem.

This result suggests that CV relevant beliefs can be primed, if not updated, within the valuation context. Some types of information provided in the scenario are, however, likely to have more impacts on respondent beliefs than others. One might suspect that mentioning jobs will have more of an influence on salient respondent beliefs at the time of responding to a CV question, than changing the number of hectares of forest at stake. Individuals may be most responsive to the more symbolic information contained in CV scenarios, which may not always be to the wishes of the CV researcher, who would prefer respondents to take notice of the less symbolic hard facts (hectares of forest at stake, tonnes of waste spilled, numbers of birds killed, etc). Chapter 10 discusses symbols in the context of CV.
Path Analysis Results

The results for the WLS LISREL estimation of the path diagram presented in Figure 9.1, are presented in Tables 9.5 and 9.6, for each of the four scenarios. Table 9.5 presents the estimated parameter values for the paths indicated in Figure 9.1, and goodness of fit measures for the model. Table 9.6 presents the total effects of the variables in the model on each of the dependent variables. The variable rincome, or rinc, is a rescaled version of housinc (defined in Table 8.1). Rincome represents household income in tens of thousands of dollars (i.e. housinc/10).

Each of the sets of results in Table 9.5 clearly perform very well against the three goodness of fit criteria listed, with no set performing significantly better or worse than the others. This indicates that the model is not badly misspecified.

<table>
<thead>
<tr>
<th>Parameter/Path</th>
<th>Parameter Estimates (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scenario 1</td>
</tr>
<tr>
<td>GA 11 Pmideol to Envorein</td>
<td>0.373 (8.95)</td>
</tr>
<tr>
<td>GA 12 Rincome to Envorein</td>
<td>0.029 (0.56)</td>
</tr>
<tr>
<td>GA 22 Income to Fororien</td>
<td>0.064 (1.48)</td>
</tr>
<tr>
<td>GA 32 Income to Conseq</td>
<td>0.080 (1.86)</td>
</tr>
<tr>
<td>GA 42 Income to CV</td>
<td>0.005 (0.14)</td>
</tr>
<tr>
<td>GA 43 Rprice to CV</td>
<td>0.006 (0.16)</td>
</tr>
<tr>
<td>BE 21 Envorein to Conseq</td>
<td>0.688 (11.78)</td>
</tr>
<tr>
<td>BE 32 Fororien to Conseq</td>
<td>0.874 (18.18)</td>
</tr>
<tr>
<td>BE 42 Fororien to CV</td>
<td>0.390 (3.21)</td>
</tr>
<tr>
<td>BE 43 Conseq to CV</td>
<td>0.384 (3.49)</td>
</tr>
<tr>
<td>GFI</td>
<td>0.925</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.948</td>
</tr>
<tr>
<td>RMSR</td>
<td>0.059</td>
</tr>
</tbody>
</table>
### Table 9.6 Total Effects (The Sum of Direct and Indirect Effects)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Scenario</th>
<th>SC1</th>
<th>SC2</th>
<th>SC3</th>
<th>SC4</th>
</tr>
</thead>
<tbody>
<tr>
<td>pmideol on</td>
<td></td>
<td>0.373</td>
<td>0.402</td>
<td>0.420</td>
<td>0.240</td>
</tr>
<tr>
<td>envorien</td>
<td></td>
<td>(0.042)</td>
<td>(0.045)</td>
<td>(0.045)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>rinc on</td>
<td></td>
<td>0.029</td>
<td>0.118</td>
<td>0.017</td>
<td>-0.051</td>
</tr>
<tr>
<td>envorien</td>
<td></td>
<td>(0.051)</td>
<td>(0.052)</td>
<td>(0.054)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>pmideol on</td>
<td></td>
<td>0.257</td>
<td>0.317</td>
<td>0.335</td>
<td>0.163</td>
</tr>
<tr>
<td>fororien</td>
<td></td>
<td>(0.036)</td>
<td>(0.043)</td>
<td>(0.042)</td>
<td>(0.039)</td>
</tr>
<tr>
<td>rinc on</td>
<td></td>
<td>0.084</td>
<td>0.105</td>
<td>0.120</td>
<td>0.095</td>
</tr>
<tr>
<td>fororien</td>
<td></td>
<td>(0.050)</td>
<td>(0.049)</td>
<td>(0.049)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>envorien on</td>
<td></td>
<td>0.688</td>
<td>0.789</td>
<td>0.798</td>
<td>0.681</td>
</tr>
<tr>
<td>fororien</td>
<td></td>
<td>(0.058)</td>
<td>(0.064)</td>
<td>(0.057)</td>
<td>(0.058)</td>
</tr>
<tr>
<td>pmideol on</td>
<td></td>
<td>0.224</td>
<td>0.289</td>
<td>0.287</td>
<td>0.140</td>
</tr>
<tr>
<td>conseq</td>
<td></td>
<td>(0.033)</td>
<td>(0.040)</td>
<td>(0.037)</td>
<td>(0.034)</td>
</tr>
<tr>
<td>rinc on</td>
<td></td>
<td>0.153</td>
<td>0.093</td>
<td>0.131</td>
<td>0.012</td>
</tr>
<tr>
<td>conseq</td>
<td></td>
<td>(0.047)</td>
<td>(0.052)</td>
<td>(0.051)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>envorien on</td>
<td></td>
<td>0.601</td>
<td>0.719</td>
<td>0.684</td>
<td>0.582</td>
</tr>
<tr>
<td>conseq</td>
<td></td>
<td>(0.054)</td>
<td>(0.059)</td>
<td>(0.053)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>fororien on</td>
<td></td>
<td>0.874</td>
<td>0.911</td>
<td>0.858</td>
<td>0.854</td>
</tr>
<tr>
<td>conseq</td>
<td></td>
<td>(0.048)</td>
<td>(0.049)</td>
<td>(0.042)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>pmideol on CV</td>
<td></td>
<td>0.186</td>
<td>0.246</td>
<td>0.262</td>
<td>0.081</td>
</tr>
<tr>
<td>rinc on CV</td>
<td></td>
<td>(0.029)</td>
<td>(0.036)</td>
<td>(0.037)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>rprice on CV</td>
<td></td>
<td>0.097</td>
<td>0.004</td>
<td>0.045</td>
<td>0.019</td>
</tr>
<tr>
<td>rinc on CV</td>
<td></td>
<td>(0.047)</td>
<td>(0.053)</td>
<td>(0.054)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>envorien on CV</td>
<td></td>
<td>0.006</td>
<td>-0.014</td>
<td>0.097</td>
<td>-0.230</td>
</tr>
<tr>
<td>rprice on CV</td>
<td></td>
<td>(0.039)</td>
<td>(0.041)</td>
<td>(0.038)</td>
<td>(0.044)</td>
</tr>
<tr>
<td>fororien on CV</td>
<td></td>
<td>0.499</td>
<td>0.597</td>
<td>0.624</td>
<td>0.337</td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td>(0.053)</td>
<td>(0.057)</td>
<td>(0.053)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>conseq on CV</td>
<td></td>
<td>0.725</td>
<td>0.757</td>
<td>0.782</td>
<td>0.495</td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td>(0.056)</td>
<td>(0.056)</td>
<td>(0.051)</td>
<td>(0.048)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.384</td>
<td>0.552</td>
<td>0.494</td>
<td>0.211</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.110)</td>
<td>(0.137)</td>
<td>(0.114)</td>
<td>(0.089)</td>
</tr>
</tbody>
</table>

* cells contain estimated total effect and standard error.

The modification indices for the estimated scenario 1 model are presented in Table 9.7 where the dependent variables are indicated by the row headings. As an example, the gain in chi-square from estimating a path from Envorien directly to CV is 0.382. A first observation is that most of the modification indices correspond to paths that

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11 LISREL does not produce t-statistics as standard output concerning total effects. For this reason, tables containing total effects include standard errors, and tables containing parameter estimates include t-statistics.
point in the opposite direction to a path already included. Thus, an improvement of approximately 9.4 in chi-square could be expected if the path leading from conseq to fororien is freed up (estimated). Although this makes some substantive sense, in that beliefs regarding consequences in the south east forests may be similar to those relating to native forests in general, and such beliefs may influence one's general attitude to native forests (fororien), such a modification is excluded here on the basis that paths leading from the specific to the general are in contradiction to the psychological theories referred to above. Some of the other suggested modifications make less sense. Allowing a path to be estimated from CV response to fororien is clearly non sensical. It is pleasing to see that this modification index is extremely small, however, and unlikely to result in a statistically significant path.

TABLE 9.7 MODIFICATION INDICES

<table>
<thead>
<tr>
<th>Beta</th>
<th>Envorien</th>
<th>Fororien</th>
<th>Conseq</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Envorien</td>
<td>0.000</td>
<td>2.286</td>
<td>2.842</td>
<td>0.010</td>
</tr>
<tr>
<td>Fororien</td>
<td>0.000</td>
<td>0.000</td>
<td>9.438</td>
<td>1.636</td>
</tr>
<tr>
<td>Conseq</td>
<td>9.439</td>
<td>0.000</td>
<td>0.000</td>
<td>1.898</td>
</tr>
<tr>
<td>CV</td>
<td>0.382</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gamma</th>
<th>Pmideol</th>
<th>Rinc</th>
<th>Rprice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Envorien</td>
<td>0.000</td>
<td>0.000</td>
<td>1.528</td>
</tr>
<tr>
<td>Fororien</td>
<td>2.286</td>
<td>0.000</td>
<td>0.765</td>
</tr>
<tr>
<td>Conseq</td>
<td>13.248</td>
<td>0.000</td>
<td>1.894</td>
</tr>
<tr>
<td>CV</td>
<td>0.050</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Of greater interest are the modification indices relating to possible paths from envorien to conseq (9.439) and from pmideol to conseq (13.248). These indices are high enough to produce statistically significant parameter estimates, and it is conceivable that substantive reasons exist for such modifications. It is possible,

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12 This was confirmed by actually freeing up this coefficient and observing the significance of the estimated coefficient.
however, that these indices reflect little more than measurement and sampling error. The skewed distributions of the variables involved, in conjunction with the fact that two of the variables are being treated as ordinal and one (conseq) as continuous, could for example produce such an effect. Indeed, exploratory analysis suggests that these modification indices are quite sensitive to assumptions such as choice of correlation matrix and whether a variable is defined as ordinal or continuous. Defining fororien, envorien and conseq as all continuous, produces significantly lower modification indices, for example.

Consider now the effect of actually freeing the above two paths. The effect of freeing the path from envorien to conseq is to produce a significant coefficient ($t=5.2$) for this path, the estimated coefficient being 0.808. The path coefficient from fororien to conseq is reduced from 0.874 to 0.354, and the path from envorien to fororien is reduced from 0.688 to 0.642. The path from fororien to CV is reduced from 0.390 to 0.158, but the path from conseq to CV is increased from 0.384 to 0.606. The effect is thus to take explanatory power away from fororien and give it to envorien, and conseq. This is seen in the total effects of fororien and envorien on CV response, the former decreasing from 0.725 to 0.372, and the latter remaining fairly constant (0.488 cf 0.499). The modified model thus suggests that envorien has greater influence on CV response than fororien, even though the latter is more specific to the CV response. This is contrast to a priori theoretical expectations (see reference to Ajzen and Fishbein, 1977 in Chapter 5, Section 5.3), and in the absence of a substantive explanation, is difficult to accept.

Further insight can be gained from considering how the results of the path analysis relate to that of simple bivariate linear regressions. Had a product-moment correlation matrix instead been used, with all variables treated as continuous, and MLE used instead of WLS, the total effects for envorien and fororien (on CV) would approximate the corresponding standardised coefficients in the bivariate regressions of these two variables on CV response. Because different procedures have been used here to estimate path models than those outlined above, the comparisons are more tentative. However, bivariate regression results do indicate that envorien should have lower explanatory power than fororien; the respective regression coefficients being 0.42 and 0.47 respectively (other results not shown). Since this is what theory suggests, and since no satisfactory a priori considerations compel us to do otherwise, a path from envorien to conseq cannot be justified, and as a result, is not included in any of the results presented in Tables 9.5 and 9.6. Similar considerations relate to the possibility of freeing a path from pmideol to conseq, and hence this path is also omitted from the results in Tables 9.5 and 9.6.
Scenario Comparisons

Consider first how the influence of values on the dependent variables varies across the 4 scenarios. An initial observation is that although the parameter estimates for the values-environ link are quite similar for the first three scenarios, that of the fourth, trust-fund scenario, is noticeably lower. This is an intriguing result, since scenario should not really affect these generalised measures. If the corresponding estimated parameters for two scenarios are significantly different, this would imply that some form of priming effect has occurred. Given our previous discussion of this possibility, a significant difference is not expected to appear. One way to investigate this further is to select two scenarios, say the 3rd and 4th, which are most suitable for a referendum/trust-fund comparison, and which have the greatest difference in parameter estimates (for GA11), and to see if the 95% confidence intervals (CI’s) for the two pmideol-environ parameters overlap. The resulting CI for GA11 in scenario 3 is [0.33,0.51] and [0.13,0.35] for scenario 4. The 95% confidence intervals thus overlap, indicating that the two scenarios do not produce significantly different GA11 parameter values at the 95% level. Although the two intervals only just overlap, if we recall that our earlier assumptions (Section 9.2.7) will tend to produce underestimates of standard errors, the difference may be less marked than it appears. Nonetheless, it is accepted that some degree of priming may be occurring here, especially given that the parameter estimates are more consistent for the first three scenarios.

Pmideol appears to produce a lower total effect on CV response in the 4th scenario (0.081) than in the other 3 scenarios. The confidence intervals are [0.79,0.33] and [0.04,0.12] respectively, indicating that the difference in total effects is significant. Again, it is noted that the standard errors used in these calculations may be biased downwards, thereby exaggerating statistical differences. The apparent greater direct effect of pmideol on CV response in scenario 3 compared with scenario 4 could be a consequence of several factors. It may, for example, reflect the possibility that referendum formats activate postmaterialism values to a greater extent than trust fund formats. This is indeed what one might expect, given that pmideol is a measure of values considered most relevant in political science circles where the focus is on voting behaviour. As McAllister (1990) has pointed out, however, pmideol has also been shown to be related to environmental involvement, and the trust fund scenario can be viewed in this light. Because the items included in the postmaterialism scale relate to individual attitudes regarding social issues, one might expect the referendum format to activate such values to a greater extent than the trust fund.

An alternate explanation is that the trust fund format produced greater focus by the individual on aspects of the scenario such as price, and that this has caused a
corresponding decrease in the explanatory power of the default assumptions involving values and generalised attitudes. A perusal of the parameter estimates in models 3 and 4 of Table 9.5 suggests that both of the above factors may be occurring. Although the trust fund format consistently produces lower parameter estimates for the key paths mediating values and CV response, this is most marked for the values-environ and conseq-CV links. The total effect of fororien on CV response is thus significantly higher in scenario 3 than in scenario 4. The confidence intervals for these two estimates fail to overlap by 0.93. It is here that the effect of greater price sensitivity might be expected to result in lesser dependence on default assumptions such as provided by values and generalised attitudes. It is tentatively concluded that the trust fund format produces greater price sensitivity, which in turn results in lesser explanatory power for default assumptions based on values and generalised attitudes.

If we now consider how the total effect of pmideol on fororien varies across scenarios 3 and 4, we find that scenario 4 again produces a lower estimate (0.163 cf 0.335), and that the confidence intervals for these effects are significantly different, failing to overlap by only a small amount (0.01). When the likely underestimation of standard errors is considered, this overlap result may well disappear. Again, however, some degree of priming effect appears to be occurring, where the referendum format produces a stronger relation between values and generalised attitudes.

Focussing again on the preferred scenario 3-4 comparison, consider how the above two types of income effects vary across referendum and trust fund formats. In scenario 3, the total ‘attitudinal’ effect of income on CV response is 0.108 (t=2.84, not shown) and the direct ‘budget-constraint’ effect is -0.062 (t=-1.54). The latter is wrong-signed, and although not statistically significant at the 95% level, is sufficient to cancel out enough of the positive attitudinal effect to produce a total effect of 0.45 which fails to reach significance. This illustrates one of the key advantages of using SEM over standard regression analysis, namely the ability to separate out indirect and direct effects. In scenario 4, the total effect of income on CV response (0.019) again fails to reach statistical significance (t=0.37), as does the direct ‘budget’ effect (-0.014, t=-0.289), which again cancels out a portion of the indirect ‘attitudinal’ effect which in this case is not significant (0.033, t=1.2). It is surprising that the direct effect of income on CV responses is not significant, and wrong-signed in scenario 4, where price is highly significant.

Fewer differences are to be found amongst the 3 referendum scenarios. One result of some interest is that the total effect of income is marginally significant in scenario 1 only (t=2.06). There are no obvious reasons why this would be the case, and when the possible underestimation of standard errors is considered, this result may
disappear. Scenario 3 produces a significant price coefficient, but as found in the previous chapter is wrong-signed. It is interesting to note that the total effects of pmideol, envorien and fororien on CV responses are actually greater for this scenario than scenarios 1 and 2, although these differences are not statistically significant at the 95% level.

Having accepted a given model specification, we can now consider the results in more detail. In the discussion that follows, the focus is on scenario 1 results. The results in Table 9.5 indicate that all of the paths linking values, envorien, fororien, conseq and CV response are statistically significant. Note that the effect of pmideol on envorien is highly significant. As expected, postmaterialists tend to be more green than materialists. The coefficient of 0.373 indicates that a one unit increase in value type produces an increase in envorien of 0.373. It is important to remember, however, that an arbitrary scale is being used for these variables.

Consider the effect of fororien on CV response. An indirect effect is calculated by multiplying the various parameter values for paths involved in this effect. The total effect equals the sum of the direct and indirect effects. The indirect effect of fororien on CV responses is thus 0.874 * 0.0384 = 0.336. The total effect in Table 9.6 is 0.725 which equals 0.336 plus the direct effect parameter 0.390. The total effect is clearly significant (t=12.95). Results not shown (and presented as standard Lisrel output) indicate that the indirect effect is statistically significant (t=3.2). In terms of parameter values, the indirect effect of fororien on CV is 46% of the total effect. The hypothesis that beliefs regarding the consequences of pro-logging and pro-environment outcomes affect CV response is thus supported, as is the hypothesis that fororien has a major influence on such beliefs. It appears that the general thrust of the beliefs used to measure the south-east forests specific variable, Conseq, is largely determined by the respondent's general attitude to logging in native forests. These results are consistent with the second hypothesis discussed in Section 9.3.3 concerning Conseq, although the findings at the start of Section 9.3.4, regarding the effect of scenario on Conseq must be noted. It appears that although beliefs regarding issue-specific consequences are largely influenced by more generalised attitudes, they are also responsive to some features of the valuation context. More research is required to identify the types of information provided in CV scenarios that respondents are most sensitive to.

Now consider the total effect of pmideol on CV response. The indirect effect is 0.186, which is highly significant (t=6.4) and equal to the total effect since no direct
path linking the two exists. Given that the total effect of fororien on CV is 0.725, the total effect of pmideol on CV is thus $0.373 \times 0.688 \times 0.725 = 0.186$.

It is interesting to note that once the influence of pmideol on environment-development orientation is considered, the effect of pmideol on CV response dissipates little as we move down the path diagram in Figure 9.1. The total effect of values on envorien is $0.373$ ($t=8.9$), for values on fororien it is $0.257$ ($t=7.1$), for values on conseq it is $0.224$ ($t=6.8$) and for values on CV response it is $0.186$ ($t=6.4$). The explanatory power of values on envorien is surprisingly close to that of values on CV response, given that CV response is substantially more specific than general environment-development orientation. This suggests that respondents do not appear to be particularly sensitive to information that is specific to the south-east forests, such as that supplied in the CV scenario. Postmaterialists thus tend to say “yes” to the CV question and materialists tend to say “no”. The implication is that results such as those encountered in the RAC south-east forests CV study (see Chapter 4) may arise. Responses are fairly indifferent to the number of hectares being preserved, since whether its 10% or 90% it’s still the same attitude or values that is being expressed\(^{13}\).

Similar considerations relate to price which was marginally significant in one scenario of the RAC south-east forests study (after consistency checks carried out and some respondents removed from dataset-see Chapter 4) and not significant in scenario 1 of this study. A failure of respondents to be price-sensitive is associated with attitudes and values having higher explanatory power than would otherwise be the case. With respect to the bayesian updates involved when citizens enter the valuation context, these results confirm the hypothesis of Chapter 5 that citizen attitudes and values provide the default positions and assumptions that individuals employ when responding to the CV question.

Finally, consider the effect of income on general attitudes and CV response. Since envorien, fororien and conseq are all measures of attitude toward (or beliefs regarding) the environment, there is little point comparing the paths linking income to each. Of greater interest is the total indirect effect of income on CV and how this compares with the direct effect. Recall that the former represents the attitudinal effect and the latter the income effect. Now the total effect is $0.097$ ($t=2.06$) (Table 9.6) and the direct effect is $0.005$ ($t=0.14$)(Table 9.5). The sum of the various

\(^{13}\) If any one individual was given information stating that any of three amounts of preservation were possible, then results would be different.
indirect effects is thus 0.092. Note that both effects are positive. Individuals with higher incomes tend to have greener orientations, and individuals with more income are slightly (but by no means significantly) more likely to favour Option B in the CV question. The fact that 95% of the influence of income on CV response is due to the attitudinal effect suggests that the significant total effect should not be seen as offering support to the consumer model of CV responses. Indeed, the fact that the direct effect is so small and statistically weak is cause for some concern. This result is consistent with the hypothesis that CV responses in scenario 1 represent little more than attitudes.

9.4 INTRINSIC RIGHTS AND MORAL ABSOLUTISM

9.4.1 Introduction

In Chapter 7, a distinction was made between the issue of whether intrinsic rights exist, and if so, how they are to be handled, and the issue of whether humans believe in such rights, and if so, how they think such rights should be handled. The former is the concern of environmental ethicists, and discussed little in this thesis. The second, however, is entirely relevant to the thesis, since beliefs regarding intrinsic rights are not only expected to influence the magnitude of existence values, but they may also result in protest responses in CV studies. In this section, the focus is on modelling the structural relations involved in the influence of respondents' beliefs regarding intrinsic species rights on CV responses. This is in line with Edwards' (1986, p.149) request that "methods designed to measure attitudes and a person's commitments to specific principles and groups need to be assimilated into the design of contingent choice experiments". The link between distributive and procedural notions of justice referred to in Chapter 7 is also investigated.

Section 9.4.2 presents the proposed structural model, and Section 9.4.3 presents the measurement models. Section 9.4.4 then presents the path analysis results.

9.4.2 Proposed Structural Model

As a first step in modelling the absolutist nature of CV preferences, a structural model like that in Figure 9.3 will be estimated. According to this model, individuals who believe that species have rights (or intrinsic value) independent of humans, are likely to believe that it is morally wrong to harm nature. This in turn causes absolutist or lexicographic preferences regarding environmental protection. Not all individuals who believe it is wrong to harm nature will have lexicographic preferences, however, since they may still adopt a utilitarian perspective in considering whether or not to
support something that is wrong, for a greater good. An individual may, for example, believe that it is wrong to harm nature and that it is wrong to put someone out of employment. When it comes to the crunch, and the individual feels compelled to make a decision, he/she may decide that preservation is slightly more important, or vice versa. An extreme absolutist would either preserve or not preserve, depending on which moral principle has primacy (or is most salient at the time). A bounded absolutist might say preserve, unless the costs are unacceptably large.

FIGURE 9.3 BASIC HYPOTHESISED STRUCTURE FOR INTRINSIC RIGHTS/ABSOLUTISM MODEL
Path 7 in Figure 9.3 provides an avenue through which the belief that it is wrong to harm nature can influence CV response in a non-absolutist manner. Although Path 1 is included to capture the explanatory power of the important fororien attitude it is possible that Path 7 may add additional explanatory power, by capturing an intensity of feeling that fororien may not. Having included paths 1 and 7, interest then lies in the parameter estimate and statistical significance of path 6. It is path 6 that should capture lexicographic influences on CV response. It is emphasised that this does not provide a fully conclusive test of the existence and significance of lexicographic CV responses. It is possible, for example, that the variable representing absolutist beliefs captures an intensity of utilitarian belief that neither paths 1 nor 7 capture.

Path 2 in Figure 9.3 reflects the expectation that an individual’s general attitude to environmental issues, such as that pertaining to native forests, is likely to influence his/her belief concerning whether it is wrong to harm nature. Even if an individual agrees that species have rights he/she may only believe it to be wrong to harm nature, if he/she has a pro-environment orientation. Path 3 provides a direct effect of intrinsic rights belief on absolutist environmental stance. This allows the total effect of intrinsic rights on absolutist beliefs to be most accurately estimated, since as noted above, a belief that it is wrong to harm nature may capture a degree of utilitarian concern. Path 3 also aids model identification.

Figure 9.4 presents the basic model of Figure 9.3, but with an additional component added, and paths labelled according to the terminology of structural equation modelling. The additional component relates to the fact that individuals who believe in intrinsic rights and who have absolutist beliefs are likely to reject the notion of trying to value the environment in dollar terms. Such individuals are likely to see the environment as priceless and hence object to the notion of calculating prices on the grounds that it implies tradeoffs which they object to. This provides the link between the distributive and procedural notions of justice discussed in Chapter 7.
In terms of structural relations, an individual's belief regarding the appropriateness of environmental valuation is seen to be a function of (i) his/her general environment-development stance in the native forest domain; (ii) his/her belief regarding the role of economics in environmental decision-making; and (iii) his/her degree of absolutism. The final (dotted) path to be discussed in Figure 9.4 indicates that beliefs regarding the appropriateness of monetary valuation may have a direct influence on CV response. Of course, to have such an effect, the CV question would actually have to be perceived by the respondent to involve an attempt at dollar valuation, or some closely related economic objective. This path should thus give an idea as to the extent to which CV responses are influenced by perceptions regarding the desirability of environmental valuation. One might expect that this path will be more significant in the trust fund format than the referendum formats.
9.4.3 Measurement Models

Of the 8 variables in the structural model illustrated in Figure 9.4, only three were measured with multiple items, these being fororien (previously described), belief in intrinsic rights/value, and acceptability of environmental valuation.

Four items in the questionnaire were included to tap the belief-in-intrinsic-rights construct. These were C5d, C5f, C5m and C5o. The results of a one factor congeneric model containing these items are presented in Table 9.8, along with the factor scores regressions, which were used to create the composite variable 'intrnsic' in SPSS. The goodness of fit statistics indicate an excellent fit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5d</td>
<td>0.39</td>
<td>0.85</td>
<td>0.06</td>
</tr>
<tr>
<td>C5f</td>
<td>-0.77</td>
<td>0.41</td>
<td>-0.26</td>
</tr>
<tr>
<td>C5m</td>
<td>-0.86</td>
<td>0.26</td>
<td>-0.47</td>
</tr>
<tr>
<td>C5o</td>
<td>-0.80</td>
<td>0.37</td>
<td>-0.30</td>
</tr>
</tbody>
</table>

Although four items relating to the desirability of monetary valuation of the environment were included within the questionnaire (D7c, D7f, D7h and D7n), one item (D7c) was dropped because its estimated path coefficient was so small (0.05). It is not clear whether this is due to the way this item was measured, or the fact that it taps a different construct to the other three. However, one might suspect the former, and it is accepted that a more equal balance between positively and negatively worded statements would have been preferable. Nonetheless, the remaining three items should be sufficient to tease out those who believe that monetary valuation of the environment is desirable and those who do not. The results of the 3 item congeneric
model are presented in Table 9.9. As with the other 2 or 3 item scales used herein, results indicated a perfect fit. The most simply worded item (D7h) produced the greatest loading on the latent variable, and the factor score regressions were used to create the composite variable dollvaln.

**TABLE 9.9 LISREL MEASUREMENT MODEL RESULTS: DOLLVALN***

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>D7f</td>
<td>0.70</td>
<td>0.50</td>
<td>0.39</td>
</tr>
<tr>
<td>D7h</td>
<td>0.71</td>
<td>0.49</td>
<td>0.41</td>
</tr>
<tr>
<td>D7n</td>
<td>0.59</td>
<td>0.65</td>
<td>0.26</td>
</tr>
</tbody>
</table>

* Results indicated a perfect fit.

The remaining 5 variables in the path analysis were observed, or measured using a single item. Rprice was again used in place of price (Rprice = 0.1 * price) and CV is the same as before. The following variable definitions apply to the remaining 3 variables:

- nwrong = 5 point likert scale response indicating strength of disagreement with the statement: ‘Harming nature for the sake of development is morally wrong’. This is item C5a in the questionnaire.

- absolutism1 = 5 point likert scale response indicating strength of disagreement with the statement: ‘I would never favour a proposed environmentally threatening development’ (C5i in questionnaire).

- absolutism2 = 5 point likert scale response indicating strength of disagreement with the statement: ‘Wildlife has the right to be protected irrespective of what this costs society’ (C5n in questionnaire).

- deconomics = 5 point likert scale response indicating strength of disagreement with the statement: ‘Environmental decisions can be made mainly on the basis of comprehensive economic analysis (D7e in questionnaire).

Note the two variables measuring absolutism. Absolutism1 is focussed at the level of individual behaviour (personal norms) and Absolutism2 is focussed at what the individual thinks society should do. These are slightly different constructs and each will be separately tested in the path analysis. To the extent that these two variables produce different corresponding path coefficients, Absolutism1 might be expected to
have a relatively higher impact on CV response in the trust fund format. This is because the trust fund format is more focussed at the level of individual behaviour. In one respect, the referendum question does, however, align more closely with absolutism1 than absolutism2. Referenda typically require individuals to indicate what they favour, a characteristic of the item used to measure absolutism1. Overall, a priori considerations do not provide a clear indication as to the expected relative explanatory power of the two absolutism measures. Note also that the use of a five point likert scale in measuring absolutism is consistent with Scott’s (1965) notion of ‘degrees of absolutism’, referred to in Chapter 7.

Fororien, deconomics, and intrinsic are coded such that higher values indicate responses that are more ‘green’ in nature, and dollvaln, nwrong and absolutism are coded in the opposite direction.

9.4.4 Path Analysis Results: Intrinsic Rights and Moral Absolutism

Table 9.10 presents the results for the estimated structural models and Table 9.11 contains the corresponding direct effects. The four sets of results correspond to two scenarios (3 and 4) and two absolutism measures. Scenarios three and four are used so as to provide the best comparison of trust fund and referendum scenarios.

Note that in none of the models has the path BE 4.1 from dollvaln to CV response been estimated. This is because initial runs indicated that in none of the four cases was this path significant, and removing the path permits greater flexibility in model specification, especially in relation to identification of the equation involving CV as dependent variable. The modification indices for the path BE 4.1 in the four sets of results presented in Table 9.10 are small accordingly (0.9, 1.1, 2.3 and 3.5 respectively). Although not a significant difference, note that the modification indices are slightly higher in the trust fund results, a result that accords with the expectation that trust fund formats are most likely to be perceived to involve economic valuation type tradeoffs. This is in contrast, however, to the finding in Chapter 8 that question D7n is a statistically significant determinant of ‘question dislike’ in scenario 3 only.

The most significant finding here however, is that in neither scenarios do CV responses appear to be influenced by a perception that the CV question actually involves some attempt at pricing nature. Although individuals may protest at the income-environment tradeoff, as discussed above and empirically investigated in the previous chapter, such protests do not involve an understanding of the true valuation nature of the question. A common criticism of CV is that ‘People will not tell you how much they think the environment is worth in dollar terms’. The above results
suggest that in well-designed dichotomous-choice CV studies, this criticism may not be valid.

As expected, respondent beliefs regarding the role of economics in environmental decision-making (deconomics) has a statistically significant influence on dollvaln, in all four models. Coupled with the fact that only 18% of respondents agreed with the deconomics statement, and the majority disapprove of environmental valuation, it is clear that the true nature of CV questions must continue to be ‘hidden’ from respondents.

**TABLE 9.10 ESTIMATED ‘INTRINSIC RIGHTS’ CAUSAL MODEL’**

<table>
<thead>
<tr>
<th>Parameter/Path</th>
<th>Scenario (SC) and Absolutism Measure (C5n or C5i)</th>
<th>SC3, C5n</th>
<th>SC3, C5i</th>
<th>SC4, C5n</th>
<th>SC4, C5i</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(-1.90)</td>
<td>(-1.16)</td>
<td>(-2.06)</td>
<td>(-5.10)</td>
</tr>
<tr>
<td>GA 11 Fororien to Dollvaln</td>
<td>-0.174 (-3.79)</td>
<td>-0.165 (-3.55)</td>
<td>-0.194 (-3.34)</td>
<td>-0.237 (-4.11)</td>
<td></td>
</tr>
<tr>
<td>GA 21 Fororien to mvrong</td>
<td>-0.222 (-4.23)</td>
<td>-0.218 (-4.15)</td>
<td>-0.237 (-4.76)</td>
<td>-0.258 (-5.41)</td>
<td></td>
</tr>
<tr>
<td>GA 23 Intrinsic to mvrong</td>
<td>-0.467 (-9.68)</td>
<td>-0.474 (-9.90)</td>
<td>-0.480 (-9.36)</td>
<td>-0.468 (-9.70)</td>
<td></td>
</tr>
<tr>
<td>GA 33 Intrinsic to Absolutism</td>
<td>-0.674 (-17.07)</td>
<td>-0.352 (-5.94)</td>
<td>-0.687 (-15.85)</td>
<td>-0.292 (-4.48)</td>
<td></td>
</tr>
<tr>
<td>GA 41 Fororien to CV</td>
<td>0.297 (5.79)</td>
<td>0.355 (7.07)</td>
<td>0.255 (6.29)</td>
<td>0.319 (7.04)</td>
<td></td>
</tr>
<tr>
<td>GA 44 Rprice to CV</td>
<td>0.067 (1.52)</td>
<td>0.092 (2.09)</td>
<td>-0.238 (5.44)</td>
<td>-0.280 (6.51)</td>
<td></td>
</tr>
<tr>
<td>BE 13 Absolutism to Dollvaln</td>
<td>0.524 (9.41)</td>
<td>0.676 (11.03)</td>
<td>0.409 (5.94)</td>
<td>0.124 (2.29)</td>
<td></td>
</tr>
<tr>
<td>BE 32 mvrong to Absolutism</td>
<td>0.145 (2.31)</td>
<td>0.378 (5.24)</td>
<td>0.193 (3.71)</td>
<td>0.363 (5.01)</td>
<td></td>
</tr>
<tr>
<td>BE 42 mvrong to CV</td>
<td>-0.069 (-1.10)</td>
<td>0.026 (0.31)</td>
<td>0.141 (1.95)</td>
<td>0.082 (1.36)</td>
<td></td>
</tr>
<tr>
<td>BE 43 Absolutism to CV</td>
<td>-0.322 (-4.66)</td>
<td>-0.374 (-3.70)</td>
<td>-0.301 (-4.08)</td>
<td>-0.195 (-3.05)</td>
<td></td>
</tr>
<tr>
<td>GFI</td>
<td>0.989</td>
<td>0.969</td>
<td>0.988</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>AGFI</td>
<td>0.963</td>
<td>0.897</td>
<td>0.959</td>
<td>0.912</td>
<td></td>
</tr>
<tr>
<td>RMSR</td>
<td>0.042</td>
<td>0.075</td>
<td>0.045</td>
<td>0.037</td>
<td></td>
</tr>
</tbody>
</table>

* cell entries corresponding to paths contain the estimated path coefficient, and the associated t-statistic.
# TABLE 9.11 DIRECT AND INDIRECT EFFECTS

<table>
<thead>
<tr>
<th>Effect</th>
<th>Scenario (SC) and Absolutism Measure</th>
<th>SC3, C5n</th>
<th>SC3, C5i</th>
<th>SC4, C5n</th>
<th>SC4, C5i</th>
</tr>
</thead>
<tbody>
<tr>
<td>fororien on Dollvaln</td>
<td>-0.112</td>
<td>(0.050)</td>
<td>-0.112</td>
<td>(0.048)</td>
<td>-0.133</td>
</tr>
<tr>
<td>deconomics on Dollvaln</td>
<td>-0.174</td>
<td>(0.046)</td>
<td>-0.165</td>
<td>(0.047)</td>
<td>-0.194</td>
</tr>
<tr>
<td>Intrinsic on Dollvaln</td>
<td>-0.389</td>
<td>(0.042)</td>
<td>-0.359</td>
<td>(0.039)</td>
<td>-0.319</td>
</tr>
<tr>
<td>nwrong on Dollvaln</td>
<td>0.076</td>
<td>(0.027)</td>
<td>0.256</td>
<td>(0.053)</td>
<td>0.079</td>
</tr>
<tr>
<td>Absolutism on Dollvaln</td>
<td>0.524</td>
<td>(0.056)</td>
<td>0.676</td>
<td>(0.061)</td>
<td>0.409</td>
</tr>
<tr>
<td>fororien on nwrong</td>
<td>-0.222</td>
<td>(0.052)</td>
<td>-0.218</td>
<td>(0.052)</td>
<td>-0.237</td>
</tr>
<tr>
<td>Intrinsic on nwrong</td>
<td>-0.467</td>
<td>(0.048)</td>
<td>-0.474</td>
<td>(0.048)</td>
<td>-0.480</td>
</tr>
<tr>
<td>fororien on Absolutism</td>
<td>-0.032</td>
<td>(0.014)</td>
<td>-0.082</td>
<td>(0.025)</td>
<td>-0.046</td>
</tr>
<tr>
<td>Intrinsic on Absolutism</td>
<td>-0.742</td>
<td>(0.026)</td>
<td>-0.531</td>
<td>(0.041)</td>
<td>-0.779</td>
</tr>
<tr>
<td>nwrong on Absolutism</td>
<td>0.145</td>
<td>(0.050)</td>
<td>0.378</td>
<td>(0.072)</td>
<td>0.197</td>
</tr>
<tr>
<td>fororien on CV</td>
<td>0.323</td>
<td>(0.050)</td>
<td>0.381</td>
<td>(0.047)</td>
<td>0.275</td>
</tr>
<tr>
<td>Intrinsic on CV</td>
<td>0.271</td>
<td>(0.046)</td>
<td>0.187</td>
<td>(0.034)</td>
<td>0.167</td>
</tr>
<tr>
<td>rprice on CV</td>
<td>0.067</td>
<td>(0.042)</td>
<td>0.092</td>
<td>(0.044)</td>
<td>-0.238</td>
</tr>
<tr>
<td>nwrong on CV</td>
<td>-0.115</td>
<td>(0.058)</td>
<td>-0.116</td>
<td>(0.058)</td>
<td>0.083</td>
</tr>
<tr>
<td>Absolutism on CV</td>
<td>-0.322</td>
<td>(0.069)</td>
<td>-0.374</td>
<td>(0.101)</td>
<td>-0.301</td>
</tr>
</tbody>
</table>

* Cell entries are total effect and associated standard error.

All signs corresponding to statistically significant parameters are as expected, for all models. Both fororien and intrinsic are statistically significant predictors of nwrong, and this applies to all four sets of results. This is also as expected. An interesting result is that the influence of intrinsic on absolutism is significantly greater for absolutism2 (C5n) than for absolutism1 (C5n) (based on confidence intervals and 95% significance levels). One possible explanation for this is that absolutism2 follows more naturally from beliefs regarding intrinsic values than absolutism1. Where intrinsic and absolutism2 are both beliefs regarding what is right for society,
absolutism1 involves a personal norm and hence what is perceived to be right for the individual. Since beliefs regarding social norms are often seen to be causally prior to personal norms, as for example postulated in the Theory of Reasoned Action, absolutism1 may be less closely linking to intrnsic than absolutism2.

Few clear differences in the estimated structural model for scenarios 3 and 4, and for a given measure of absolutism, are evident. The main differences appear to concern the paths GA 1 1 and BE 1 3, both of which involve the variable Dollvaln. It appears that in the referendum scenario, Dollvaln is influenced more by absolutist beliefs, and less by general attitude to logging, than in the trust fund case. It is not readily apparent why this might be so. Given that Dollvaln has been found to have little influence on CV response, its determinants need not concern us here. Another result relevant to comparison of referendum and trust fund scenarios is that intrnsic and absolutism have a slightly lower total effect on CV response in the referendum format than in the trust fund format. The only case in which statistically significant differences (based on confidence intervals) arise here, however, is in a comparison of the total effects of intrnsic on CV, for the c5i measure of absolutism. In this case, scenario 3 produces a significantly greater estimate of the total effect, although only marginally significant at the 95% significance level (CI's overlapping by 0.009). The fact that absolutism measures are a statistically significant determinant of CV response in both referendum and trust fund scenarios supports the notion that a significant proportion of respondents are responding in an absolutist manner. In the trust fund case, sufficient respondents are, however, price sensitive to produce a statistically significant coefficient for GA 4 3. Results in the next chapter suggest that proportion of price sensitive respondents required to produce such an effect may be quite low.

9.5 CHAPTER CONCLUSIONS

The major conclusions for this chapter are as follows:

Structural Equation Modelling and CV

(i) Structural Equation Modelling offers a more flexible way to explore the structure of CV preferences and responses than single equation linear or non-linear regressions. It allows both the horizontal and vertical structure of preferences to be modelled, compared with single equation regressions, where the analysis of vertical structure is limited to moderating effects involving the use of multiplicative terms. In comparison with standard regression procedures, SEM also has the advantage of simultaneous estimation of measurement and
structural models. This means that more accurate measures of abstract psychological and sociological constructs can be used when modelling the structural relations involved in preference formation.

(ii) Although SEM clearly has several advantages in comparison to more conventional forms of statistical analysis in CV circles, the present study has identified an important limitation regarding use of the technique. In particular, estimated structural models can be very sensitive to the researcher’s choice of input matrix and method of estimation. Although WLS with a polychoric correlation input matrix is the theoretically preferred approach when non-normal variables are involved, this general result may not hold true when non-normality occurs in continuous (rather than ordinal) variables. This means that the use of highly kurtosed treatment variables can throw the results of much of the analysis out. In the AFAS application, the price variable was particularly prone to this problem. In contrast, results appeared quite robust to the assumed linear relationship between price and CV response. Given the sensitivity of results to assumptions made by the researcher, and the lack of clear guidance in the literature as to how to proceed when non-normal continuous variables are encountered, it would appear that some of the benefits from using SEM may not be worth the costs. It is, for example, questionable whether the benefits from simultaneous estimation of measurement and structural models are worth pursuing, when the far greater sensitivity of results to assumed input matrix and estimation procedure are considered. The use of path analysis in conjunction with congeneric measurement models used to provide composite variables based on factor scores may be a more defensible way to proceed. It should be noted that one does not necessarily require use of a package such as LISREL to conduct path analysis, as results can be obtained by estimating a series of regressions. LISREL does however offer the simplest way of obtaining the full set of results typically of interest in path analysis (direct and indirect effects etc.). A package such as LISREL also permits estimation of measurement models, which is not possible with standard econometric software. Other statistical packages such as SAS and SPSS which contain a factor analysis module can also be used to calculate composite variables.

Values and Vertical Structure

(iii) The general thrust of respondents’ beliefs regarding the consequences of logging for the environment in the south-east forests, is strongly negatively correlated with the general thrust of beliefs regarding the consequences of
environmental protection for the logging industry, and the economy more generally. In conjunction with the finding that individuals' general environment-development orientation is strongly related to such beliefs, this suggests that respondents' issue-specific beliefs are subject to only limited modification within the valuation context. It is little surprise then, that CV results have often not been as sensitive to the scope of the object of valuation as CV practitioners would like (the RAC south-east forests study in Chapter 4 being a prime example). As Kahneman (1986) noted, individuals may have their answer ready before reading the information contained in the CV scenario. One might expect that respondents will be more responsive to information that has greater symbolic content. They may, for example, be more responsive to a mention of 'jobs' or 'loggers out of work', than a dramatic variation in the number of hectares being involved. More research is required to identify the type of information supplied within valuation contexts that respondents do tend to be sensitive to. Chapter 10 discusses symbolic aspects of CV responses in considerably more detail.

(iv) Path analysis results support the general framework outlined for the expression of citizen values, attitudes and citizen opinions, suggested in Chapter 5. Modification indices indicate that no major misspecifications are present when the proposed model is estimated. As expected on the basis of prevailing theories in psychology, the influence of generalised attitudes and values on CV response is mediated by more domain specific attitudes, with the more generalised measures then having little direct influence on CV response. The same structural model appears to apply equally to referendum and trust fund scenarios.

(v) The path analysis results indicate that abstract measures of core social values have surprisingly high explanatory power with respect to CV responses. Unfortunately, studies that have regressed measures of actual behaviour on individuals' core values are rare, and hence it is difficult to put this result in perspective. It would appear, however, that CV responses provide a convenient vehicle through which respondents can express their values. This value-expression maintains high explanatory power, despite its abstract, generalised nature, and the various constraints such as price and income, that respondents are required to take into account. This result is consistent with the limited sensitivity to scope referred to above. Of the various measures of held values used in this study, those corresponding to postmaterialism and the social
values inventory appear to have greatest explanatory power in the context of CV.

(vi) A comparison of the direct (budget constraint) and indirect (attitudinal) effects of income on CV response reveals that although these effects can cancel one another out, the often positive relation between environmental concern and income means that they may add together in a positive fashion. It is perhaps surprising then, that valuation functions with statistically significant income coefficients tend to be quite elusive in Australia, and also overseas. An important implication here is that statistically significant income coefficients do not necessarily add much support to the consumer model of CV responses. The results of this study indicate that the attitudinal role of income can be far more significant than the budget constraint role. The extent to which significant income coefficients support the CV-consumer model thus depends on whether the attitudinal effect involves attitudes of a consumer nature.

**Intrinsic Rights and Moral Absolutism**

(vii) A structural model linking beliefs regarding intrinsic value, the wrongness of harming nature, moral absolutism, and two procedural notions regarding the role of economics in decision-making has been proposed and estimated. Diagnostics provide no indication of major model misspecifications, and general support for the postulated model is found.

(viii) Results indicate that beliefs concerning distributive justice (for example, belief in intrinsic species rights) can influence CV response in a variety of ways. Not only do they have an influence on level of environmental concern, but they may suggest which rules (eg utilitarian, deontological) are appropriate when tradeoffs arise. This in turn has clear implications for the perceived appropriateness of various procedural arrangements (such as the perceived appropriateness of environmental valuation). An interesting result is that although a large proportion of respondents do not see monetary valuation of the environment as an appropriate way to make decisions regarding environmental matters, this belief does not appear to have an influence on CV response in either trust fund or referendum scenarios. This suggests that few respondents perceive the true valuation nature of CV questions.

(ix) Results are also consistent with the notion that individuals (as citizens) respond to the tradeoffs implied in CV questions in a variety of ways. Some respondents appear to behave an absolutist or deontological manner, and others
respond in a utilitarian manner. Results indicate that absolutist responses may be significant determinants of CV response in both referendum and trust fund scenarios. Given the results of Section 8.6, absolutist responses in the referendum format (scenario 3) would appear to involve redirections of government expenditure. Further research is required to investigate the public's willingness to trade finances in one government portfolio for another.
CHAPTER 10

A MODEL OF VALUE-EXPRESSIVE AND SYMBOLIC CV RESPONSES

10.1 INTRODUCTION

In his discussion of the citizen, Sagoff (1988) emphasises that individuals will often respond to CV questions according to a deontological or rights-based ethical theory. In chapter 5 it was argued that different citizens employ different ethical theories when forming preferences regarding environmental matters, and that in the ideal, these preferences will not necessarily be deontologically motivated, and may well be utilitarian. Results in Chapter 7 and 9 suggest that respondents’ beliefs regarding intrinsic species rights may well be motivating absolutist or lexicographic CV responses.

Edwards (1992, 1986) has discussed the possibility of ethically driven lexicographic preferences and argued for a greater focus of research on the motivations behind CV responses. There is only currently a small amount of existing empirical evidence relating to such motivations. In another study regarding existence values for wildlife, two thirds of respondents to a salmon survey said that “trade-offs between money and wildlife did not describe their decision-making behaviours, and 70% of all respondents gave answers which appeared inconsistent with either the neoclassical or lexicographic models of behaviour” (Stevens et al, 1991, p 398). This lead these authors to conclude that “alternative models of individual decision making may be needed for existence value analysis” (Stevens, et al, 1991, p 399).

Schkade and Payne (1993, 1994) used verbal protocol analysis to investigate thought processes driving CV responses and found few instances of reasoning involving the required economic trade-offs. Rather, a range of factors appeared to be influencing CV responses. Twenty-three percent of respondents, for example, “suggested a desire to signal concern for larger or more inclusive issues, such as preserving the environment or leaving the planet for their progeny” (Schkade and Payne, 1994, p100). This reasoning was seen to be consistent with a symbolic interpretation of responses. Mitchell and Carson (1989, p249) have described symbolic bias as occurring “when respondents react to an amenity’s general symbolic meaning instead of to the specific levels of provision described ... a propensity to respond to the symbol rather than the substance”. Schkade and Payne (1994) also found support for the Kahneman and Knetsch (1992a) notion that CV responses reflect the moral
satisfaction associated with the payment or contribution. Plott (1993, p472) concluded that although results exist that may be considered consistent with the warm glow thesis, no model, based on an appropriate theory, currently exists: "If one is to test the 'warm glow' hypothesis, very little theory exists to serve as a guide for the modelling effort".

The purpose of this chapter is to respond to the requests of authors such as Edwards (1986), Stevens et al (1991) and Plott (1993), and to present a theoretically informed motivational model of 'seemingly lexicographic' CV responses, and to discuss the implications of the model in terms of current issues in CV as outlined, for example, in the NOAA Nobel Laureate Panel's findings. The focus is on the symbolic expression of citizen attitudes and values in CV studies, and the demarcation between the associated symbolic responses and the more frequently cited warm glow responses. The chapter draws together a number of findings from earlier chapters, particularly those relating to absolutist (or seemingly lexicographic) preferences (Chapters 5, 7, 8 and 9), the high explanatory power of values and generalised attitudes in CV studies (Chapters 4 and 9), and the tendency for individuals to adopt different roles in different institutional contexts (Chapters 3, 5 and 8). In contrast to Sagoff's (1988) suggestions of deontological type respondent behaviour, the model presented in this chapter is grounded within a utilitarian framework.

The chapter contains two main components; a theoretical discussion in Section 10.2, and an initial empirical investigation in Section 10.3. Section 10.2 is structured as follows. Section 10.2.1 introduces the theoretical discussion and briefly elaborates on the existing findings relating to symbolic and warm glow CV responses, introduced in Chapter 2. Section 10.2.2 discusses the nature and significance of symbols, Section 10.2.3 discusses the notion of symbolic attitudes, briefly introduced in Chapter 5, and Section 10.2.4 relates such attitudes to CV responses. Section 10.2.5 presents a decision - theoretic model of symbolic or value-expressive CV responses, and Section 10.2.6 extends the model to encompass another closely related type of motivation. Section 10.2.7 discusses the implications of the model.

Section 10.3 presents a first, albeit limited, empirical look at the model presented in Section 10.2. After introducing the analysis in Section 10.3.1, Section 10.3.2 estimates some of the key parameters of the model, using responses to questions contained in the AFAS. Section 10.3.3 uses regression analysis to provide a limited test of the model, and Section 10.3.4 presents the results of a simple simulation model. Section 10.4 contains conclusions for the chapter. A dichotomous-choice referendum CV format will be assumed, since it is taken that this appears to be most
favoured when eliciting non-use values associated with public goods (Mitchell and Carson, 1989).

10.2 THE THEORETICAL MODEL

10.2.1 Introduction

The notion of symbolic CV responses dates at least to Kahneman (1986), who found that the proportion of respondents willing to pay various amounts of money to clean up lakes is ‘strikingly similar’ for the Haliburton region of Ontario, the Muskoka region of Ontario, and all of Ontario. Kahneman attributed this ‘embedding’ type effect to ideological contamination that results in symbolic demand (see Chapter 2). He noted that “people seemed to be ready with an answer before the relevant numbers are specified” (p190).

Mitchell and Carson (1989) accept Kahneman’s arguments, although they are less pessimistic in the conclusions they reach. Mitchell and Carson (1989) also note that ‘symbolic bias’ is most likely to be a problem when the issue under investigation is controversial and/or stimulates strong emotional feelings which “might make it difficult for respondents to focus on the valuation-relevant aspects of the scenario” (p250).

Since the publication of Kahneman and Knetsch’s (1992a) controversial paper regarding embedding and the suggested moral satisfaction explanation, attention has been directed at the idea that CV responses may be motivated largely by the respondent’s desire for ‘warm inner glow’. An important feature of the warm glow hypothesis, explored by Andreoni (1987, 1990) is that the “warm glow of moral satisfaction ... increases with the size of the contribution: for this unusual good, the expenditure is an essential aspect of consumption” (Kahneman and Knetsch, 1992a, p64). The warm glow is held to result in an embedding effect in which the “moral satisfaction associated with contributions to an inclusive cause, extends with little loss to any subset of that cause” (p64). The warm glow hypothesis recently found favour at the Exxon sponsored Cambridge Economics conference (Hausman, 1993, p38). Diamond et al (1993,p58), for example, noted that CV answers may

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1 Because the methods used by Kahneman and Knetsch (1992a) to measure moral satisfaction are questionable, they are not discussed here. Smith (1992) and Harrison (1992) have criticised the Kahneman and Knetsch (1992a) study. Of particular concern is the way moral satisfaction was measured. It is unclear whether the satisfaction self-reports represent moral satisfaction or simply some index of utility (Smith, 1992).
reflect a ‘warm glow’ associated with showing support for the environment. When the ‘value’ of preserving two areas is obtained by summing the answers from two surveys, the resulting ‘value’ incorporates two ‘warm glows’. Thus, this ‘value’ will exceed the ‘value’ obtained from asking about the two areas jointly, which incorporates only one ‘warm glow’.

Diamond and Hausman (1993, p27) conclude that

people do indeed care about preserving wilderness areas, but we infer that standard CV questionnaires do not generate a description of preferences but, rather, elicit responses that generally express concern about preserving wilderness. One can interpret this result as saying that the warm glow effect makes up the overwhelming fraction of the answer.

In this chapter it is argued that this expressive concern that Diamond and Hausman refer to is more indicative of symbolic responses than warm glow responses. Similarly, it is argued that Plott (1993) mistakenly attributes features of symbolic responses to the warm glow hypothesis. He states (p472-4) that the -

intuition behind the ‘warm glow’ hypothesis is derived from several observations scattered throughout the conference papers. First, it is noted that CV typically employs questions that are hypothetical.... Second, the bimodal responses mentioned earlier can be interpreted as political statements. Some people would pay nothing to save a wilderness area because they are ‘in favour of logging’.... Finally, in the paper by Schkade and Payne, evidence is given that people think in such terms (like charitable giving) when answering CV questions (p472-3).

He goes on to suggest that CV measures an attitude of a different sort to that expected on the basis of economic theory. It also is interesting to note that Kahneman and Knetsch (1992a) prefer the moral satisfaction explanation of their results to the symbolic demand explanation. They state (p62) that “unlike demonstrations of embedding for existence value, the present results cannot be explained by invoking a concept of symbolic response”. The reasons for this are not discussed, and indeed, the statement itself is unclear. It is difficult to accept that emotion and symbolism do not apply to the goods and services investigated in their study, especially given that the telephone survey was conducted only weeks after a major earthquake. To fully understand symbolic CV responses, and how they differ to warm glow responses the nature of symbols must first be understood. Now consider this briefly.

10.2.2 Symbols and Nature

In a stimulating essay on human values and natural systems, Rolston (1988, p281) stresses the highly symbolic meaning that we often attach to nature:
Take the natural symbols—light and fire, water or rock, morning and evening, the warmth of summer and the cold of winter, the flows of spring and the fruits of fall, rain and rivers, seeds and growth, earth and sky. How readily we put these material phenomena to "metaphorical" or "spiritual" use, when we speak of life's 'stormy weather', or of strength of character like a rock', or insecurity 'like a shifting sand'....

Morgan et al (1983, p4-5) define a symbol as a

sign which denotes something much greater than itself, and which calls for the association of certain conscious or unconscious ideas, in order for it to be endowed with its full meaning and significance.... Symbols are [thus] signs which express much more than their intrinsic content; they are significations which embody and represent some wider pattern of meaning.

The role of symbols and symbolism in non-western cultures has been studied in considerable detail, where it is often taken that the spiritual, sacred, and ritualised are more salient than in western cultures. However, even in western cultures, symbols may be seen to "influence virtually every aspect of our existence" (Morgan et al, 1983, p5). Symbols may be consciously contrived to create certain effects, or they may arise unconsciously. They may also be highly individualised or of practically universal significance (Morgan et al, 1983). Physical objects, attitudes, values, events, and behaviour can all have symbolic content or meaning, and those relating to the environmental are no exception. Rothman and Lichter (1987), for example, argued that environmental issues are predominantly symbolic in nature, and for individuals alienated from the social and political system, may serve as a surrogate for criticism of these systems. Having found that value-orientations were the most important determinants of risk perceptions concerning Great Lakes pollution, Steel et al (1990) concluded support for a symbolic interpretation of risk preferences.

Kennedy (1988) describes how symbols can be interwoven into the goals, inputs, structures, processes and outputs of forest resource management. In terms of public perceptions, Kennedy (1988, p245-246) notes that in western societies,

urban citizens usually perceive and value public forests less for their practical, utilitarian, commodity values than for their idealistic and romantic meaning and recreational uses. ..Natural resource managers who are perplexed by citizens who value wilderness they will probably never 'instrumentally' visit .... or rare or endangered wildlife they will never see ... fail to appreciate the strong symbolic values these signs have in urban society.

Symbolism thus cuts across a diverse range of goods for which markets already exist. Indeed, advertising often seeks to create symbolic images that may lead to purchases that would otherwise not occur.
Few environmental economists would disagree with this comment, since symbolic values can be considered a legitimate component of ‘existence value.’ Indeed, symbolism may actually be used to explain why values arising from CV studies are typically quite high. To say that eagles should be sacrificed for the sake of development is to reveal more than a willingness to forgo birds of a particular kind, but also a willingness to sacrifice the symbolic values that are associated with these birds. A decision to sacrifice eagles is for many individuals also a decision to sacrifice freedom, strength and beauty. But can such symbolic attributes be valued in dollar terms? Are they commensurable? Are people willing to put a price on the symbol of freedom? And if so, what other implications follow?

Symbolism stimulates feelings, and the associated emotional and intuitive preferences cannot always be moulded into logical and analytical object-appraisal evaluations. According to Daniel (1988), techniques such as CV may often not succeed in translating or forcing the emotional side of human judgements into the required logical and analytic framework of cost-benefit analysis: “Effective integration ... may require a more substantial modification of the policy and decision-making system”(p289). Unfortunately, Daniel does not elaborate on why intense emotional and intuitive feelings cannot be moulded into a CV framework. Certainly, respondents who perceive a CV question to involve an attempt at placing dollar values on the environment, may reject such a notion and respond in a strategic or protest manner. Results in Chapter 9, however, suggest that this may not present much of a problem in dichotomous-choice CV studies.

A further consideration is that symbolic content may lead to embedding, since the symbolic content of preference objects may not be additive in the usual utilitarian sense. Two eagles may represent no more freedom than one eagle. This is not the whole story, however. A proper understanding of CV responses requires reference to the link between symbols, values, and attitudes. Central here is the concept of value-expression, which evolves when we turn to the notion of symbolic attitudes.

10.2.3 Symbolic attitudes

Recent years have witnessed the emergence of the concept of symbolic attitudes in the psychological and sociological literature. Symbolic attitudes may be regarded as attitudes “involving strong affect, tied to important moral concerns or core values, and as primarily expressive (vs instrumental) in nature” (Chaiken and Stangor, 1987,
p579). As such, they tend to arise in relation to attitude objects with high symbolic content. Symbolic attitudes "are typically conditioned early in life and are not due to the implications of the issue for one's personal welfare.... Attitudes formed on the basis of symbolic beliefs reflect, among other things, the influence of the individual's values, or beliefs about what would benefit society as a whole" (Young et al., 1991, p272). The result can be cognitive compartmentalisation of personal and group well-being (Kinder and Sears, 1981). The moral and societal orientation of symbolic attitudes has affinities with the distinguishing characteristics of citizen responses outlined in Chapter 5. The notion of symbolic predispositions was introduced in Chapters 3 and 5. Appendix C discusses the literature on symbolic attitudes in more detail.

The concept of symbolic attitudes involves taking a functionalist approach to attitudes, the theory of which was originally advanced by Katz (1960) and Smith et al (1956). According to the functionalists, "people hold and express certain attitudes and beliefs because doing so meets psychological needs" (Abelson and Prentice, 1989, p361). Katz (1960) argued that attitudes may serve several different purposes in our lives. Firstly, an attitude may serve the instrumental (or object-appraisal) function of helping us gain rewards and avoid punishments. Secondly, an attitude may serve an ego-defensive function of helping us to avoid personality conflicts and anxiety. Thirdly, it may serve a knowledge function by helping us to order and assimilate complex information (often by acting as a schema), and finally, it may serve a value-expressive function where it is rationally thought out to reflect deeper values and ideals. Of course a given attitude may serve several functions. Herek (1987), for example, found that students' attitudes concerning homosexuals served a single attitude function in 64 percent of cases, and two or more functions in the remaining 36 percent of cases. Herek (1986) distinguishes between two types of expressive functions; social-expressive and value-expressive functions. The former involves a social identification or adjustment function and defines the social group anchorage of the individual, and seeks to minimise discomfort resulting from failure to meet expectations. The latter involves the degree to which a given belief expresses deeper, more fundamental beliefs.

3 This is in line with Daft's (1983) 'dual-content framework' for the analysis of symbols, which suggests that symbols communicate instrumental and/or expressive information to individuals, and that the relative importance of these two types of symbolic content will vary from one symbol to another. He also suggested that expressive symbols may pertain to more abstract and/or poorly understood phenomena.
In the context of CV responses in mail questionnaires, value-expressive, ego-defensive and knowledge functions can be expected to be common. The former is “directed mainly towards confirming the validity of one’s own self-concept” (Stahlberg and Frey, 1988, p153 in Hewstone et al) and less at bringing about outcomes. An individual who considers herself to have strongly green values, is thus likely to feel the need to express a green response in a CV questionnaire. Failure to do so might result in ambivalence or dissonance, which in turn may activate ego-defensive functions, whereby the individual employs defence mechanisms such as rationalisation (and sometimes projection of negative feelings onto others) (Stahlberg and Frey, 1988). The knowledge function of attitudes may help the individual to avoid attitude dissonant information in the first place, by causing the individual to skip over information that is perceived as unlikely to be of any consequence. An individual with strongly green values, who thinks that forests should be preserved without question, may skip over important scenario information and jump straight to the dichotomous response question.

Herek (1986) refers to a table, reproduced here as Table 10.1, in discussing which attitude functions are likely to be dominant in given contexts. As this table shows, Herek claims that an attitude serves an evaluative function when the benefit (or satisfaction) to the individual derived from its expression is low and the benefit to the individual derived from the attitude object or outcome is appraised to be high. An expressive function is served when the benefits from expression are high and the (instrumental) benefits from the object are low. When neither function provides high benefits, the attitude is non functional and can be easily changed, and attitudes providing high amounts of both kinds of benefits are ‘complex’, and although less easily changed, are susceptible to situational influences.

Herek (1986, p112) notes that to “the extent that attitudes are complex ... a message will be more effective in changing attitudes when situational factors ‘prime’ the person to be receptive to the function stressed in the message”.

4 Domain characteristics and personality characteristics are the other sources of attitude function. Regarding situational characteristics, a “social expressive function will be fostered when group membership and social acceptance are salient. Value-expressive functions are likely to emerge when personal values and ideology are made salient” (Herek, 1986, p109).

5 Young et al (1991), for example, successfully primed the object-orientated or self-interest side of political attitudes.

6 Fazio (1989) has noted that the power and functionality of an attitude is determined by the likelihood that the object will be activated from memory upon mere exposure to the attitude object.
### TABLE 10.1 CATEGORIES OF ATTITUDE FUNCTIONS

<table>
<thead>
<tr>
<th>Amount of benefit derived from attitude's expression</th>
<th>Amount of (Instrumental) benefit derived from object</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Nonfunctional attitudes Low</td>
</tr>
<tr>
<td>High</td>
<td>Evaluative Function</td>
</tr>
<tr>
<td>High</td>
<td>Expressive Function</td>
</tr>
<tr>
<td>High</td>
<td>Complex Function</td>
</tr>
</tbody>
</table>

(Source: Herek, 1986, p106)

#### 10.2.4 Symbolic Attitudes and CV

In order for CV results to be consistent with the framework of cost-benefit analysis, CV responses need to be based on object-appraisal considerations (ie instrumental benefits). The respondent is typically required to state whether or not he or she is willing to pay \(Sc\) in order to achieve personal benefits associated with a preservation outcome. The personal benefits can be based on either egoistic or (impurely) altruistic considerations. For current purposes what matters is that these benefits are assumed to be associated with a preservation outcome, and not the process of expressing one's preferences.

When utility is gained from the act of expressing one's attitudes (or values), the decision facing the individual is then no longer the required object-appraisal CV decision, concerning whether \(U'(A,y^0) \geq U'(B,y^0-c)\), but rather whether \(U'(A,e_A,y^0) \geq U'(B,e_B,y^0-c)\), where \(A\) and \(B\) are the two attitude objects (policies, programs or states of the environment, \(q_1, q_2\)) to be considered in the CV question, and \(e_A\) and \(e_B\) indicate that the individual may receive benefits from expressing attitudes in favour of \(A\) and \(B\) respectively.

It is important to note that the satisfaction one derives from value (or attitude)-expression is different to the warm inner glow usually involved in arguments about CV responses. In the former case, the utility arises from having expressed one's preferences.

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7 Using the arguments \(A\) and \(B\) in the utility function in place of \(q_1\) and \(q_2\) permits a more general case to be considered, and makes the following discussion less complicated. As discussed in Chapter 5, objects of choice often include factors such as development benefits that the classical CV formulation does not allow for. It is assumed that \(A\) and \(B\) represent multidimensional policies, even though they are not explicitly represented as vectors.
values, whereas in the latter, it arises from having made a behavioural promise to donate dollars to a good cause.\textsuperscript{8} The latter is thus directly related to intended payment: without an intention to actually pay, warm glow benefits are not possible. In contrast, expressive benefits can be obtained without an intention to pay if, for example, one does not believe that payment will actually be required of individuals.

When the amount of utility riding on the outcome of a CV response is significantly higher than the amount of utility associated with expressing one’s attitudes or values\textsuperscript{9}, CV responses will, other factors aside, exhibit the desired CBA properties, this situation corresponding to the top right cell of Table 10.1. In CV valuation functions, this implies statistically significant coefficients for price and income, and any measures of outcome-orientated tastes and preferences.

The fact that tastes and preferences are typically interpreted as general attitudes relating to total economic value, TEV, can make it difficult to identify the function(s) these attitudes serve. Existence Values, for example, are often measured using likert-scale responses to statements such as “It is important to have places where plants and animals are preserved even if I never actually go there to see them”. Attitudinal responses to such a statement could reflect either value-expressive or instrumental functions, and finding statistically significant coefficients for such variables does not tell us which is having the dominant effect on CV responses. Price, however, is different. If attitudes such as the above have significant explanatory power but price (and/or income) do not, then it would appear that respondents are expressing their values in a way that is not constrained by outcome related factors such as price. Of course, value-expressive responses can have a substantial influence on WTP estimates without variables such as price and income failing to become statistically significant. If, for example, only 50 percent of respondents take any notice at all of price, and the remaining 50 percent take full account of it, the latter may be sufficient to produce a significant price coefficient. This is explored further in Section 10.3.4.

At this stage it might appear that value-expression in CV questions can be an expensive business. If ignoring price and responding ‘symbolically’ to CV questions actually costs the individual the $c stated in the question, then the benefits from value-expression must surely be substantial. But do individuals really believe that a

\textsuperscript{8} Responding to questions in a questionnaire can in fact be viewed as a contribution, in the sense that each response makes a small contribution to an important decision facing society.

\textsuperscript{9} The model can be applied to either attitude or value expression, and hence the terms attitude and value are used interchangeably in this chapter. This is not to say that the benefits from attitude expression are the same as those from value-expression.
yes response in dichotomous choice CV questions will cost them $c, or do they discount this cost for some reason? This question is worth pursuing, given several of the results in Chapters 4, 8 and 9, that suggest that individuals appear to be expressing values and attitudes in a way that is not particularly price sensitive.

10.2.5 A Decision-Theoretic Framework

Some progress can be made here by drawing on the theory of electoral preference advanced initially by Brennan and Buchanan (1984) (the seeds of which were sown by Buchanan, 1954, see Chapter 3), and extended by Brennan and Lomasky (1993). The discussion that follows focuses mainly on dichotomous-choice referendum format CV studies. Focussing on this particular format not only makes discussion easier, but is perhaps the easiest with which to draw comparisons with electoral choice.

Brennan and colleagues use a decision-theoretic framework to argue that human behaviour is institution dependent and that individuals can be viewed as having two-hats, one for behaviour in markets and one for the ballot box and other collective activities. The central analytic proposition that Brennan draws on in establishing the two-hats proposition (also referred to as behavioural non-neutrality) is that in the market the individual is decisive, whereas in the ballot box he or she is not.

*Faced with a choice between market options a and b, the agent genuinely chooses one or the other. It is a genuine choice because the opportunity cost of opting for a is b forgone. The chooser actually gets what he chooses.... At the ballot box, in particular contrast, the agent is nondecisive. The opportunity cost of “choosing” electoral option A is not the other option B forgone (or, at least in any except very remote cases): Whether option A or B actually emerges as the electoral outcome is a matter not of how I vote, but of how everyone else does (Brennan and Lomasky, 1993, p15).*

Brennan and Lomasky show how the same egoistic motivational structure can produce different behaviour in different institutional domains\(^\text{10}\). Their ‘two-hats’ model thus assumes motivational neutrality, but behavioural non-neutrality.

Brennan and Lomasky note that public choice theorists actually use the notion of expressive elements (civic duty) to explain voter turnout, and that it seems unlikely that such ethical considerations would disappear once the voter has arrived at the ballot box. Rather, Brennan and Lomasky see value-expression and hence ethical concerns as playing a greater role in electoral preferences than in market preferences.

\(^{10}\) The “way in which that uniform motivational structure fleshes itself out in behaviour is, we argue, likely to be radically different in the two institutional settings. Each institutional structure engages, as it were, with different aspects of human motivation” (Brennan and Lomasky, 1993, p15).
"Political symbols that seem likely to stimulate a sympathetic response in voters— that generate expressive returns— will become the very stuff of democratic politics" (Brennan and Lomasky, 1993, p41). It may be the "symbolic power of the policy, rather than the costs and benefits the policy scatters on particular voters that will be most relevant" (Brennan and Lomasky, 1993, p51). In the environment domain, this symbolism arises not only from politicians and the media, but perhaps most importantly, from conservation groups.

According to Brennan and Lomasky (1993), electoral preferences are to be seen as more impartial and reflective than market preferences, since the inconsequentiality of voting can lead to detachment. "The individual is able to consider his electoral decision from an overall, impersonal standpoint rather than, as is the case in the market, in terms of narrow costs and benefits" (p153). "The voter who perceives herself as endorsing through her vote an equitable distribution of resources thereby receives a direct expressive return" (p106).

Before returning to CV, a brief overview of the decision-theoretic framework is in order. Consider the rational individual faced with a choice between the same options, denoted A and B, in the marketplace and electoral settings respectively. In the former case, the choice is decisive, and if the value in dollar terms that individual \( i \) places on outcomes A and B are \( R_{iA} \) and \( R_{iB} \) respectively\(^{11}\), then the expected instrumental or object-appraisal value of a choice for A is

\[
Y_i^A = R_{iA} - R_{iB}
\]

In the electoral case where the individual is not decisive, the expected instrumental value of a vote for A becomes

\[
Y_i^A = h(R_{iA} - R_{iB})
\]

where \( h \) is the probability that \( i \) will be decisive, which is assumed to equal the probability of a tie among all other voters\(^{12}\).

\(^{11}\) The following decision-theoretic discussion is framed in terms of the monetary equivalents of benefits individuals derive. This is what Brennan and Lomasky (1993) use, and is the most easily interpreted in the CV context.

\(^{12}\)(i) The essential results do not change if we suppose a mandate model (see Brennan and Lomasky, 1993 for discussion), in which the size of a majority is seen to have an influence on decisions. (ii) Although we have assumed linearity here, the qualitative results will be unaffected by the use of a non-linear function instead. The quantitative results may however be affected.
Now, let $E^i$ denote the value in dollar terms that the individual obtains from simply expressing a preference for A, rather than B. If $L^i_A$ and $L^i_B$ represent the expressive returns to i of expressing preferences for A and B respectively, then

$$E^i = L^i_A - L^i_B.$$  

Decisiveness does not enter here because value-expressive benefits accrue to the individual irrespective of what others do. Overall, the individual will choose A over B in the market if:

$$R^i_A + L^i_A \geq R^i_B + L^i_B \quad (1)$$

and will vote for A over B in the electoral setting if

$$h.R^i_A + L^i_A \geq h.R^i_B + L^i_B \quad (2)$$

Comparison of these two conditions indicates that in the electoral context instrumental elements carry a weight $h$ times that of expressive elements, where $h < 1$. That is, a one dollar benefit from instrumental returns from A has the same impact on the overall decision as $h$ in expressive benefit ($h < 1$).

What values for $h$ might we expect? In the simplest binomial formulation analysed by Brennan and Lomasky (1993), values of $h$ are a function of two parameters; the number of voters $n$, and the expected proportionate majority for A, $t$ (or the difference between 0.5 and the probability that each voter votes for A). Table 10.2 shows some values of $1/h$ corresponding to various values of $n$ and $t^{13}$.

---

13 Refer to Section 10.3.2 for one of the formulae given by Brennan and Lomasky (1993).
TABLE 10.2 VALUE OF THRESHOLD INSTRUMENTAL RETURN REQUIRED TO HAVE SAME INFLUENCE ON VOTE AS ONE DOLLAR OF EXPRESSIVE RETURN.

<table>
<thead>
<tr>
<th>Electoral Size</th>
<th>Value of t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$t=0.0000$</td>
</tr>
<tr>
<td>2001</td>
<td>56</td>
</tr>
<tr>
<td>20001</td>
<td>177</td>
</tr>
<tr>
<td>200,001</td>
<td>560</td>
</tr>
<tr>
<td>10 million</td>
<td>4000</td>
</tr>
<tr>
<td>100 mill.</td>
<td>12500</td>
</tr>
</tbody>
</table>

Source: Brennan and Buchanan 1984, p190.

We are now in a position to see how Brennan’s model might be adapted to the case of responses to referendum CV studies. Do respondents perceive their own responses to a questionnaire as decisive? If responses are to be considered appropriate for use in CBA, the required answer must be ‘yes’. Such use of the results from CV surveys requires that respondent behaviour can be considered equivalent to market behaviour, as represented by (1) above. This is unlikely to be the case, however. Firstly, it is hard to imagine any respondent who would think that they are the only one to receive a given questionnaire. In general, the populace is familiar with the notion of surveys, particularly in relation to polls regarding political preferences. Secondly, even if all other respondents were expected to be tied in relation to responses to a CV question, it is still unlikely that the individual would see his or her response as entirely decisive. In Australia at least, results of community attitude surveys tend to be only one of a number of inputs to management decisions, and it is certainly the exception that survey results are the sole determinants of such decisions. In the case of public (environmental) inquiries, for example, community input has to be considered along side a range of expert evidence relating to the social and physical sciences, as well as other forms of community input such as public hearings and written submissions. Although the typical respondent is unlikely to be aware of the exact nature of other inputs, it does seem unrealistic to assume that they see them as non-existent. It might be more realistic to assume that respondents see survey results as one of 5 or 10 aspects of the overall investigation. A third possible source of perceived nondecisiveness, perhaps particularly relevant to commissions of
inquiry, is that recommendations of the government department or other organisation in charge of making the overall recommendations (if applicable) is not necessarily decisive. When recommendations are forwarded to relevant ministers, final decisions are then subject to a range of political considerations, which can potentially result in failure to adopt and implement such recommendations. For present purposes, it is assumed that CV scenarios, including payment vehicles, are accepted as real and not hypothetical by respondents. It is assumed, for example, that respondents do not perceive the questionnaire as purely an academic exercise. The discussion also abstracts away from protest responses regarding payment vehicles, implied property rights etc.

Overall, then, it is highly unlikely that respondents do in fact see their own responses as decisive. CV responses may resemble electoral votes more than market choices, as reflected in $h \ll 1$. Adapting the above decision-theoretic framework for electoral choice to responses in dichotomous-choice referendum CV formats, simply involves the addition of parameters to account for the fact that electoral results are usually decisive whereas survey results are not. Let $h$ represent the probability of being decisive in the results of a referendum CV question. Let $s$ represent the probability of the questionnaire results being decisive, including non-decisiveness at the political level. If $B$ represents a higher level of environmental quality than the original level $A$, then the rational referendum CV respondent will vote for $B$ over $A$ if

$$h \cdot s \cdot R^i_A + L^i_A \leq h \cdot s \cdot R^i_B + L^i_B$$

Since instrumental factors involve a cost, in the form of payment, in the case of $B$ but not $A$, (3) may be restated as

$$h \cdot s \cdot O^i_A + L^i_A \leq h \cdot s \cdot O^i_B - h \cdot s \cdot P^i_B + L^i_B$$

where $O^i_A$ is instrumental benefits associated with $A$ (outcome related WTP for development, equivalent to $R^i_A$), $O^i_B$ represents TEV associated with $B$, and $P^i_B$ represents the cost (bid value or price) associated with $B$ (ie $R^i_B = O^i_B - P^i_B$).

Now surveys generally involve smaller sample sizes than real referenda or other electoral choices. Thus for a given value of $t$, $h$ will be larger in the CV context than in the true electoral context. If, for example, we assume $n$ is approximately 2000 and $t$ is close to 0.0, then on the basis of $h$ alone, one dollar’s benefit from value-expression has the same influence on individual responses as approximately $50 worth of outcome-appraisal benefit. Remembering that the payment figure, $P^i_B = sC$, is an important part of the outcome side of the equation, and probably the most
unambiguous component available for investigation, this suggests that responses will be 50 times more sensitive to value-expressive benefits than price.

What happens when the parameter $s$ is introduced? Although it is possible to use some sort of mathematical formulation to derive an estimate of the likelihood of all other the inputs to a given overall environmental decision being exactly balanced (and hence the survey results being decisive), there is little point in following this route here, especially given the complex and variable nature of high level decision-making. Rather, a ball-park figure for $s$ of 0.1 is simply adopted. This figure, based on the results of discussions with individuals when pretesting a questionnaire, assumes that individuals think that the questionnaire results have a probability of being decisive of about 10 percent. Once this is accounted for, our previous threshold figure of $50 now jumps to $500. One dollar benefit from value-expression now has the same influence on CV response as a stated (once-off) payment of $500. This comparative influence of expressive and instrumental considerations in CV response formulation applies whether we are considering yes or no CV responses. It is certainly an interesting result, if one accepts the above framework and assumptions made.

If it is accepted that expressive returns may be far more influential on CV responses than instrumental returns, this does not necessarily mean that individual CV responses, and hence estimated mean or median WTP, will be biased as a result, since instrumental and expressive considerations may both suggest the same CV response. And indeed, even if differences in suggested instrumental and expressive responses do occur, it is conceivable that the biases resulting from pro-environment and pro-development value-expression might cancel out, leaving estimates of mean or median WTP little affected. Table 10.3 presents a matrix of combinations of CV responses suggested by instrumental and expressive concerns.

Cases 1 and 4 involve no disagreement between the CV responses suggested by instrumental and expressive concerns. Case 1, for example, involves an individual who would like to express his or her pro-environment values and whose total economic value for the environmental good in question exceeds that required to justify the personal payment of $P_B = c$. Case 4 involves an individual who would like to express his or her pro-development values, and whose total economic value for the environmental good in question is less than that required to justify the personal payment of $P_B$. Cases 1 and 4 present no problem for CV.
TABLE 10.3 MATRIX OF CV RESPONSES SUGGESTED BY VALUE-EXPRESSIVE AND INSTRUMENTAL CONCERNS\textsuperscript{14}

<table>
<thead>
<tr>
<th>Suggested Value-Expressive Response</th>
<th>YES (pro-environment orientation)</th>
<th>NO (pro-development orientation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suggested Instrumental Response</td>
<td>YES</td>
<td>Case 1</td>
</tr>
<tr>
<td></td>
<td>$L_A &lt; L_B$</td>
<td>$L_A &gt; L_B$</td>
</tr>
<tr>
<td></td>
<td>$h.s.O_A &lt; h.s.O_B - h.s.P_B$</td>
<td>$h.s.O_A &lt; h.s.O_B - h.s.P_B$</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>Case 3</td>
</tr>
<tr>
<td></td>
<td>$L_A &lt; L_B$</td>
<td>$L_A &gt; L_B$</td>
</tr>
<tr>
<td></td>
<td>$h.s.O_A &gt; h.s.O_B - h.s.P_B$</td>
<td>$h.s.O_A &gt; h.s.O_B - h.s.P_B$</td>
</tr>
</tbody>
</table>

Now consider Case 3. This involves an individual who would like to express his or her pro-environment values but whose total economic value for the environmental good in question is less than that required to justify a personal payment $P_B$. A low income individual with moderately green values and faced with a required payment of $200 is a likely candidate here. The payment associated with the green outcome drives a wedge between the suggested instrumental responses, based on $O_A$ and $O_B$, and expressive responses, based on $L_A$ and $L_B$. Although CV intends to drive a wedge between price and individuals’ environmental values, when non-decisiveness enters their calculations, problems may arise when individuals react to the wedge by responding expressively (yes) rather than instrumentally (no), thereby resulting in upwardly biased CV responses for case 3 respondents\textsuperscript{15}. If the above theory of symbolic CV responses is accepted, this upward bias may be considerable, manifesting itself in empirical results through a flattening in fitted logit curves.

\textsuperscript{14} (i) Cases where equalities occur in the first equation in each cell present no problems from a CV perspective, since respondents will presumably then respond according to instrumental benefits. When equalities occur in the second but not the first equation, problems may arise if value-expressive considerations tend to favour one vote in preference to another. A small bias in the direction of the outcome with highest expressive benefits results. (ii) The h’s and s’s cancel in the second equations.

\textsuperscript{15} It is possible that some individuals will experience moral costs associated with giving misleading 'yes' responses. The emotion associated with the issue under investigation, and the fact that the response is to the benefit of a higher moral cause (preservation of wildlife) may, however, make it easy to rationalise away, ignore, or not experience such costs in the first place.
Case 2 involves an individual who would like to express his or her pro-development values, but whose total economic value for the environmental good in question is large enough to justify a personal payment of $P_a$. Thus although the individual generally places greater importance on economic growth than environmental protection, for the particular area under investigation, he or she is willing to pay the amount specified. This could arise if the individual sees the good in question as of exceptional environmental importance, or if he or she sees some self-centred reason to preserve, such as friends, relatives or self being likely to benefit from preservation, through recreational, employment or any other means. A NIMBY (not in my backyard) response, for example, might involve an individual who generally supports (or sees no problems with) hazardous waste disposal plants, opposing such a plant when it is proposed for the individual’s own local neighbourhood\(^\text{16}\). Of course similar types of considerations may occur with Case 3.

A fundamental difference between Cases 2 and 3 exists, however: in Case 3 price conflicts with expressive desires, whereas in Case 2 price reinforces expressive desires. The proportion of ‘pro-environment’ individuals falling into the case 3 category rather than the case 1 category is thus expected to be less than the proportion of ‘pro-development’ individuals falling into the case 2 category rather than the case 4 category\(^\text{17}\).

This suggests that if equal proportions of respondents have pro-environment and pro-development orientations, Case 3 will be more common than Case 2. It follows that the net effect of expressive considerations across the entire sample will be to produce upward biases of WTP.

In practice, however, it is unlikely that equal numbers of respondents will have pro-environment and pro-development orientations. The actual proportions will be a function mainly of the existing proportions in the populations and response biases associated with self-selection. Although it is possible that a sufficiently large majority of pro-development orientations may exist to allow the effects of case 2 responses to ‘balance out’ the upward biases resulting from the price related wedge associated with case 3, this is perhaps unlikely to occur. It is certainly not the case in Australia.

\(^{16}\) This is an example of a LULU, or locally undesirable land-use. Another common form of NIMBY relevant to CV studies occurs when individuals tend to favour environmental protection, when the economic benefits forgone do not affect the individual and/or family, friends, community etc.

\(^{17}\) We are assuming that other factors, such as expressive benefits and non-price instrumental benefits, have similar distributions for the two sub-populations.
for example, where the vast majority of individuals have a pro-environment orientation rather than a pro-economic-development orientation (Lothian, 1994). Since response biases are unlikely to reverse this trend, and in fact can be expected to exaggerate it, CV responses in Australia can be expected to result in upwardly biased estimates of median WTP. The magnitude of this may be quite significant, given that pro-environment orientations appear to be about five times as common as pro-development orientations, and that the pro-environment orientation is the most susceptible to diverging instrumental and expressive preferences. The net effect of expressive considerations on estimates of median WTP will, however, vary from culture to culture, and target population to target population. On the face of it, it might appear that the general tendency will be to produce upward biases amongst affluent western societies.

It thus appears that not only are instrumental and expressive preferences expected to diverge frequently in CV studies, but it is also highly unlikely that the overall effects will balance out. If the above framework is accepted, symbolic CV responses will typically result in either underestimates or overestimates of the median environmental values required for CBA, and in the majority of cases, one might speculate it will be the latter. The above discussion has focussed on the impact of symbolic responses on median WTP. In the case of the mean, the direction of biases is less uncertain. Because symbolic CV responses cause a flattening in estimated logit curves, the larger right-hand tails that are associated will produce dramatic overestimates of mean WTP.

10.2.6 Broadening the Model: Outcome-Related Expressive Responses

Thus far, the discussion in this chapter has focussed purely on internally-motivated value-expressive CV responses. The benefits from expression arise from the individual’s desire to express a response that is consistent with his or her core values, and hence concept of self.

Another form of expressive behaviour in CV studies, and which has not been referred to in this chapter, is the outcome-related expressive CV response. Unlike the value-

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18 Lothian (1994, p94) conducted a major survey of Australian questionnaire results pertaining to these orientations, and concluded that the “overall average for these surveys was: pro-environment 85 per cent, pro-alternative 15 per cent, nearly six to one in favour of the environment. The results of these surveys indicate the over-whelming pro-environmental preference of the Australian community”.

19 This assumes that negative WTP associated with the left tail is not calculated and subtracted.
expressive form discussed above, this expression is motivated by a desire to influence the outcomes of a CV study in a manner not intended by the researcher. It is useful to distinguish two types of outcome-related expressive CV response: (i) those for which the payment vehicle is believed, and (ii) those for which it is not. The latter is associated with 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. The model presented above can be broadened to incorporate this type of expressive response, by defining a further parameter \( v \), representing the perceived probability that the payment vehicle is realistic and implementable. When equation 3 is modified accordingly, the rational referendum CV respondent will then vote for B over A if:

\[
h' \cdot s' \cdot v \cdot R_A^i + L_A^i \leq h' \cdot s' \cdot v \cdot R_B^i + L_B^i
\]

where \( h' \) and \( s' \) are \( h \) and \( s \) redefined to be conditional on a perceived certainty of payment vehicle implementation \((v=1)\). The parameter \( s' \) thus represents the probability that the questionnaire results will be decisive in bringing about the outcome pertaining to the issue under investigation, given that a pro-environment outcome would cost all individuals the amount of money specified by the bid value. The parameter \( v \) represents the probability that this cost would actually arise. Results of Chapter 7 indicate that the value of \( v \) in Australian CV studies employing tax payment vehicles may be far from 1.0. Individuals corresponding to case 3 in Table 10.3 may be particularly likely to assess how realistic the payment vehicle is, since they have the most to gain by identifying a weakness. Alternatively, their desire to express their values may cause them to skip right over such information. In either event, it is clear 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 it is not, may present a formidable, if not impossible, challenge. Here may lie a root of the problem with the RAC south-east forests study discussed in Chapter 4. The payment vehicle in this study may not have stood up to the close scrutiny to which case 3 individuals subjected it.

The first type of outcome-related CV response is a common phenomena in actual voting behaviour, and involves ‘sending a message’ to politicians or decision-makers. This may take several forms. First, one might predict that the preferred outcome, say the re-election of a particular political candidate, is sure to come about (be voted in).
In order to prevent complacency on the part of the candidate, the voter may actually vote against him or her, in an attempt to make the winning margin as small as possible. Second, voters may attempt to vote against the wishes of their candidate, when relatively unimportant issues arise. A committed labour voter may thus vote against a labour candidate in a local election (for example a by-election) in the hope that the federal labour minister does not become complacent. The same applies to opinion polls relating to voting intentions. It can be optimal to vote against one’s wishes in an opinion poll, when one expects that politicians ‘may get their act together’ if informed about poor polling results.

It is not entirely clear how the first type of outcome-related expressive concern is manifested in the results of CV studies. One might expect that the problems arising are small in comparison to the other types of expressive motivation discussed above.

10.2.7 Implications of the Model

It has been argued that in one important respect, namely the probability of being decisive, CV responses represent political votes more than market purchases. Such a notion of institution dependent behaviour has roots in Buchanan (1954), who identified several other differences between individual choice in voting and in the market. The argument that CV responses resemble votes is consistent with the common occurrence of bi-modal WTP distributions (Plott, 1993).

Although the discussion in this chapter has focussed around the referendum format, the same general principles apply to market-based CV questions. It is conceivable, however, that the referendum format might stimulate voter responses more than the market format. One way to investigate this is to compare referendum and non-referendum dichotomous choice studies. According to the above model, it is hypothesised that referendum or voting formats are likely to produce higher estimates of WTP than non-referendum or non-voting formats. Some support for this hypothesis is found in McFadden and Leonard (1993) who found that including the words ‘vote for’ in a dichotomous choice CV question produced higher WTP.

It is also conceivable that the model presented above may explain the greater price sensitivity in the trust fund scenario of the AFAS than the referendum scenarios (Chapter 8). Certainly, implementation bias may lie behind this result, as discussed in Section 10.2.6., and it is quite possible that the model of Section 10.2.5 is also at work here. The latter is unlikely to explain the complete lack of price sensitivity in the referendum scenarios, however. There is no reason why the value-expressive model could not be adapted to voluntary trust fund responses. In this case, the
relevant notion of decisiveness would be the perceived likelihood that the individual’s own contribution would tip the scales in favour of preservation. This would depend on the number of respondents making a contribution, and the total contribution required to tip the scale. One might expect that overall perceptions of decisiveness in trust fund and referendum scenarios are unlikely to differ to the extent required to account for the differences in price sensitivity. Note that although the difference appears to be related to a redirection of tax revenue interpretation of scenarios 1 and 3, the lack of price sensitivity with this interpretation still remains to be explained. Section 10.3 explores the applicability of the (internally motivated) value-expressive model to the AFAS referendum scenario results.

It is also clear now why the statements of Diamond and Hausman (1993) and Plott (1993), quoted above, confuse symbolic responses with those motivated by the desire for warm glow. The first two points raised by Plott in favour of the warm glow thesis are actually more applicable to the theory of symbolic responses. A central aspect of the latter is that responses are seen as hypothetical in the sense of being of little influence, even when the scenario is perceived to be real. In contrast, a distinguishing feature of the warm glow thesis is that expenditure necessarily accompanies warm glow and as a consequence, hypothetical interpretations of CV questions cannot result in warm glow as defined by Kahneman and Knetsch (1992a) and Andreoni (1987, 1990). Plott’s observation that CV responses resemble political statements is also more consistent with the symbolic attitudes theory, since institution-dependent behaviour is central to this theory. Advocates of the warm glow thesis, in contrast, do not appear to offer an a priori explanation linking warm glow to political statements. Applying the notion of non-decisiveness to the warm glow hypothesis would see warm glow diminishing in accordance with perceived non-decisiveness.

Diamond and Hausman’s (1993) linking of expressive concerns with warm glow also appears to lack theoretical basis. Warm glow results primarily from the act of giving to a good cause, not from expressing one’s values. And regarding Plott’s (1993) suggestion that CV measures an attitude of a different sort to that expected on the basis of economic theory, the author could not agree more. It has been argued that CV responses will, in many cases, represent simply an expression of symbolic attitudes which, in the case of CV, may involve ‘discounting’ price. It is not clear how the different sort of attitudes that Plott (1993) refers to relate to the warm glow thesis.

A question that arises is the following: If symbolic responses are to a large extent price insensitive, then are they also insensitive to other features of the scenario?
According to the model, differences in scenarios will produce different results to the extent that they involve differing symbolic content and hence emotion and value arousal. Mentioning the word ‘cyanide’, or referring to ‘jobs’ in a CV scenario can thus be expected to produce different results. Changing the number of hectares of forest at stake, as in the RAC south-east-forests study, is much less likely to stimulate a reaction, however, since whether its 50% of the forests being preserved or 10%, the symbolic contents of the words used in the scenarios is the same in both cases. A related implication of the theory presented in this chapter is that there may be little or no incentive for cognition, because the costs of wrong decisions are extremely small. In discussing the implications of the work of Brennan and colleagues, referred to as ‘low cost decision theory’, Kirchgassner (1992, p311) notes that using “traditional economic arguments, we cannot explain why behind a ‘veil of insignificance’ any voter should—according to his/her preferences, vote ‘correctly’ or vote ‘wrongly’ either”\(^{20}\). Although non-decisiveness may result in issue-specific preferences that are dominated by ethical concerns, they may be constructed on the basis of less deliberation than more decisive preferences. One might expect that Sagoff (1988) would support the former consequence but not the second. Note, however, that in terms of stimulating ‘ethical preferences’ for the purposes of social choice, the use of low-decisiveness incentives is not only cognitively-efficient, but capable of being used on large representative samples of individuals. In contrast, citizen juries (see Chapter 5) are cognitively demanding and likely to involve small unrepresentative samples.

A defence that is sometimes offered in relation to the validity of CV is that referendum CV studies, or even actual opinion-polls, have proved to be fairly accurate predictors of actual electoral outcomes (Carson, 1993). It is important to note, however, that ‘electoral validity’ does not necessarily imply ‘market validity.’ Because both CV questionnaires and actual referenda may be dominated by expressive responses that discount outcome related concerns such as price, one cannot assume that the results of either imply the public’s true WTP for the program in question. Electoral validity may not be a sufficient condition for the CBA use of CV results.

The symbolic response model also offers an explanation as to why dichotomous-choice CV studies tend to produce higher estimates of WTP than open-ended

\(^{20}\) Kirchgassner (1992) goes on to discuss how ‘soft incentives’, or psychic costs, may dominate preferences under situations of low decisiveness, and how soft incentives can be in competition with one another. An interesting implication here is that value-expressive incentives may come into conflict with soft incentives concerning honesty or truthfulness. It may thus be useful to think in terms of net psychic costs. See also Kirchgassner and Pommerehne (1993).
equivalents (Walsh et al., 1990, Kristrom, 1990b, Desvousges et al., 1993, Brown et al., 1994). In a dichotomous choice study, respondents wanting to express their ‘green values’ must say yes to whatever price they are presented with. Saying ‘no’ to $200 when your true maximum WTP is $150 is likely to leave you ambivalent, since a no response puts you in the same box as someone with pro-development values (negative WTP), or someone with a lower positive WTP ($2, for example), and does not permit you to unambiguously express your values. In contrast, one can express green values in open-ended questions by offering any amount of money. Blamey (1994, p.173) refers to this phenomena as ‘close enough bias’, suggesting that the:

\[
\text{closer one's maximum WTP is to the supplied figure (but still below it) the greater the likelihood of a misleading 'close-enough' response. Although a crude model, it is possible to envisage respondents as being liable to close-enough bias when their true maximum WTP is closer to the supplied bid value than to the midpoint of zero and the bid value.}
\]

Blamey (1994) presents a simple model of ‘close-enough’ response behaviour, in which a linearly increasing probability of misleading response is assumed when actual WTP is in excess of 75% of the bid value presented to respondents, but less than the bid value itself. Blamey adjusted the dichotomous choice data of Kristrom (1990) according to this model and found that estimated mean WTP was reduced by 25%.

In a comparison of dichotomous-choice and open-ended CV responses in actual and hypothetical payment contexts, Brown et al. (1994) found that WTP estimates were higher in the dichotomous-choice case, and that this difference was greatest with hypothetical payments than actual payments. One explanation that the authors offer for their results is that open-ended questions are more difficult, and more difficult questions result in lower WTP\(^{21}\). Although this may explain the higher WTP estimates in dichotomous choice studies, it does not explain why the difference is greater when hypothetical payments are involved. The second preferred explanation submits that “respondents have two objectives in responding to a WTP question. First, they may want to truthfully answer the question asked about their actual willingness to pay. Second, they may want to indicate how favourably they view the

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\(^{21}\) In order to test the hypothesis that CV questions perceived to be more difficult result, ceteris paribus, in lower estimates of WTP, CV response in the AFAS trust fund scenario was regressed on a standard set of independent variables, and variable B5c relating to perceived difficulty of the CV question. The estimated logistic regression was as follows: \(\log(\text{odds of yes CV response})= -0.7687 - 0.0785 \text{price} - 0.0093 \text{income} + 1.0959 \text{BAL1} - 2.6302 \text{BAL2} + 0.2433 \text{B5c}\). The respective standard errors were 0.4393, 0.0177, 0.0482, 0.2755, 1.0394, and 0.1167. The variable B5c is positively signed and statistically significant at the 95% significance level (\(p=0.037\)), supporting the claim that the more difficult a CV question is perceived to be, the lower the likelihood of a yes response in a dichotomous choice study, and the lower the resultant estimates of WTP.
good at issue, or at least whether they view the good favourably” (Brown et al, 1994, p13). Brown et al’s brief discussion of how individuals might respond to the problem of dual objectives is very similar to that discussed by Blamey (1994). Neither explores the broader implications of value and attitude expression. The results of Brown et al (1994) support the more encompassing model presented in this chapter.

The model presented above focuses on value-expression. There is, however, another type of expressive response acknowledged in the literature, and that is the social-expressive response noted above. Social expressive concerns can be similar to social desirability biases, which, although largely (if not wholly) absent in mail questionnaires, apply to in-person and, to a lesser extent, telephone interviews. When one takes into account the likely non-decisiveness of a CV response, the prospect of simply pleasing the interviewer can become considerably more attractive. In this respect, mail surveys may offer an advantage over in-person interviews. In terms of value-expression, mail questionnaires may also give respondents more time to think, and put emotions and off-the-cuff opinions aside before answering. In this respect responses may be less symbolic. In-person interviews can also involve presenting respondents with information containing higher symbolic content than mail or telephone modes; for example, by including more photos of dead animals, bulldozers etc.

The symbolic response model supports Mitchell and Carson’s (1989) observation that symbolic responses may be more problematical when the issue under investigation is controversial and the subject of emotional discussions. In the absence of emotion, the model presented above may be less applicable, since the expressive benefits will tend to be much smaller. It is accepted that ‘successful’ valuations of a range of symbolic environmental goods have been reported in the literature. When non-use values are the major component of total economic value, it can be expected that in controversial cases, respondents will be subjected to some degree of symbolic media coverage, prior to being presented with the questionnaire. This is largely a result of the work of interest groups such as Greenpeace, who actively work to promote symbolic images and stimulate public emotion. Individuals may thus bring some form of issue-opinion to the valuation situation, along with an emotional desire to express that opinion. The expression of opinions specific to the issue under investigation is consistent with our model, as long as outcome-related aspects are subordinated to expressive interests. Indeed, drawing on psychological findings, it has been suggested that environmental issues are likely to be accompanied by symbolic attitudes which are closely tied to moral concerns and hence values, and which are primarily expressive. It is possible, however, that these symbolic attitudes may be highly issue-specific. In such cases,
responses will have lesser tendency to produce embedding effects or part-whole biases. It is also possible, that CV responses may express broad value concerns exhibiting all of the characteristics of symbolically driven embedding effects, but may be totally price responsive. Both types of responses are special cases of the model outlined above. In the event that responses are issue specific and price responsive, no problem may arise for CV for CBA, and the term symbolic bias may no longer be relevant.

A possible exception here is when cognitive dissonance arising from conflicting expressive and outcome interests causes 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. 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’.

Now consider briefly the implications of our symbolic response model for three topical and controversial areas in CV. The first is the argument that estimates of WTP arising from CV studies are too high to be believable. In terms of the issues addressed by the NOAA Nobel Laureate Panel, this relates to the implausibility of responses and also the absence of a meaningful budget constraint. The model provides some support for these claims, since individuals are assumed to ‘discount’ price. This does not mean that symbolic responses imply lexicographic responses in the sense that the individual will respond the same to any price. Rather, a threshold exists beyond which individuals wishing to express their green values or attitudes will derive less utility from the act of expression, than the expected net utility loss associated with the instrumental factors including ‘discounted’ price. The theory is thus consistent with the large right tails observed in many dichotomous-choice CV studies, and the fact that large left and right tails, or flatter than expected logit functions tend to be associated with voter responses. Desvousges et al (1993), for example found that more than 30% of their dichotomous-choice sample agreed to pay at least $1000 per year to prevent damage from oil-spills, and Diamond and Hausman (1993) link large WTP responses with political statements, warm glow and a vague notion of value-expression. Blamey (1994) found that more than 30 percent of respondents indicated a WTP of at least $3000 per year to prevent the environmental impacts associated with logging on Fraser Island in Queensland, Australia. There were still indications, however, that had prices in excess of $3000 been used, a greater proportion of respondents would have responded no. It is perhaps hard to
accept that many respondents with green values would respond yes to any price in dichotomous-choice studies, as a ‘deontological ethic’ interpretation of responses might suggest (Sagoff, 1988). According to the symbolic response model, everyone’s discounted price thresholds will at some stage be exceeded. In terms of equation (4) above (Section 10.2.5), there must be some \( P_B \) such that \( h.s.O_A^i + L_A^i > h.s.O_B^i - h.s.P_B + L_B^i \).

A further point worth noting is that people are notoriously bad at handling small probabilities when it comes to information processing (Hogarth, 1987). This means that faced with extremely small probabilities of decisiveness, individuals may tend to either exaggerate the probabilities when information processing, or treat them as zero. In the latter case, truly lexicographic responses arise, in the unbounded sense. One might also imagine a choke-effect amongst CV respondents behaving in a strategic manner (ie strategic bias). In terms of maximising strategic influence, responding yes to ‘ridiculously high’ figures, that the individual could obviously not afford, may not always be advisable, since it may lead researchers to question the truthfulness of the response, and possibly not take it seriously. Numerous explanations can be offered that are consistent with claims that \( WTP \) responses tend to be implausibly high.

Further work is clearly needed to identify those that are most significant, and the extent to which the combined effects produce problematical results.

Second, consider the implications of symbolic responses for part-whole bias. Mitchell and Carson (1989, p237) view symbolic bias and part-whole bias as special cases of amenity misspecification bias. Amenity misspecification bias occurs “where the perceived good being valued differs from the intended good” (p237). Part-whole bias occurs where “a respondent values a larger or a smaller entity than the researcher’s intended good” (p237). Mitchell and Carson (1989) acknowledge that part-whole biases will often result from symbolic effects where the public goods under investigation are treated as global symbols, without paying sufficient attention to the information supplied in the scenario. In addition, it is argued here that it may be rational in a decision-theoretic sense for individuals to discount symbolically neutral scenario information, and respond in a value-expressive, manner.

Part-whole biases are similar to perfect embedding (defined in Chapter 2). As a third application of the value-expressive model to a topical issue in CV, consider regular embedding, and the related phenomena of sequential disaggregation. Here, the WTP for a good/service differs when valued alone to the value obtained from first obtaining WTP for a more inclusive good, and then disaggregating to obtain the portion attributable to the good in question. The question of whether income and substitution
effects alone can explain such results was discussed in Chapter 2, and is not repeated here. The implications of our symbolic response model for sequential valuation and disaggregation studies are two-fold. First, income effects may still apply, although the discounting of price will make such effects very small indeed. Secondly, since individuals are responding to the symbol rather than the substance, substitution effects will focus more on substitution with regard to the specific symbols at issue, rather than symbolically-neutral features of the scenario. Once the individual has expressed his or her values aroused by a given symbol, the utility gained from successive expressions of that same value can be expected to be diminishing. An interesting feature of symbolic responses, however, is that the estimated WTP arising from more inclusive causes can actually be lower than that arising from less inclusive causes. This will arise when the less inclusive cause has greater symbolic content, and stimulates emotions and the need for value-expression more than the inclusive cause. It is conceivable, for example, that the bald eagle contains greater symbolic content than preserving birds in general.

As Schkade and Payne (1994) state, CV studies will reflect a range of motivations and types of reasoning. A theory relating to one particular type of motivation, symbolic CV responses, has been offered, with the intention of stimulating greater theoretically informed discussion of symbolic biases, and also warm glow ‘biases’. It is not claimed that all, or even most, CV responses will necessarily follow such a pattern in any one CV study, nor is it argued that the occurrence of symbolic bias precludes warm glow effects, or vice versa\textsuperscript{22}. Empirical research is clearly needed to investigate such effects in greater detail.

### 10.3 EMPIRICAL RESULTS FOR THE VALUE-EXPRESSIVE SYMBOLIC RESPONSE MODEL

#### 10.3.1 Introduction

In this section a first attempt is made to empirically explore the model presented above in Section 10.2. The analysis focuses on the internally motivated form of the model, and hence does not address the considerations of Section 10.2.6. A rigorous

\textsuperscript{22} Evidence that individuals often do not follow models of decisiveness is found among individuals who personally boycott various products, often because the producers of such products are involved in unethical investments. Unless the individual expects to be the decisive force in changing the producers investment practices, there would appear little reason to boycott the products of the company. Note however that what is likely to be motivating such boycotters is their personal norms or ethics, the maintenance of which can bring substantial internal benefits. Boycotting is thus consistent with the model presented in this chapter.
test of the model is not attempted. The main reason for this is that at the time the model was developed, the author was already committed to the above case study involving a mail survey, and a proper test of the model is probably better suited to a controlled laboratory experiment. There are several reasons why an empirical test of the model in a mail survey study such as that presented above is limited. First, perceived decisiveness in the above case study is expected to be very small for the vast majority of the sample, perhaps too small for the model to predict that any respondents would be price sensitive. Second, the observations in Section 10.2.7 regarding how individuals handle small probabilities present problems. Third, further treatments and hence more sub-samples would ideally have been used, for which funds were not available here.

Notwithstanding such considerations, an attempt is made in this chapter to explore the value-expressive model to the extent possible, given the nature of the survey data available. First, the likely magnitude of the decisiveness parameters is estimated. Second, regressions are employed to test whether perceived decisiveness is a significant determinant of CV response. Third, a simple simulation model is presented that explores the implication of lexicographic responses on estimated valuation functions. Although this latter analysis involves only a simplified version of the value-expressive model, it provides an important insight into the link between lexicographic citizen responses and measures of validity and reliability typically used in the context of CV.

10.3.2 Decisiveness in the AFAS CV question

In order to gain some idea of the values that \( h \) and \( s \) are likely to take on in an actual CV mail questionnaire, several questions were appended to the end of the AFAS questionnaire. The first of these, question f19a, sought information regarding perceived sample size:

\[
\text{F.19. How many people do you think a questionnaire like this would be sent to?} \\
\text{Please make a guess?} \quad \_\_\_\_\_\_\_\_
\]

Although this is clearly an unusual question to include in a questionnaire, the results should give some idea of the distribution of perceived sample sizes. Results are summarised in Table 10.4, where the data has been collapsed into a number of categories.
The results indicate a wide range in perceived sample sizes, with 65 percent of the sample estimating it to be in excess of 2000, 49 percent estimating it to be in excess of 5000, 31 percent estimating it to be in excess of 10,000, and 16 percent estimating it to be in excess of 100,000. Now consider respondent perceptions regarding the likely distribution of responses to the CV question. The following question (f19b) was included in order to provide an estimate of the parameter $t$:

If you had to guess the percentage of respondents indicating a response in favour of Option B (Conservation Reserves) in Question B2 (page 5), what would your best guess be? ______ %

Responses to this question indicated that 39 percent of respondents thought that the majority would favour Option A, 44.9 percent thought that the majority would favour option B, and 16.0 percent thought that it would be equally divided. In order to provide respondent estimates of the parameter $t$, responses to f19b were subjected to the following manipulation, $f19b' = \frac{\text{ABS}(f19b-50)}{100}$. The distribution of resultant estimates of $t$ is presented in Table 10.5.

<table>
<thead>
<tr>
<th>Perceived Sample Size, N.</th>
<th>Frequency</th>
<th>Valid Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100</td>
<td>39</td>
<td>2.6</td>
</tr>
<tr>
<td>101 - 500</td>
<td>106</td>
<td>7.2</td>
</tr>
<tr>
<td>501 - 1000</td>
<td>242</td>
<td>16.4</td>
</tr>
<tr>
<td>1001 - 2000</td>
<td>136</td>
<td>9.2</td>
</tr>
<tr>
<td>2001 - 5000</td>
<td>233</td>
<td>15.8</td>
</tr>
<tr>
<td>5001 - 10000</td>
<td>257</td>
<td>17.4</td>
</tr>
<tr>
<td>10001 - 50000</td>
<td>122</td>
<td>8.3</td>
</tr>
<tr>
<td>50001 - 100,000</td>
<td>101</td>
<td>6.9</td>
</tr>
<tr>
<td>100,001 - 500,000</td>
<td>79</td>
<td>5.4</td>
</tr>
<tr>
<td>5000,001 - 1,000,000</td>
<td>67</td>
<td>4.5</td>
</tr>
<tr>
<td>&gt; 1 million</td>
<td>91</td>
<td>6.2</td>
</tr>
</tbody>
</table>
### TABLE 10.5 VALUES OF T FOR AFAS CV QUESTIONNAIRE (ALL SCENARIOS COMBINED)

<table>
<thead>
<tr>
<th>Value/Range in %</th>
<th>Frequency</th>
<th>Valid Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>234</td>
<td>16.1</td>
</tr>
<tr>
<td>0.01</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>0.02</td>
<td>9</td>
<td>0.6</td>
</tr>
<tr>
<td>0.03</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>0.04</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>0.05</td>
<td>80</td>
<td>5.5</td>
</tr>
<tr>
<td>0.06-0.10</td>
<td>357</td>
<td>24.5</td>
</tr>
<tr>
<td>0.11-0.20</td>
<td>335</td>
<td>22.9</td>
</tr>
<tr>
<td>0.21-0.30</td>
<td>276</td>
<td>18.9</td>
</tr>
<tr>
<td>0.31-0.40</td>
<td>115</td>
<td>7.9</td>
</tr>
<tr>
<td>0.41-0.50</td>
<td>42</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Results indicate that the majority of the estimates are not close to zero, with only 17.2 percent of respondents indicating values below 0.05.

Since the instrumental returns required to be equal in value to one dollar's expressive returns rise 'astronomically' as t departs from 0.0 (Brennan and Lomasky, 1993, p57), and since the majority of respondents estimate t to be well in excess of 2000, it can be expected that for the majority of pro-environmental respondents (who respond according to this general model), the perceived probability of being decisive in the questionnaire results will be very small.

With respect to the additional parameter s, two further sub-questions were appended to the questionnaire. The percentage responses are indicated below.

Surveys like this one are often used by public inquiries. The Resource Assessment Commission, for example, used several questionnaires in conjunction with its public inquiries.

When conducted in conjunction with public inquiries, how much do you think the results of such surveys have an influence on final management decisions?
It is clear from these results that respondents do not see the results of either the AFAS questionnaire, or those conducted in conjunction with public inquiries, as decisive. With only about 15 percent of respondents seeing these questionnaires as having considerable influence, or a great deal of influence, the parameter $s$ will further reduce the perceived probability of decisiveness, below what it would be on the basis of $n$ and $t$ alone. Given that the most common responses are 'little influence' and 'some influence', it would appear that a value of $s$ in the vicinity of 0.1 may not be far off the mark for the majority of respondents. Note that the decisiveness of the AFAS questionnaire is perceived to be marginally lower than used in conjunction with public inquiries.

Overall then, it appears that the parameters $n$, $t$ and $s$ are, for most respondents, such that they will produce a very low probability of decisiveness. Following Brennan and Lomasky (1993, p.56) the probability of decisiveness within the questionnaire results can be approximated according to the following equation:

$$h = \left(3.1416n^{0.5}\right) \cdot \left(\frac{1-4t^2}{n}\right)$$

This equation was used to calculate the within-questionnaire decisiveness levels for scenario 3 respondents in the AFAS survey. This can be multiplied by the perceived probability of the results of the questionnaire being decisive. The following subjective probabilities have been assigned to the various response categories of question f19d: f19d=1 becomes $s=0.01$, f19d=2 becomes $s=0.05$, f19d=3 becomes $s=0.10$, f19d=4 becomes $s=0.20$, and f19d=5 becomes $s=0.5$). Multiplying these estimates of $h$ and $s$ produces estimates of the overall perceived probability of being decisive with respect to future management of the south-east forests. These estimates are summarised in Table 10.6.
TABLE 10.6  SUMMARY OF ESTIMATED OVERALL DECISIVENESS LEVELS: SCENARIO 3 RESPONDENTS

<table>
<thead>
<tr>
<th>Probability of Decisiveness: h*s</th>
<th>Frequency</th>
<th>Cumulative Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00000 (exact)</td>
<td>140</td>
<td>40.2</td>
</tr>
<tr>
<td>0.00000 (rounded, r)</td>
<td>148</td>
<td>82.8</td>
</tr>
<tr>
<td>0.00001 (r)</td>
<td>8</td>
<td>85.1</td>
</tr>
<tr>
<td>0.00002 (r)</td>
<td>3</td>
<td>85.9</td>
</tr>
<tr>
<td>0.00003 (r)</td>
<td>6</td>
<td>87.6</td>
</tr>
<tr>
<td>0.00004 (r)</td>
<td>4</td>
<td>88.8</td>
</tr>
<tr>
<td>0.00005 (r)</td>
<td>1</td>
<td>89.1</td>
</tr>
<tr>
<td>0.00006 (r)</td>
<td>10</td>
<td>92.0</td>
</tr>
<tr>
<td>0.00008 (r)</td>
<td>7</td>
<td>94.0</td>
</tr>
<tr>
<td>0.00009 (r)</td>
<td>5</td>
<td>95.4</td>
</tr>
<tr>
<td>0.00013 (r)</td>
<td>4</td>
<td>96.6</td>
</tr>
<tr>
<td>0.00016 (r)</td>
<td>3</td>
<td>97.4</td>
</tr>
<tr>
<td>0.00018 (r)</td>
<td>4</td>
<td>98.6</td>
</tr>
<tr>
<td>0.00025 (r)</td>
<td>2</td>
<td>99.1</td>
</tr>
<tr>
<td>0.00036 (r)</td>
<td>1</td>
<td>99.4</td>
</tr>
<tr>
<td>0.00040 (r)</td>
<td>1</td>
<td>99.7</td>
</tr>
<tr>
<td>0.00041 (r)</td>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>348</td>
<td></td>
</tr>
</tbody>
</table>

The results in Table 10.6 confirm that the perceived probabilities of decisiveness for a typical AFAS referendum CV question are extremely low, with 95 percent of scenario 3 respondents indicating a decisiveness level below 0.001. For these respondents, one dollars worth of internal expressive benefit has the same impact on utility as 1000 dollars worth of outcome related benefit. The highest decisiveness probability is 0.0041, for which the equivalent threshold instrumental return is $244. With a highest bid value of $200 in the CV question, the model thus predicts that practically all respondents will be price insensitive. Of course it is not claimed that the price insensitivity found in the referendum scenarios is a consequence of nearly all respondents following the value-expressive model. As noted previously, a number of factors are no doubt involved, of which one may be value-expression.
10.3.3 Regression Models

The fact that decisiveness levels are uniformly so low means that including variables relating to decisiveness in logistic regression models with CV as dependent variable is, on a priori grounds, unlikely to produce a significant interaction between price and decisiveness or price and environmental attitudes\(^2\). Should statistically coefficients of the expected sign be found, however, the results would appear consistent with a substantial systematic upward bias in WTP estimates (for CBA) associated with value-expressive CV responses.

To test this possibility, logistic regression models were estimated for a typical referendum scenario, scenario 3, with various additive and multiplicative terms involving perceived decisiveness included as independent variables. Three new variables were created for use in the logistic regressions, defined as follows:

- \(\text{decisive} = \) estimated individual's perceived probability of decisiveness in the CV question.
- \(\text{fbal1} = \) a dichotomous dummy variable taking on a value of 1 if the respondent indicated that the preservation of native forests is more important than the economic benefits of logging (question C4); 0 otherwise.
- \(\text{fbal2} = \) a dichotomous dummy variable taking on a value of 1 if the respondent indicated that the economic benefits from logging are more important at this time than the preservation of native forests (question C4); 0 otherwise.

The simplest regression model specification for testing the effect of decisiveness on CV responses is to only estimate it over the portion of the sample for which \(\text{fbal1} = 1\); that is, respondents tending to have a pro-environment, or green orientation. As noted above, it is for these individuals that price drives a wedge, and hence detection of a significant effect is most likely. The first set of model results presented in Table 10.7 correspond to this basic model, where no \(\text{fbal}\) or interaction terms are included.

\(^2\) It is of course possible that a large number of respondents followed the general value-expressive model, but perceived decisiveness levels to be greater than those calculated here.
The results of the first 'basic' model are extremely pleasing, given the above observations regarding the probability of decisiveness. The fact that decisive is near significance at the 95 percent level and of the expected sign provides considerable initial support to the value-expressive model. The results indicate that individuals who are most likely to think that forests should be preserved (ie Bal1=1) are less likely to respond yes to the CV question as their perceptions regarding the decisiveness of their response increases. This is precisely what the value-expressive model predicts: as decisiveness for these individuals increases, they will tend to attach greater weight to outcome related factors such as price, relative to their desire to express a green response. As found in Chapter 8, price coefficients again fail to come close to statistical significance. The fact that they are wrong signed may thus be of little concern.

It is important to note that this result cannot, theoretically, be attributed to strategic biases or warm glow effects, because such responses are not incentive compatible in referendum formats. In the terminology of the value expressive model, both strategic biases and warm glow effects are outcome related, and hence the strategic or warm glow benefits are discounted at the same rate as all other outcomes entering the respondent's mind.
Consider the impact on predicted yes probabilities of an increase in probability of decisiveness from 0.0001 to 0.001. When price is equal to $200 (rprice = 20), the probability of a yes response in model 1 is 0.593 (by simple substitution) when decisive = 0.0001, and 0.473 when decisive = 0.001. This increase in decisiveness of a factor of ten has thus produced a reduction in yes probabilities of 12.0 percent which is quite substantial, and makes one wonder what might happen if the decisiveness increased by a further order of magnitude, or two24. Interestingly, the influence of decisiveness only falls slightly for lower prices. At a price of $10, for example, an equivalent change in decisiveness levels to that assumed above results in a change in predicted yes probabilities of 11.9 percent. This probably reflects the fact that the influence of decisiveness on price-sensitivity is confounded by a range of other factors that have caused individuals to be price insensitive. Indeed, the raw data, and estimated regression coefficients for scenario 3, indicate that the proportion of yes responses actually increases slightly with price. Even if all respondents followed the value-expressive model alone, a positive price coefficient would not be expected. Given that only a portion of respondents are likely to follow the symbolic attitudes model, other factors are clearly involved.

The positive relation between price and yes responses, and the subsequent confounding influence on the value expressive model is more evident when a price*decisiveness interaction term is added to the basic model specification. Results for such a model are presented in Table 10.7 (second set of results). Adding the interactive terms increases the statistical significance of the decisive variable to the point where it is now easily significant at the 95 percent significance level. Although the coefficient for decisive has become greater in magnitude, this increase is largely offset by the moderating effect of decisive on the price/CV-response relationship. As expected on the basis of the values that decisive takes on, this interactive term is not statistically significant at the 95 percent level, which is comforting, given that it is wrong-signed with respect to a priori expectations of the value-expressive model. Although the impact of the additive decisive term on CV response is greater for model two than model one, when the non-significant moderating effect is added to the direct effect, the overall influence of decisive on CV response becomes smaller at higher prices.

Further insight regarding the appropriateness of the value-expressive model can be gained by estimating the regressions over the entire scenario 3 dataset. This means including individuals in favour of forest preservation, those in favour of logging, and

24 This would involve extrapolating beyond the range of decisiveness values present in the data.
those undecided. Since expressive and outcome related considerations are more likely to coincide in the case of pro-logging individuals, according to the value-expressive theory decisive should be a more significant determinant of CV response for pro-protection respondents that for pro-logging respondents. Because the expressive response for pro-logging individuals is no in the CV question, and because some such individuals may actually decide to respond yes to the CV question for outcome-related reasons (eg I didn’t realise the impacts of logging were this bad), the theory predicts that decisive should have a negative effect on the probability of a yes CV response for such individuals, although there is probably not a lot in it.

To estimate the logistic regression over respondents with any of the above attitudes to forest management, dummy variables such as fball1 and fbal2 relating to such attitudes need to be included, along with their interactions with other key variables in the model. The final set of results in Table 10.7 correspond to such a specification. Note that the additive effect of decisive has lost its statistical significance (and changed sign), and that the interactive term (decisive*fball) now picks up the effect of decisive. This interaction has the expected sign and is highly significant, whereas the equivalent term for fbal2 does not come close to statistical significance.

Because decisive now enters the model in four terms, making interpretation more difficult, it is convenient to substitute values for fball1 and fbal2 into the estimated equation, obtaining a clearer comparison of results for pro-logging and pro-preservation respondents. The resulting two relationships are as follows:

\[
\log(\text{odds yes: pro-logging}) = -2.5367 + 0.0116rprice + 663.688\text{decisive} + 67.0601(\text{decisive} \times rprice)
\]

\[
\log(\text{odds yes: pro-pres.}) = 0.8501 + 0.0116rprice - 1313.392\text{decisive} + 67.0601(\text{decisive} \times rprice)
\]

The additive effect of decisive on the likelihood of a yes response is thus positively signed for pro-logging individuals. Given that the remaining interactive term is positively signed, it can be concluded that the overall effect of nondecisiveness for pro-logging individuals is to reduce the likelihood of a yes response, and hence increase the likelihood of a no response, as indicated by the individuals’ general attitude to logging in native forests. The (decisive*rprice) terms is again wrong-signed but not statistically significant at the 95 percent level.

Overall then, it is concluded that the results provide limited initial support for the value-expressive model. Given the extremely low probabilities of decisiveness calculated for respondents, it is most comforting that several statistically significant relationships involving the decisive variable were found, and that in all such cases,
coefficients had the expected sign. Perhaps the benefits that individuals receive from expressing their attitudes and values are well in excess of $1. The model clearly requires further testing before any firm conclusions can be drawn.

10.3.4 A Simulation Model Of Attitude-Expressive CV Responses

An alternate approach to analysing the effect of attitude or value expressive on CV responses and associated logistic regressions is through the use of simulation modelling involving Monte Carlo sampling. Monte Carlo sampling refers to procedures that are used to "sample values randomly from probability distributions. These sampled values are then used in a simulation model" (Watson, 1981, p14).

In the context of CV, probability distributions can be used to generate utility functions or WTP distributions corresponding to any number of respondents, and bid values can be randomly allocated to individuals. A deterministic simulation model can then be used to investigate the effect of different motivational or behavioural assumptions regarding how individuals respond to CV questions.

In this section, the results of a simple Monte Carlo simulation model are described which permits the effects of different proportions of lexicographic responses on estimated logistic regression results to be investigated. Of particular interest is the extent to which the size and statistical significance of the price variable varies, as the proportion of lexicographic respondents is increased systematically from 0% to 95% of the sample. In statistical terms, we are interested mainly in the power of the test of the null hypothesis that the bid value has zero influence on CV response, the power of a test being equal to one minus the probability of a type II error\(^{25}\), or the ability of the test to detect that the null hypothesis is false.

The intention is to show that a statistically significant coefficient on the price variable in logistic regressions is consistent with a large proportion of respondents having responded lexicographically.

It is argued that CV practitioners (and some researchers) tend to focus too much on the simple question of whether a statistically significant price coefficient has or has not been obtained, assuming that if a significant estimate has been obtained, the results "are probably not too bad"\(^{26}\). A more appropriate way to view such results is

\(^{25}\) A type II error occurs when the null hypothesis is accepted but the alternative hypothesis is true. A type I error occurs when the null hypothesis is rejected but it is actually true.

\(^{26}\) This is an over simplification of the diagnostic rigour of many CV researchers. The basic point remains, however.
to ask what is the significance level (on a continuum), and what proportion of lexicographic, strategic responses etc are consistent with this outcome. It is emphasised that the simulation model presented here is necessarily rudimentary. A thorough monte carlo investigation of the effect of lexicographic responses would present a substantial, and most useful, undertaking. The objective here is simply in illustrating the power of the test of the bid coefficient, under conditions similar to that of a typical dichotomous-choice CV study.

The basic elements of the simulation model, and the rationale behind them, are as follows:

(i) a sample size of 1000 is used, in line with the sample sizes typically employed in discrete choice CV studies;

(ii) each 'respondent' is randomly assigned a maximum net willingness to pay for the good under investigation. The use of net WTP is consistent with the notion that in referendum formats, individuals typically make some consideration of the opportunity costs of preservation. The results in earlier chapters are consistent with this. Because net WTP is assumed to equal (WTP for preservation)-(WTP for development), a proportion of respondents will have a negative net WTP. Because the proportion of negative net WTP’s is a function of the mean and standard deviation assumed for the probabilistic normal distribution assumed for this variable, these parameters can be varied to create a desired proportion of negative values. Since approximately 20 % of Australians are known to have pro-development orientations when it comes to environment-development tradeoffs, the mean and standard deviation were chosen such that approximately 20 % of respondents would be allocated negative net WTP values. An arbitrary mean WTP of $100 was assumed, with a standard deviation of $120. Individuals were randomly assigned maximum net WTP’s from this distribution.

(iii) A lexicographic code (LXCODE) between 0 and 1 was also allocated to each respondent, being randomly drawn from a uniform distribution. The value of this variable determines whether the particular respondent responds lexicographically, or instead makes the required economic tradeoff when confronted with the question ‘would you be WTP..?’.

(iv) Each respondent is randomly allocated a bid value, as is typical in dichotomous choice CV studies. Individuals were first randomly allocated a value from the uniform distribution with endpoints 0.0 and 90.0 (the variable BB). If this value is less than 10.0, a bid value of $2 is assigned. If it is greater than or equal to
10.0 and less than 20.0, a bid value of $5 is assigned, and so on, until individuals with BB greater than 80 are assigned the highest bid value of $500. The range of bid values employed are considered typical for dichotomous choice CV studies. The set of bids is (2, 5, 10, 20, 50, 100, 200, 300, 500).

(v) A loop was created in order to enable the proportion of lexicographic respondents to be varied across different runs. The proportion of lexicographic responses increases from 0% to 95% in increments of 5%.

(vi) Lexicographic individuals respond purely in terms of whether net WTP is positive or negative. Someone who has a WTP greater than or equal to zero is assumed to express this preference in the form of a yes CV response, and someone who has a negative WTP is assumed to respond no. This is consistent with the notion of attitude expression and the use of attitudes as default assumptions. Lexicographic responses are unbounded, with no attempt being made to model either the threshold effects referred to by Edwards (1986), or the decisiveness weights discussed above.

(vii) Individuals making the desired economic tradeoff respond in terms of whether net WTP is greater than or less than the bid value assigned to them.

(viii) Based on their net WTP, individuals are assigned a value for the categorical attitude variable, ORIENT.

(ix) Having established each individual’s CV response and attitude value, two logistic regressions are then run, both having CV response as the dependent variable (1=yes, 0=no). The first has both bid and orient as independent variables (Model A), and the second has just bid value (Model B).

(x) The regressions are repeated for each iteration of the loop referred to in (v).

The simulation model was run in SPSS, the program for which is included in Appendix G. The results for the model are presented in Table 10.8.
The main result of interest is that the coefficient for bid value remains statistically significant at the 95 percent level (i.e., < 0.05 in third results column), up to the point where 90 percent of responses are lexicographic, where, in the model specification without the attitudinal variable, it loses its significance. In the model with the attitudinal variable, it is statistically significant when 95 percent of responses are lexicographic. Of course, the precise point at which bid value loses its significance will be sensitive to the assumed parameters for the normal distribution referred to.

<table>
<thead>
<tr>
<th>Percentage of Lexicographic Responses/Model A or B</th>
<th>Result</th>
<th>BID Coefficient</th>
<th>ORIENT Coefficient</th>
<th>Signif. of BID Coeff.</th>
<th>-2logL</th>
<th>% correct pred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>A</td>
<td>-0.0840</td>
<td>8.65</td>
<td>0.0000</td>
<td>111.7</td>
<td>97.3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0148</td>
<td>-</td>
<td>0.0000</td>
<td>896.4</td>
<td>78.0</td>
</tr>
<tr>
<td>10%</td>
<td>A</td>
<td>-0.200</td>
<td>2.55</td>
<td>0.0000</td>
<td>506.8</td>
<td>93.3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0096</td>
<td>-</td>
<td>0.0000</td>
<td>1041/4</td>
<td>76.8</td>
</tr>
<tr>
<td>20%</td>
<td>A</td>
<td>-0.0119</td>
<td>1.82</td>
<td>0.0000</td>
<td>701.8</td>
<td>87.8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0067</td>
<td>-</td>
<td>0.0000</td>
<td>1148.2</td>
<td>74.6</td>
</tr>
<tr>
<td>30%</td>
<td>A</td>
<td>-0.0087</td>
<td>1.72</td>
<td>0.0000</td>
<td>763.7</td>
<td>84.0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0050</td>
<td>-</td>
<td>0.0000</td>
<td>1206.6</td>
<td>68.5</td>
</tr>
<tr>
<td>40%</td>
<td>A</td>
<td>-0.0078</td>
<td>1.74</td>
<td>0.0000</td>
<td>770.0</td>
<td>84.3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0043</td>
<td>-</td>
<td>0.0000</td>
<td>1221.4</td>
<td>68.0</td>
</tr>
<tr>
<td>50%</td>
<td>A</td>
<td>-0.0063</td>
<td>1.81</td>
<td>0.0000</td>
<td>761.2</td>
<td>83.8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0033</td>
<td>-</td>
<td>0.0000</td>
<td>1231.1</td>
<td>65.0</td>
</tr>
<tr>
<td>60%</td>
<td>A</td>
<td>-0.0057</td>
<td>1.895</td>
<td>0.0000</td>
<td>737.7</td>
<td>86.1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0028</td>
<td>-</td>
<td>0.0000</td>
<td>1223.5</td>
<td>66.0</td>
</tr>
<tr>
<td>70%</td>
<td>A</td>
<td>-0.0054</td>
<td>2.02</td>
<td>0.0000</td>
<td>697.1</td>
<td>87.6</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0025</td>
<td>-</td>
<td>0.0000</td>
<td>1204.4</td>
<td>67.1</td>
</tr>
<tr>
<td>80%</td>
<td>A</td>
<td>-0.0042</td>
<td>2.38</td>
<td>0.0000</td>
<td>603.4</td>
<td>90.8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0016</td>
<td>-</td>
<td>0.0001</td>
<td>1166.8</td>
<td>72.2</td>
</tr>
<tr>
<td>90%</td>
<td>A</td>
<td>-0.0026</td>
<td>3.18</td>
<td>0.0002</td>
<td>450.5</td>
<td>96.7</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-0.0005</td>
<td>-</td>
<td>0.2763</td>
<td>1107.9</td>
<td>75.7</td>
</tr>
<tr>
<td>95%</td>
<td>A</td>
<td>-0.0018</td>
<td>4.55</td>
<td>0.0463</td>
<td>291.9</td>
<td>98.2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>+0.0002</td>
<td>-</td>
<td>0.6830</td>
<td>1073.5</td>
<td>77.2</td>
</tr>
</tbody>
</table>
above. As the proportion of respondents with a WTP in excess of the maximum bid value increases, price sensitivity clearly drops off.

For present purposes, it is sufficient to note that for parameter values that appear quite plausible, and for a fairly typical sample size, the power of the test of the hypothesis that bid coefficient equals zero, is very high. The test is capable of detecting small proportions of price sensitive individuals. CV practitioners should thus treat statistically significant bid coefficients as only a weak indicator of the theoretical validity of their results.

10.4 CHAPTER CONCLUSIONS

In an attempt to provide a more encompassing understanding of citizen responses to CV questions, a motivational model of CV responses has been presented. It is expected that the model will only be appropriate for a proportion of CV respondents, and further such endeavours are required before a comprehensive understanding of how citizens actually respond to CV questions can be claimed. Nonetheless, the model presented in Section 10.2 may help explain a number of phenomena that have troubled CV researchers in recent times. This has been discussed in detail in Section 10.2.7, and is not repeated here.

The initial empirical investigation of the symbolic response model indicates that respondents to CV questions are highly unlikely to perceive their responses as decisive. On the basis of the estimates of perceived decisiveness presented in this chapter, one would expect price sensitivity among respondents acting in accordance with the model to be very low indeed. The simulation results indicate that only a small percentage of fully price responsive respondents may be required to produce statistically significant coefficients for price in estimated valuation functions. Obtaining such coefficients is thus only a weak indicator of valid CV results for CBA purposes.
CHAPTER 11

FINAL THOUGHTS

The thesis has discussed differences between consumer and citizen CV responses. The former involves the type of response that is desirable for the purpose of estimating the consumer-surplus or total economic value (TEV) associated with the provision of specified environmental goods or services, for incorporation into CBA. It has been argued that the introduction of referendum and political market models involves a departure from this ‘consumer model’, that has not been fully thought through. The use of the political market model tends to stimulate citizen considerations, which deviate from the desired consumer considerations in several ways. Likely characteristics of CV results that are more consistent with a citizen-voter interpretation than a CV-consumer interpretation include:

(i) Respondents acting altruistically toward other members of the current generation who stand to benefit from a preservation outcome;

(ii) Respondents taking into account the opportunity costs associated with preservation;

(iii) Respondents subordinating private interests in favour of collective interests;

(iv) Respondents taking a range of procedural justice notions into account when formulating responses; and

(v) Respondents having preferences of a seemingly lexicographic nature, motivated by either deontological ethics, rules of thumb or other simplifying decision heuristics, or the utilitarian desire to express one’s preferences and values.

It is also noted that the tendency to use median rather than mean estimates of WTP is more consistent with a citizen-voter interpretation of results than a CV-consumer interpretation.

In this final chapter, the discussion and conclusions of previous chapters are drawn together in a discussion of the social choice implications of the consumer-citizen distinction. It is not intended that this chapter provide a comprehensive listing of all major conclusions of the thesis: these are largely contained in the chapter conclusions and need not be repeated in detail here. Rather, it is taken as given here that CV responses often reflect a range of citizen considerations, and that the political market model primes such thoughts. This permits the question of what constitutes a valid
CV question, to be addressed. The answer depends of course on what the purpose of CV is perceived to be.

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). 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:

**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.

**CBA Valuation Validity** - Does the technique provide the basis for an unbiased estimate of TEV for the difference \( q_1 - q_0 \) in environmental services, as required for the purposes of CBA?

**Program Valuation Validity** - Does the technique provide an unbiased estimate of the value the public attaches to a given government policy or program?

**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?

Consider how different CV formats perform against these notions of validity, when individuals are assumed to take citizen considerations into account when formulating their responses. Table 11.1 summarises the findings. A first point to 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.

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1 As noted in Section 9.2.6, 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).
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 citizen beliefs, attitudes and opinions to the valuation situation, and the survey instrument does not result in the moulding required for a consumer surplus, TEV interpretation of results. 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.

Although program valuation validity is potentially satisfied for, or consistent with the use of, all but the second CV formats listed in Table 11.1, 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 construct validity, as the results of Chapter 7 suggest. 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 convincing the public that additional taxes are realistic, if true valuations are sought. In Australia, this presents a substantial challenge.

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 are 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. The only situation where censoring could be justified in this instance is where responses reflect a failure of individuals to believe certain aspects of the scenario. 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.

---

2 In Australia, where voting is compulsory, an informal vote occurs when the ballot paper is incorrectly filled out, and not included in vote counts as a result.
TABLE 11.1 VALIDITY OF VARIOUS CV QUESTION FORMATS.

<table>
<thead>
<tr>
<th>Question format</th>
<th>Market Validity</th>
<th>CBA Valuation Validity</th>
<th>Program Valuation Validity</th>
<th>Electoral Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary Trust Fund</td>
<td>Consistent format; unlikely vast majority would actually get around to making the promised purchase (See Chapter 3 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).</td>
<td>Consistent format; most citizen considerations cause problems and protests, outliers and lexicographic responses must be removed.</td>
<td>Consistent format if voluntary market approach desired. Unlikely to be believed or seen as appropriate social choice mechanism. Some citizen considerations cause problems. Protests, outliers and lexicographic responses to be removed.</td>
<td>Inconsistent. Voluntary trust fund has little resemblance to a referendum.</td>
</tr>
<tr>
<td>Referendum: additional tax, information focusing on environmental good.</td>
<td>Inconsistent format.</td>
<td>Consistent format, but citizen considerations cause problems (eg jobs, procedural notions). Protests, outliers and lexicographic responses must be removed.</td>
<td>Inconsistent format- information biased in favour of preservation outcome. Protests, outliers and lexicographic responses to be removed.</td>
<td>Inconsistent format- in reality, individuals would take jobs into account, and build up to referendum would expose individuals to the pro-development case.</td>
</tr>
<tr>
<td>Referendum: additional tax, information balanced with respect to environmental good and opportunity costs.</td>
<td>Inconsistent format.</td>
<td>Inconsistent format- unwanted reference to opportunity costs. Citizen considerations cause problems. Protests, outliers and lexicographic responses must be removed.</td>
<td>Consistent format- additional tax would have to be believed. Protests, outliers and lexicographic responses to be removed.</td>
<td>Consistent format- only informal votes need be removed.</td>
</tr>
<tr>
<td>Referendum: redirection of public expenditure, information balanced.</td>
<td>Inconsistent format.</td>
<td>Inconsistent format.</td>
<td>Consistent if willingness to redirect expenditure is considered an acceptable measure of value. Protests, outliers and lexicographic responses to be removed.</td>
<td>Consistent. Only informal votes need be removed.</td>
</tr>
</tbody>
</table>

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, Lindsey (1994, p124) found 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”.

As Table 11.1 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 preferences. It is important to note, however, that although electoral validity may represent the most realistic objective of valuation type questions, it is neither a necessary nor 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, and still be valid from a true political market perspective. As seen in the previous chapter, such responses are highly undesirable from a CBA perspective.

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, or other members of the current generation, but also the type of preference that is being expressed (eg absolutist, value-expressive, protest or other procedural). The Hanemann (1994) position fails to address the additional assumptions regarding human behaviour that are required when specific economic techniques are employed, as Broome (1992) acknowledges. Although motivations may matter little when one is exploring movements along a

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3 This is not to say that value-expressive responses are a desirable feature of electoral preferences. The question of what constitutes a desirable vote has not been discussed in detail in this thesis. 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, as noted in Chapter 10. 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 sable underlying preferences that shape their responses to important political questions, but that any given survey question measures those preferences imperfectly. See also Appendix E, Section E.2.2.
demand curve, for example the increase in demand for sausages associated with a 5% price rise in sausages, motivations are important when attempting to use CV to estimate TEV for inclusion in CBA. It is only when electoral or market validity is the objective, that motivations behind CV responses may matter little. Unfortunately, CBA valuation validity is likely to be a more elusive objective. Electoral validity is consistent with an alternate interpretation and use of CV results, which as indicated in Chapter 5, may provide a most useful input to decision-making.

Motivations behind CV responses are also important from a sustainability perspective. A commitment to ecological sustainability may have implications for how one responds to some of the major issues currently facing CV, and yet references to it in the major CV journals are not as common as one might expect. As noted in Appendix H (see also Chapter 2), ordering effects associated with sequential valuation structures, and impulsive CV purchases may be consistent with economic theory, but are of questionable use from a sustainability perspective. Similarly, the way in which Hoehn and Randall’s (1987) policy-referendum model is to be operationalised may be influenced by a commitment to sustainability, following which a holistic approach to environmental decision-making and a focus on policies regarding sustainability is preferred. As also noted in Appendix H, current CV practice is such that the valuation interests of public servants, funding bodies, and researchers tends to set the valuation agendas and hence valuation structures that have an important influence on estimates of economic value arising. Similarly, the organisation of government departments and their respective branches and sections can influence the outcomes of CV inclusive CBA’s, by altering the agenda and hence valuation structure that is assumed to be relevant. Such influences are undesirable from a sustainability perspective, unless the agenda reflects the perceived magnitudes of threats to sustainability, which appears unlikely.

A further type of validity, that of *sustainability validity*, may thus be defined as the ability of a particular social choice mechanism to bring about outcomes consistent with the requirements of ecological sustainability. 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 good being valued and hence the likelihood of a pro-environmental outcome⁴. The common single-issue focus of CV questions may thus

⁴ 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.
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 WTP. 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 validity perspective has received less attention in the literature than one might have thought.

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 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 percentage of individuals for special education and guidance, more informed and deliberated preferences would almost certainly be forthcoming. Participants could, for example, be made members of an environmental jury as discussed in Chapter 5. As with decision making based on expert panels, this approach clearly has certain advantages. The disadvantage, however, is that it less democratic. Environmental decisions involve subjective assessments and some individual or group of individuals will always have to make them. Taking such assessments 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. 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

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5 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.

6 Rather, discussions appear to have been dominated by a concern with the consistency of such motivations with economic theory (see Chapter 2).
environmentally aware and risk-averse public. Indeed, one might suspect that in developed countries, individuals tend to respond to ignorance and uncertainty with risk-aversion. Estimates of WTP are, for example, typically high in relation to the switching value at which pro-development outcomes are suggested (i.e. the per-capita equivalent of the expected net present value of the proposed development). A further point is that the non-decisiveness of CV responses may result in preferences that are dominated by ethical considerations. When such considerations pertain to species preservation and/or intergenerational equity, preferences that suggest pro-environment outcomes are likely.

The point here is not that CV necessarily offers a better approach to environmental decision making than alternates, but rather that in some respects, it may not be as bad as often thought among non-economists, and some economists. 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 interrelationships 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.

There is a clear need for further research into how individuals construct their contingent valuation responses, and how such construction can be expected to change in response to different question formats and question framing, and also different applications, with differing degrees of public knowledge, media attention etc. It has been argued in this thesis that a thorough understanding of such factors can enable CV researchers to better understand the origin of a significant proportion of the biases typically encountered in well-designed CV studies, and to subsequently address them in an appropriate manner. Once factors influencing citizen preference construction are understood, the potential influence of such factors can be anticipated, and in the more problematical cases, decisions made regarding the appropriate strategies to follow. In cases where citizen issue-opinions are generally well-constructed at the time a valuation is required, researchers must decide whether a more appropriate course of action is to opt for a different approach altogether, or to attempt to mould individuals' preferences in the direction of those required for CV.

7 To some extent, this will be a consequence of the single-issue approach to valuation, as discussed above.
As the above discussion indicates, most approaches have their limitations. 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.

In conclusion, the point of departure for the emergence of CV was so that environmental considerations would get taken into account in social decision making, via CBA. For a variety of reasons, CV methodology for pure public good type environmental issues, has moved in the direction of a political market model. The main burden of the work reported in this thesis is that the implications and opportunities arising have yet to be fully thought through. There are three related aspects involved. First, how do individuals respond to different types of survey? This is what the thesis has mostly dealt with. Second, what is the comparative accuracy or validity of the various different methods of obtaining community input to environmental decision-making. The discussion in this chapter suggests that treating CV results as 'sample referenda' is likely to be more valid than treating them as a providing estimates of TEV. Third, what types of social choice mechanisms go with a commitment to sustainability? This question has only been touched on this thesis. Further research is required to address how new social choice mechanisms can be developed that satisfy sustainability requirements, and how existing institutions can be so adapted.

The question of how individuals think about the environment, and how they formulate and express preferences in the survey context, is extremely complex. This thesis has endeavoured to provide further insight into just some aspects of this question. Considerable further research is required before it can be claimed that such processes are well understood.
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APPENDICES
APPENDIX A

THEORETICAL BASIS FOR CV

In this Appendix the standard theoretical basis for environmental valuation is briefly summarised, beginning with the consumers utility maximisation problem and ending with the consumer surplus measures that CV can potentially be used to estimate.

A.1 UTILITY MAXIMISATION AND CV

The Marshallian (or ordinary) demand function, $x_i$, gives the quantity of good $i$ that a consumer desires at a given level of prices and income.

It can be derived by manipulating the first order conditions for utility maximisation in the consumer choice problem, as shown below.

Utility Maximisation Problem

$$\text{Max } U(x) = U(x_1, \ldots, x_n)$$

$$\text{s. t. } \sum_{i=1}^{n} p_i x_i = y$$

Equation 1 presents a constrained optimisation problem that can be solved by setting up the Lagrangian function, $L$, and equating each of its $n+1$ partial derivatives to zero. This provides the first order conditions for utility maximisation.

Lagrangian Function

$$L = U(x_1, \ldots, x_n) + \lambda \left[ \sum_{i=1}^{n} p_i x_i - y \right]$$

---

1 This Appendix draws heavily on Blamey (1991), and as such, has been credited toward a past university qualification.
First Order Conditions

\[ \frac{\partial L}{\partial x_i} = \left[ \frac{\partial U(x)}{\partial x_i} \right] + \lambda \, p_i = 0 \]

\[ \frac{\partial L}{\partial x_n} = \left[ \frac{\partial U(x)}{\partial x_n} \right] + \lambda \, p_n = 0 \]

\[ \frac{\partial L}{\partial \lambda} = \sum_{i=1}^{n} p_i \, x_i - y = 0 \]  \hspace{1cm} (3)

Rearranging the first n of these equations so that price is on the right-hand side and then dividing the ith equation by the jth gives the general result:

\[ \left( \frac{\frac{\partial U(x)}{\partial x_i}}{\frac{\partial U(x)}{\partial x_j}} \right) = \frac{p_i}{p_j} \]  \hspace{1cm} (4)

where the LHS represents the ratio of marginal utilities for commodities i and j respectively, or alternatively the marginal rate of substitution of commodity i for j, \( MRS_{ij} \).

This result shows that the rate at which a consumer is willing to trade i for j (without a change in utility) is in fact equal to the price ratio or the rate at which he/she is forced to trade i for j (without exceeding the budget).

Marshallian demand functions are obtained in rearranging the first n first order conditions and substituting for corresponding \( x_i \)'s in the \( (n+1) \)th condition which is simply the original budget constraint. Solving for the Lagrange multiplier and substituting back into the first n conditions results in the set of demand functions.
\( x_i = x_1(p_1, \ldots, p_n, y) \)
\[
\begin{align*}
x_n &= x_n(p_1, \ldots, p_n, y) \\
\text{or in vector notation,}
\end{align*}
\]
\[
x = x(p, y)
\]

It is often convenient to refer to the indirect utility function, \( v \), in which utility is shown as a function of prices and income. This is obtained by substituting the demand functions into the direct utility function \( u(x(p,y)) = v(p,y) \). The consumer’s problem can thus be restated as:

\[
v(p,y) = \max u(x)
\]

s.t. \( p \cdot x = y \)

The indirect utility function gives us the maximum utility achievable at given prices and income. Indirect utility functions can be used instead of direct utility functions to derive demand equations. The following result, known as Roy’s Identity is obtainable:

\[
x_i(p,y) = \frac{\frac{-\partial v(p,y)}{\partial p_i}}{\frac{\partial v(p,y)}{\partial y}}
\]

for \( i = 1, \ldots, n \)

The inverse of the indirect utility function is the expenditure function which gives the minimal amount of income necessary to achieve a given level of utility at the given prices. The expenditure function \( e(p,u) \) thus provides the minimum cost of achieving a fixed level of utility.

The dual to the consumer utility maximisation problem is hence the following cost minimisation problem:

\[
e(p,u) = \min p \cdot x
\]

s.t. \( u(x) \geq u \)

The first order conditions for this problem can be used to show that the derivative of the expenditure function with respect to the price of a good is equal to the quantity demanded of that good. That is:
\[ \frac{\partial e(p, u)}{\partial p_i} = x_i(p, u) \]

In most circumstances the utility maximisation and dual problems should provide the same result. Expenditure and income can be used interchangeably since the minimal expenditure to reach utility \( v(p, y) \) is \( y \). In addition, if \( y = e(p, u) \) then

\[ x_i(p, u) = x_i(p, y) = x_i(p, e(p, u)). \]

We can now consider the effect of price changes on demand. Examining the effect of price rather than quantity changes provides the most straightforward derivation of Hicksian surplus measures. Similar implications result from developing the analysis in terms of quantity changes. For present purposes, one can think of quantity changes of environmental goods resulting in price changes. A decrease in water quality at the most preferred fishing spot, for example, is likely to result in travel to the next preferred fishing spot, which is likely to be associated with higher travel costs and hence price. Differentiating the implicit demand function with respect to price gives

\[ \frac{\partial x_i(p, e(p, u))}{\partial p_i} = \frac{\partial x_i(p, y)}{\partial p_i} + \frac{\partial x_i(p, y)}{\partial y} \frac{\partial e(p, u)}{\partial p_i} \]

Substituting \( x_i(p, u) \) for \( \frac{\partial e(p, u)}{\partial p_i} \)

and rearranging obtains

\[ \Delta x_i \approx \frac{\partial x_i(p, y)}{\partial p_i} \Delta p_i \]

\[ \approx \frac{\partial x_i(p, u)}{\partial p_i} \Delta p_i - \frac{\partial x_i(p, y)}{\partial y} \cdot x_i \cdot \Delta p_i \]

substitution effect income effect

This result is known as the Slutsky equation. It decomposes the demand effect of a price change into the substitution and income effects. The substitution effect measures the change in demand for a good due to that good becoming relatively more
expensive (or cheaper) than other goods. The income effect represents the fact that a price change will mean that the consumer will now be able to purchase a different number of goods with the same income, thereby altering his or her real income.

These effects are illustrated in Figure A.1 for a two good case in which the price of \( x_1 \) rises from \( p_{11} \) to \( p_{12} \).

The effect of the price rise is to steepen the budget line whilst maintaining the same vertical axis intercept. The budget line passing through B would apply if after the price rise the consumer was given extra income to keep him/her on the original indifference curve. The extra income, \( \Delta y \), is compensation for the price rise. It enables the consumer to retain his/her purchasing power. A reduction in demand for commodity one from \( x_{11} \) to \( x_{10} \) corresponds. This is the substitution effect. If instead the consumer’s income was not compensated, the budget line would shift left and a new optimum would result at C, on a lower indifference curve. The reduction in demand from \( x_{10} \) to \( x_{13} \) is the income effect.

Because consumers are rarely compensated for price changes, changes in demand usually exhibit both the income and substitution effects as represented by Marshallian demand curves and surplus measures. For analysis of the welfare effects of certain policies, however, we are often concerned with the change in utility (in monetary terms) associated with the policy. It is this \( \Delta y \) amount that equates before and after utility, that CV practitioners attempt to measure.

Recognising that an exact welfare measure must incorporate real income effects to compare before and after states of satisfaction, Hicks (1956) extended Marshallian demand curves and associated surpluses to obtain Hicksian compensated demand curves and new measures of surplus. Utility is constant along a Hicksian demand curve since the income effect has been removed through compensation. Figure A.1b shows Marshallian and Hicksian demand curves corresponding to the price rise in Figure A.1a. The Hicksian curve is represented as \( h(p, u_0) \), the \( u_0 \) representing the level of utility to be held constant.
FIGURE A.1 DERIVATION OF HICKSIAN DEMAND CURVES THROUGH ISOLATION OF INCOME AND SUBSTITUTION EFFECTS
A.2 CONSUMER SURPLUS MEASURES

The consumer surplus measures corresponding to the two types of demand curves illustrated above are as follows:

Hicks

\[ \text{Compensating Variation} = \text{COV} = \int_{p_1}^{p_2} h(p, u_0) \, dp \]

\[ = \text{area a+ b+c+ d+ e+f} \]

Marshall

\[ \text{Compensating Surplus} = \text{CS} = \int_{p_1}^{p_2} x(p, y) \, dp \]

\[ = \text{area a+ b+c+ f} \]

Hicksian consumer's surplus can be measured either as compensating variation (COV) or equivalent variation (EV), depending on the base level of utility. Just et al (1982, p. 85) define COV as "the amount of income which must be taken away from a consumer (possibly negative) after a price and/or income change to restore the consumer's original welfare level". Similarly, EV is defined as "the amount of income that must be given to a consumer (again possibly negative) in lieu of price and income changes to leave the consumer as well off as with the change". Compensating variation thus focuses on income adjustments required to equate utility to the initial level of welfare, whereas equivalent variation focuses on the post change level of utility. In Figure A.1 we considered Marshallian and Compensating Variation welfare measures. Point D in Figure A.1a corresponds to the loss in income that would have the same impact on utility as the price rise, if initially at point A. Point D is achieved by moving the initial budget line down and to the left until it is tangential with the lower indifference curve. Point D in the lower figure corresponds with point D in Figure A.1a. The Hicksian (compensating) demand curve passing through D also passes through C, indicating that utility is the same at either point. If the lower utility level is \( u_1 \), the equivalent variation measure of consumer surplus is given by
Equivalent Variation = $EV = \int_{p_1}^{p_2} h(p, u_i) \, dp$

= area a\, b\, c

Box 1 provides alternate definitions of each of the four Hicksian measures of a welfare change. The compensating surplus, COS, and equivalent surplus, ES, measures are too restrictive however, to be useful in practice (Freeman, 1979). We will hence focus our attention on the CS, COV and EV measures.

**COV VERSUS EV VERSUS CS**

In general, the COV and EV measures attribute different dollar values to a utility change since the marginal willingness to pay for a public good depends on the utility level (Johansson, 1987). The exception is when the marginal utility of money is constant (income elasticities equal zero), or equivalently when the income effect is zero (Green, 1984).

For a price increase (above example) it is apparent that

$$EV < CS < COV,$$

and for a price decrease

$$COV < CS < EV.$$

In fact, the higher the income elasticity and the larger the ratio of consumer's surplus to income, the greater will be the divergence of the three relevant demand curves. Because Marshallian surplus measures are often more achievable in practice but are inconsistent with any theoretical definition of a welfare change it is important to ascertain if and when the differences are significant.

Following the seminal work of Willig (1976) it is apparent that "if the product of income elasticity and the ratio of surplus change to total income divided by 2 [denoted ε] is less than 0.05 in absolute value, no more than about a 5 percent error... is made by using consumer surplus as a measure of either compensating or equivalent variation" (Just et al, 1982, p. 100). In many cases this condition is expected to hold.

In cases where it does not, however, COV or EV can be estimated for a price fall as follows:
**BOX I**

**Summary of Hicksian Welfare Measures**

**Compensating Variation (COV):** the change in income at the new prices that would make the individual indifferent between the original prices and the new prices.

\[ u(p_0, Y) = u(p_1, Y + COV) \]

In terms of expenditure functions, COV may also be defined as

\[ COV = e(p_1, u_t) - e(p_t, u_0) \]

The superscript \(t\) refers to final (initial) states in both cases.

Price Increase: minimum compensation required to accept the price rise and be no worse off than prior to the rise.

Price Fall: maximum amount of money the individual is WTP for opportunity to be able to consume at the lower prices.

**Compensating Surplus (COS):** the change in income after the price change that would make the individual indifferent between the original prices and the new prices, given that the level of consumption is constrained at that which would be chosen at the new prices.

\[ u(p_0, x_1, Y + COS) = u(p_0, x_1, Y) \]

Price Increase: minimum compensation required to be no worse off with the price rise and the level of consumption corresponding to the higher price.

Price Decrease: maximum amount of money the individual is WTP for the opportunity to be able to consume at the lower prices and at the level of consumption that would be chosen at those prices.

**Equivalent Variation (EV):** the change in income at the original prices that would make the individual indifferent to the new prices.

\[ u(p_0, Y + EV) = u(p_1, Y) \]

In terms of expenditure functions, EV is often defined as

\[ EV = e(p_1, u_t) - e(p_t, u_0) \]

Price Increase: the loss in income at the old (lower) prices that would make the individual indifferent to the new (higher) prices.

Price Fall: the increase in income at the old (higher) prices that would make the individual indifferent to the new (lower) prices.

**Equivalent Surplus (ES):** the change in income before the price change and when consumption is constrained to the new prices (post-change) quantity, that would make the individual indifferent to the new prices.

\[ u(p_0, x_1, Y + ES) = u(p_1, x_1, Y) \]

where \(x_1\) is the optimum level of consumption corresponding to the new prices.

Price Increase: the loss of income at the old (lower) prices and at the new (higher price) consumption level, that would make the individual indifferent to the new (higher) prices.

Price Decrease: the increase in income of the old (higher) prices and at the new (lower price) consumption level, that would make the individual indifferent to the new (lower) prices.
\[ \text{COV} = \Delta CS - \varepsilon | \Delta CS | \]
\[ \text{EV} = \Delta CS + \varepsilon | \Delta CS | \]

(Just et al, 1982).

There are a number of other considerations to be made in choosing the welfare measure, including:

- EV can be considered of greater practical relevance than COV since it is a money equivalent of a price change rather than the change in income necessary to 'prevent' a utility change (Freeman, 1979).

- COV implicitly assumes that the individual does not have the rights required to make purchases at the new prices since utility is always equated to the pre-price-change level. The EV measure implies that the individual has a right to the new price set and must be compensated if denied it (Freeman, 1979).

- EV is not independent of the order in which multiple price changes are evaluated, whereas COV is independent of the order (Freeman, 1979).

- If a study involves the comparison of more than two states of public goods, the COV measure will not necessarily rank the states correctly whereas the EV measure will. Freeman (1979) demonstrates this by showing that the COV measure can indicate a preference of one policy over another when the individual is in fact indifferent. Even if two policies should correspond to the same final utility level, the costs of achieving the initial utility level from the final position may differ (Johansson, 1987).

Bateman and Turner (1992) provide a useful overview of these and other issues regarding consumer surplus measures in the context of CV.
APPENDIX B

THE STATISTICAL NATURE OF DICHOTOMOUS-CHOICE CV MODELS

This appendix provides background concerning some of the statistical methods employed in the analysis of dichotomous-choice CV data. Parametric methods are dealt with first.

B.1 PARAMETRIC METHODS.

Dichotomous Choice CV (DCCV) questions yield dependent variables that take on discrete values, usually 0 or 1. When binary data are obtained for independent variables, dummy variables are simply added to the right hand side of ordinary least square (OLS) regression models. When we have discrete dependent variables, however, the estimation procedures are less straightforward, and we should not use an ordinary multiple regression to predict a 'yes' or 'no' response. One reason for this is that the error variance in such models is not constant, and depends on the values of the explanatory variables themselves. The error term is thus heteroscedastic; the variance of the dependent variable \( Y \) is not the same for any \( X \).

This inadequacy of linear regression models for the analysis of binary response data can be seen with the aid of Figure B.1. Figure B.1a shows the distribution of maximum WTP responses one might expect from an open-ended contingent valuation study. This is simply the normal distribution. In Figure B.1a most respondents would clearly be WTP at least an amount equal to \( X_1 \). As this amount increases, fewer and fewer people will be WTP at least this amount. In Figure B.1a few people are thus prepared to pay \( X_3 \) or more. The probability of a respondent saying no to a given \( X \) will thus increase as the \( X \) value itself increases, as shown in Figure B.1b. If the distribution in Figure B.1a is assumed, the approximate distribution in Figure B.1b should follow. Figure B.1c shows a linear probability (OLS) model estimate of the form of Figure B.1b. The OLS fit clearly does not provide constant variance for all values of \( X \) (compare vertical distance between actual and OLS curves, for error).

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1 This appendix draws on Blamey (1991).

2 In this appendix, the variable \( y \) refers to the dependent variable, rather than a 'yes' CV response as in the main text. This means that here, \( y=Pr(\text{No}) \).
FIGURE B.1 REGRESSION MODELS WITH DICHOTOMOUS DEPENDENT VARIABLES
Another reason why linear fits are not suitable for the analysis of DCCV data is that the predicted values will not be restricted to the range 0 to 1. This requires a reformulation of the multi-regression model into a form in which any predicted $Y, \hat{Y}$, can take on only values between and including 0 and 1. Such a model must have a normally (or logistically) distributed error term and be able to handle continuous independent variables.

It can be shown that the following model satisfies these requirements:

$$\ln(Y/(1-Y)) = B_0 + B_1 x_1 + \ldots + B_n x_n$$

Solving for $Y$ requires taking the exponential of both sides and the following functional form is obtainable:

$$\text{Prob (No)} = Y = [1/(1 + \exp(-(B_0 + B_1 X_1 + B_2 X_2 + \ldots + B_n X_n)))$$

The above transformation is called the logit transformation and the $\ln(Y/(1-Y))$ term is called the logit of $Y$. Graphing the logistic function, upon which the logit model is based, reveals that the function is bounded and doubly asymptotic, approaching $y = 0$ and $y = 1$ as $x$ approaches - and + infinity respectively (Figure B.2 shows a curve of this type). The slope of the logistic function of Figure B.2, given by

$$\frac{dy}{dx} = b(1-y)$$

is directly proportional to the product of the distances to the two asymptotes with $b$ the constant of proportionality (Stynes and Peterson, 1984). The logistic model thus specifies a functional relationship between a basically dichotomous dependent variable and normal dummy or metric independent variables. The explanatory variables chosen may represent either attributes of the response categories, and/or attributes of the respondent.

The expected or mean WTP can be calculated as the area to the left of the cumulative distribution function, $F(x)$, shown in Figure B.2. This area is represented by the shaded area and is typically calculated numerically.
The median WTP can be read off the curve corresponding to where the cumulative probability equals 1/2. This measure of central tendency may be preferred over the mean due to its greater robustness (outliers etc), although the final choice is ultimately a value judgement. It is important to realise that if the goal is to interpret results in terms of the outcome of a referendum, the median is the more relevant concept. The median represents an amount $M$ such that 50 percent of the people would vote ‘yes’ and 50 percent would vote ‘no’ to a proposed project, if it costs $M$ per household. Hanemann (1989) points out that the median also has the advantage that it is much less sensitive than the mean, to minor differences in the method of estimating the structural model (eg. generalised least squares versus maximum likelihood). Although the median’s greater robustness may dictate its use, it is important to realise that, strictly speaking, this measure is not consistent with the Kaldor-Hicks criterion and thus the basis of cost-benefit-analysis. A policy based on the median WTP figure may not be such that gainers can (potentially) compensate losers and still be no worse off than prior to the change.

Having fitted a particular logit function, a number of tests may be performed to establish the goodness of fit.
If we wish to do a test of the significance of the entire logit model, or a subset of coefficients in the model, when maximum likelihood estimation is used, a test using the chi-square distribution rather than the usual F test is appropriate. This involves estimating the maximum likelihood function in which all parameter values corresponding to variables being tested for significance (usually not $\alpha$, the constant term) are set equal to zero. This is the restricted maximum likelihood function. The ratio

$$\Omega = \frac{\text{max } L \text{ under restrictions}}{\text{max } L \text{ unrestricted}}$$

is then formed and if the restrictions are valid (the unrestricted model is no better than the restricted) $\Omega$ will be close to 1 (Maddala, 1988). The value ($-2 \log \Omega$) follows a chi-square distribution with $k$ degrees of freedom where $k$ is the number of restrictions. A number of variations of the log-likelihood function are also available for assessing fits in qualitative response models, including the Akaike Information Criterion (AIC)

$$AIC = -2 \log \Omega + 2(k + s)$$

where $k$ is the number of ordered values for the response, and $s$ is the number of explanatory variables. The lower the AIC value the better.

Another goodness of fit measure is the percentage of correct predictions. This is a pseudo measure of $R^2$:

$$R^2 = \frac{\text{number of correct predictions}}{\text{total number of observations}}$$

(Maddala, 1988).

It is important to note that the interpretation of $R^2$ values in ordinary least squares regressions does not hold for probit or logit models. Interpreting $R^2$ as the proportion of the variance in the dependent variable that is explained by the exogenous variable, is thus not possible. Nonetheless, the pseudo $R^2$ measures that are used for logit and probit models do give values in the range 0 to 1, and the closer to one the better (Aldrich and Nelson, 1984). Maddala (1983) discusses goodness of fit measures, along with all other aspects of binary choice models, in considerably more detail. Statistical packages such as SPSS and LIMDEP provide a number of such measures.
B.2 NON-PARAMETRIC METHODS

Kristrom (1990a) has used the work of Ayer et al (1955) to develop a technique for estimating mean and median WTP in which the use of a parametric empirical distribution function is not necessary. All that is required to use this technique is the vector of probabilities of acceptance;

\[ \Pi = (\Pi_1, \Pi_2, \Pi_3, \ldots, \Pi_m) \]

corresponding to the vector of dollar bids;

\[ A = (A_1, A_2, A_3, \ldots, A_m) \]

where \( \Pi_1 \) is the highest proportion of acceptance corresponding usually to the lowest bid \( A_1 \). Ayer et al (1955) show that if \( \Pi \) forms a monotone non-increasing sequence of proportions, then this sequence provides a Distribution Free Maximum Likelihood (DFML) estimator of the true probability for acceptance. If the vector \( \Pi \) is not monotonic, however, a simple algorithm must be applied before a DFML can be assumed. If two consecutive acceptance probabilities are not ranked in the expected manner (e.g. higher probability of acceptance for higher bid or vice versa), both must be replaced by their combined average. That is, if \( \Pi_i < \Pi_{i+1} \) for some \( i \) where \( i = 1, 2, \ldots, m-1 \), replacing both \( \Pi_i \) and \( \Pi_{i+1} \) with \( (k_i + k_{i+1})/(n_i + n_{i+1}) \) and repeating until a monotonic sequence is obtained, will result in a DFML estimator of the true sequence of probabilities.

The parameters \( k_i, k_{i+1} \) and \( n_i, n_{i+1} \) are the respective acceptance frequencies and effective sample sizes corresponding to bids \( A_i \) and \( A_{i+1} \). By interpolating between consecutive \( \Pi_i \)'s using linear or other interpolation, and extrapolating to values of \( A \) for which \( \Pi = 0 \) and \( \Pi = 1 \), an estimate of mean WTP can be made by taking the area under the empirical survivor function which graphs \( A_i \) versus \( \Pi_i \). Although linear interpolation between points is likely to be satisfactory, estimates of mean WTP are likely to be sensitive to the method of extrapolation for the same reason that mean WTP may be sensitive to the point of truncation in logit fits. Figure B.3 below shows a typical empirical survivor function. This corresponds to the data of Kristrom (1990a) given in Table B.1.
### Table B.1: Original and DFML Adjusted Acceptance Probabilities

<table>
<thead>
<tr>
<th>A (Bid in SEK)</th>
<th>Proportion Yes</th>
<th>Adjusted Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>51/60 = 0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>400</td>
<td>29/52 = 0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>700</td>
<td>33/60 = 0.55</td>
<td>0.55</td>
</tr>
<tr>
<td>1000</td>
<td>31/57 = 0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>1500</td>
<td>25/64 = 0.39</td>
<td>0.39</td>
</tr>
<tr>
<td>2000</td>
<td>16/56 = 0.29</td>
<td>0.34</td>
</tr>
<tr>
<td>2500</td>
<td>21/53 = 0.40</td>
<td>0.34</td>
</tr>
<tr>
<td>3000</td>
<td>16/53 = 0.30</td>
<td>0.32</td>
</tr>
<tr>
<td>5000</td>
<td>21/62 = 0.34</td>
<td>0.32</td>
</tr>
<tr>
<td>7000</td>
<td>5/45 = 0.11</td>
<td>0.11</td>
</tr>
</tbody>
</table>

![Empirical Survivor Function](image)

**Figure B.3** Example Empirical Survivor Function
APPENDIX C

ATTITUDES AND ENVIRONMENTAL BEHAVIOUR

C.1 INTRODUCTION

This Appendix summarises literature pertaining to the study of attitudes and behaviour, particularly as applied in the environment domain.

Several different views regarding the definition and meaning of the term attitude have been advanced. It is possible, for example, to view attitudes as simply “predispositions to respond to some class of stimuli with certain classes of response” (Rosenberg and Hovland, 1960, p3). In a three-component model of attitudes such as that of Rosenberg and Hovland (1960), these classes of response include affective responses, cognitive responses, and conative/behavioural responses. Affective responses involve evaluative feelings of like and dislike, whereas cognitive responses involve beliefs and opinions about the object, and behavioural responses are concerned with behavioural intentions or action tendencies (Strahberg and Frey, 1988). Alternatively, a single-component model of attitudes is conceivable in which attitudes are seen to involve only the affective component (Fishbein and Ajzen, 1975). Fishbein (1963, 1967) advanced an expectancy-value model of attitudes, in which an individual’s attitude toward a particular object is a function of the value of the attributes associated with the object and the subjective probability that the object exhibits these characteristics. Expectations are calculated as the sum of the various value*probability products. Whether or not the single or multi-dimensional model of attitudes is most appropriate is not yet apparent (Chaiken and Stangor, 1987).

Attitudinal measurement, using techniques such as semantic differentials and likert scales, generally follow the unidimensional approach1.

1 Likert scales are well known. A respondent is given a series of attitude statements and asked to rate them according to his/her degree of agreement or disagreement, usually on a five point scale. Semantic differentials originally involved evaluation of the meanings implied by individual words. A subject rates the meaning of each word along a number of polar dimensions consisting of adjectives such as hot-cold, weak-strong, pleasant-unpleasant. Rather than looking at the meanings of specific words, the attitudes of individuals toward a specific object can be analysed in this way, and an overall score of approval-disapproval, or agreement-disagreement can be obtained. The study of Kristiansen and Matheson (1990), discussed later in this Appendix, used such an approach to ascertain respondent attitude towards nuclear weapons in Canada. Respondents completed six 9-point semantic differential items (good-bad, acceptable-unacceptable, just-unjust, desirable-undesirable, foolish-wise, harmful-beneficial). After checking for internal consistency, attitude scores were then calculated, based on subjects’ mean response across the six semantic differential items. Depending on an individual’s attitude score, he or she was then classified as either antinuclear, pro-nuclear, or relatively neutral.
As outlined in the main text, attitudes may serve a variety of functions, including defending the ego (e.g. negative attitudes toward those who threaten), enabling the expression of values, enabling goals to be achieved (instrumental use), and simplification (e.g. through categorisation) (Strahlberg and Frey, 1988). Attitudes influence information processing in several ways. Firstly, they tend to result in selective exposure in which, according to dissonance theory, people expose themselves to attitude-consonant information and avoid attitude-dissonant information. Cognitive dissonance in a smoker may thus be minimised by avoiding or ignoring information pertaining to the undesirable health effects of smoking, and grasping at any information suggesting beneficial aspects of smoking, or that claimed harmful effects are exaggerated. Cognitive dissonance theory (Festinger, 1957) is an example of a cognitive consistency theory, according to which, individuals are assumed to “strive to have their own cognitions (beliefs, attitudes, perceptions of own behaviour) organised in a tension-free (ie non-contradictory) way. When persons perceive that some of their attitudes are contradictory, they will be in a state of cognitive imbalance...the person will be motivated to bring the cognitions concerned into a consistent and tension-free relationship by changing one or all of these cognitions” (Strahlberg and Frey, 1988, p156).

Secondly, attitudes may influence the processing of information. An example here is when individuals viewing a political debate tend to perceive their preferred candidates comments in a positive way, when if another candidate had made the same comments, they would have been perceived negatively. Finally, there is some evidence (Judd and Kulik, 1980) of bipolar attitudinal effects regarding information recall. Recall is best concerning statements that either strongly agree or strongly disagree with an individual’s attitudes. Statements resulting in weaker agreement or disagreement are less readily recalled (Strahlberg and Frey, 1988).

C.2 THE ATTITUDE-BEHAVIOUR LINK

A close correlation between attitudes and behaviour can be expected only when both measures are equally specific. Ajzen and Fishbein (1977) identify four characteristics of attitudes or behaviour that can be used to define specificity; the type of behaviour involved, the target toward which the behaviour is directed, the context in which the behaviour is to be performed, and the time the behaviour is to be performed. We may thus not expect a high correlation between responses to the question “Do you think Australia should focus more on improving the economy, more on protecting the environment, or continue with the current balance?” and actual voting behaviour at a referendum concerning a policy to prevent logging in the south-east forests from next
year, at a cost (tax increase) of $X per individual per year for ten years. The target in
the former is of much lower specificity than the latter. Note also that the action in
one question is specific (referendum vote) whereas it is not specified in the other.
The first question is more of a global attitude, however, than a highly specific
attitude, and Ajzen and Fishbein (1977) point out that substantial relationships
between global attitudes and specific behavioural acts will often occur. It should also
be noted that measured attitudes are usually uni-dimensional (affective) and that
should a multi-dimensional model be more appropriate, the identified attitude-
behaviour link may lack strength as a result. In cases of more complicated attitudes,
cognitive components may have to be considered. There is also some evidence that
attitudes based on direct experiences provide better predictors of behaviour than
other attitudes. Situational factors such as the presence of strong social norms can
also influence the attitude-behaviour link, as can habits and also perceived control
over behavioural consequences. I might think that rockclimbing is great, but when
offered the chance I might refuse because the individual offering has a poor reputation
for safety.

Ajzen and Fishbein (1980) have incorporated the main factors determining a person's
behaviour in their Theory of Reasoned Action. This theory assumes that “an
individual’s behaviour towards some attitude object is a joint function of the attitude
towards this object and his or her normative beliefs (ie beliefs about the behaviour
expected by relevant others). The impact of normative beliefs on behaviour depends
on the individual’s willingness to conform with these behavioural expectations”
(Hewstone et al, 1988, p457). This is discussed further in Section C.5.

C.3 SOCIAL AND POLITICAL ATTITUDES

Much of the discussion of social and political attitudes in psychological and political
science research has focussed on the extent to which such attitudes can be attributed
to the self-interest motive. It is in this context that the notion of symbolic attitudes
has arisen.

According to Chaiken and Stangor (1987, p579), symbolic attitudes may be regarded
“as involving strong affect, tied to important moral concerns or core values, and as
primarily expressive (vs instrumental) in nature”. The most heavily researched
symbolic attitude is what Kinder and Sears (1981) refer to as ‘symbolic racism’.

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2 This is defined as “a blend of antiblack affect and the kind of traditional American moral values
embodied in the Protestant Ethic...[It] represents a form of resistance to change in the racial status
quo based on moral feelings that blacks violate such traditional American values as individualism
and self-reliance, the work ethic, obedience, and discipline” (Kinder and Sears, 1981, p416).
Kinders and Sears see symbolic racism as providing an alternate to the dominant theoretical approach to the psychological study of prejudice, that of realistic group conflict theory. According to realistic group conflict theory (LeVine and Campbell, 1972), racial prejudice results from direct competition between blacks and whites for scarce resources. Whites perceive blacks as threatening in such areas as employment (especially in relation to affirmative action) and crime, thereby resulting in hostility toward them. Kinders and Sears (p415) thus see realistic group conflict theory as implying that social attitudes, “in short, reflect private interest”. The racial threat hypothesis can be viewed within an expectancy-value framework, in which perceived threat posed by blacks moving into a neighbourhood is seen as the product of the (i) probability that they will move in, and (ii) the perceived consequences of such an outcome. According to Kinders and Sears (1981), the racial threat hypothesis is not particularly well supported in the literature. Perceived private threat is not, according to Kinders and Sears, a necessary motivation behind symbolically racist attitudes. Rather, the emphasis is on “moralistic resentments of blacks, presumably traceable to preadult socialisation” (p414), and as such “may well have little to do with any tangible and direct impact of racial issues on the white person’s private life” (p416).

In order to investigate the relative explanatory power of the two competing theories, Kinder and Sears (1981) constructed measurement scales for both perceived threat and symbolic racism, and investigated the relation between responses to these scales and the respondents’ voting preferences in two successive elections between white and black political candidates, and where race had become a major campaign issue. The multiple regression results lead Kinder and Sears (1981) to conclude that the white public’s “political response to racial issues is based on moral and symbolic challenges to the racial status quo in society generally rather than on any direct, tangible challenge to their own personal lives...The politically important component of prejudice-symbolic racism-is compartmentalised away from the personal impact of racial conflicts. Such 'psychic segregation' not only holds for symbolic racism, but also shows up as a broader distinction...between quality of their personal life on the one hand, and the quality of national life on the other” (p429). Kinder and Sears also note that private interests and political preferences have also been known to diverge, in cases such as attitudes toward the Vietnam War, public responses to the energy crisis, and in political consequences of economic discontent: “In each case, judgements about the national condition were largely autonomous from personal experiences and predicaments” (p430). “Why this is so- why the concrete realities of people’s everyday lives are so compartmentalised away from their judgements about the society as a whole-is a complicated but researchable question” (p430).
Although earlier research regarding the effects of short-term material self-interest on sociopolitical attitudes tended to focus on racial issues, many other social issues have been investigated. In addition to racial issues, the twenty-five studies listed by Sears and Funk (1991) cover such areas as attitudes regarding employment, inflation, women’s issues, personal impact of the energy crisis, services such as social security and medicare, tax burdens, crime and gun-control, likelihood of war and vulnerability to conscription. With regard to employment, for example, the self-interest hypothesis would expect economic policies promoting employment opportunities to gain most favour amongst the unemployed. Empirical studies tend to provide only weak support for this hypothesis, however. With regard to social security and medicare, studies such as Huddy (1989) have found little support for the self-interest hypothesis that greater support for such services should come from the elderly. Sears et al (1978) investigated the effect of personal impact of the 1973-1974 energy crisis on policy attitudes such as support for reduced consumption or increased resource development, and found no significant such effects. Several studies have also investigated the plausibility of "pocketbook voting" hypotheses, in which the voter’s own financial situations (or perceptions thereof) are held to be the major influences over voting preferences in elections for political candidates. Although empirical evidence for the support of such hypotheses is mixed, overall it tends to find general support (Sears and Funk, 1991).

Having briefly reviewed the "paucity of research on symbolic attitudes", Chaiken and Stangor (1987, p580) conclude that “it is too early to judge the merit of the symbolic-non-symbolic distinction”. It is unfortunate that studies of symbolic attitudes have focussed almost exclusively on the self-interest question, and employed somewhat narrow definitions of self-interest in most cases. The definition of self-interest typically employed in these studies is limited in three important respects:

(i) only short-term benefits count;

(ii) only material benefits count; and

(iii) only private benefits count.

3 It is questionable whether this test is the most appropriate test of self-interest in this application. Is it not possible that younger individuals anticipate greater future use of such services than the elderly, and hence could be expected to have greater support for such services. This possibility is probably excluded when the definition of self-interest does not extend to expected long-term benefits. Problems with the self-interest definition used by these studies is discussed shortly.

4 Personal impact variables included perceived increase in difficulty of daily life, effects on employment, and residence in areas of restricted electricity use.
Such narrow definitions have been criticised by several authors in the literature, particularly in response to the symbolic racism studies. The studies by Kinders and Sears (1981), and Sears et al (1979, 1980), for example, have been challenged by Bobo (1983) and Sniderman and Tetlock (1986). Bobo claims that such studies have employed “an unjustifiably narrow concept of self-interests and group-interests” (p1197). He notes that group membership has an important basis for the development of self-identity and that as a result, group membership and status will often play a role in the calculation of individual interests. Challenges to group status or position can thus be expected to be in the individual’s interests. The feminist who is more likely to support those with the ‘correct’ stands on women’s issues, and to oppose those with ‘incorrect’ stands is cited as an example of the connected nature of group and individual interests. In instances such as these, voting in the group’s interests will often be to the long term interest of the individual, and hence not necessarily “an attempt to maximise immediate individual gains” (p1201). Bobo performs several statistical reanalyses of the data used by Sears et al (1979) in order to support his contentions, but the results appear to be mixed, and the terms he employs are often not clearly defined. Nonetheless, Bobo is lead to conclusions such as: “whites are in part responding to busing as a threat to their social world” (p1208).

Sears and Kinder (1985) pick up on this in their response to Bobo’s article, stating that Bobo’s results are entirely consistent with their own. They argue that Bobo failed to properly distinguish group-interest from self-interest, and to isolate a satisfactory group-orientated threat variable. In their response, Sears and Kinder do however appear to be somewhat more qualified when commenting on how perceived personal threats and realistic group conflict theory relate. They see group conflict theory as concerned with both personal and group racial threats, and see the “idea of reintroducing perceived group interest into a discussion of white’s attitudes towards blacks ...as timely and valuable”. Sears and Kinder (1985) go on to suggest that:

*In investigating the political effects of group interest...it is useful to think of a continuum of possible interests. At the narrow end are those interests that affect only the self (ie self-interest). At the broad end are interests that affect the entire society, or what Kinder and Kiewiet (1981) have called sociotropic. Intermediate between the two extremes are assessments of the group’s well-being...*

Sears and Kinder (1985) and Sears and Funk (1991) suggest that two types of group-interests be distinguished: those that are self-orientated and those that are ‘more

---

5 Bobo (1983, p1197) quotes Sears et al (1979, p369): “a ‘self-interested’ attitude is usually defined fairly restrictively as one which is directed toward maximising gains or minimising losses to the individual’s tangible private well-being”.

symbolic’ or ‘pure’. The distinction appears to involve the degree of structural and/or cognitive interdependence between the individual and the group, which is seen as higher in cases of self-orientation than in more symbolic or pure cases.

C.4 ENVIRONMENTAL ATTITUDES

Heberlein (1972) argued that changes in environmental attitudes associated with the environmental crisis reflect a transition from a narrow economic orientation toward nature to a moral orientation. Although the ethical standard behind this moral orientation is held to be “multifaceted and difficult to state succinctly”, it is argued (p80) that “Leopold himself (1948) probably best summarised it when he said: ‘A thing is right when it tends to preserve the integrity, community, and beauty of the natural environment. It is wrong when it tends otherwise’. In attempting to explain this change from the “economic to the ethical”, Heberlein utilises Schwartz’s norm activation model. It is argued that the

combination of increased population, increased pollution, and scientific research which has spelled out the adverse effects of pollution, has dramatically increased the negative consequences for others... technology, furthermore, has made the decision-maker responsible for these adverse effects, since he knowingly and willingly chose them by avoiding the alternatives which it has produced.

Increases in both awareness of consequences (AC) and ascription of responsibility (AR) have thus caused both the activation and generation of environmental norms, or what has been referred to as the ‘environmental ethic’6. An individual’s level of AR or AC in a given circumstance is held to be a function of both personal dispositions and specifics of the situation (media coverage, nature of questioning process, resource-specific aspects). Since Heberlein’s (1972) important study, a number of studies have investigated the applicability of Schwartz’s norm activation model to environmental attitudes and behaviour. Schwartz (1977) offers a comprehensive outline of the model. See Syme and Jorgensen (1994) for a discussion specific to environmental valuation.

Van Liere and Dunlap (1978), for example, found that although measures of AR were significantly related to yard-burning behaviour, AC was only weakly related7. The

6 Dunlap and Van Liere (1977) argue that Heberlein’s reference to Leopold’s land ethic does not accord properly with his use of Schwartz’s norm-activation model, since the former attributes rights to nature and is hence not restricted to anthropocentric considerations, whereas Heberlein’s use of the latter focuses on consequences to humans and is hence anthropocentric.

7 AR was measured by through the following two items: “Some people say that backyard burning should be allowed because many people are not able to take wastes to the dump and cannot afford to
claim that AR and AC have an interactive rather than additive effect on norm-behaviour relationships was also confirmed.

Black et al (1985) employed the norm activation model in attempting to explain two major consumer responses to the energy situation (efficiency improvements and curtailment). AR and AC for each behavioural option were among the ‘personal’ determinants, along with personal norms (sense of obligation), perceived social norms (what the neighbours think and do), and perceived personal benefits and costs associated with each behavioural option. A variable was also included to measure general concern about the energy situation. ‘Contextual’ variables included family income, education level, family size, age of oldest household member, primary heating fuel used by the household, size of residence, home ownership, direct or indirect payment for heating, presence of people in the home during working hours, the direct cost of residential energy and a measure of ‘economic suffering’. One of the many findings of the study was that both economic self-interest and internalised personal norms affect behavioural responses, with the relative importance of these influences varying with the behavioural option. A feature of the Black et al (1985) study is the complex causal model that was estimated.

Recognising that “widespread support for environmental protection suggests that motives other than the short-term and the individualistic impel many people to act”, Stern et al (1986, p205) tested the hypothesis that support for environmental protection depends in part on a moral judgement. Rather than using the norm-activation model to predict actual behaviour, it was used here in order to help explain judgements (personal norms) and intended actions regarding the moral obligation of industry and government to resolve hazardous chemical problems. Since personal norms focus on beliefs about what ought to be done, by either self or others, information was sought concerning what individuals believed industry and government should do about hazardous waste. Results showed that although judgements concerning the moral obligations of industry depended on both AC and AR(industry), government was held to be morally responsible to act even if it was not responsible for the problem.

have them hauled to the dump” (i.e. no alternatives); and “Some people say that backyard burning should be allowed because the amount of pollution it causes is very small compared to other sources such as automobiles” (shift blame to others). AC was measured by the following item: “Some people say that the smoke from backyard burning makes it difficult for people with respiratory problems to breathe. Do you agree or disagree?”.
Hopper and Nielson (1991) used Schwartz’s norm activation model in order to test the hypothesis that recycling behaviour can be considered altruistic. Particular attention was paid to how social norms become personal norms, and under what conditions personal norms result in recycling behaviour. Social norms are seen to represent the values and attitudes, and hence expectations, of significant others. They are likely to be generally agreed upon, in “a sort of abstract, detached way” (p200). When social norms are adopted by the individual, they become personal norms. As the norm-activation model suggests, AR and AC are the major determinants of whether personal norms lead to behaviour. Data was collected on social norms, personal norms and AC. AR was excluded due to the nature of the problem. Results suggested that personal norms are much more likely to affect behaviour when AC is high rather than when it is low. Social norm scores also correlated highly with personal norm scores, independently of AC levels. Social norms had no independent effect on behaviour, however, since their effects “were entirely mediated through personal norms”. Hopper and Nielson (1991) thus conclude support for their hypothesis of altruistically motivated recycling behaviour.

Environmental concern has been measured using a variety of measures, each differing in terms of the substantive issues addressed (e.g., pollution, population, natural resources) and/or the theoretical conceptualisation employed. Concerning the latter, studies have examined (i) perceived seriousness of environmental problem, (ii) support for government spending on environmental protection, (iii) knowledge of environmental problems and issues, (iv) support for environmental reforms/regulations, and (v) actual involvement in pro-environmental behaviours (Van Liere and Dunlap, 1981). Van Liere and Dunlap (1981) investigated the comparability of such measures, by constructing scales which differed only in terms of substantive issues and also scales that differed only in terms of theoretical conceptualisation. They found that population issues were distinct from natural resource and pollution issues, and that measures of behavioural involvement are distinct from measures of support for environmental regulations, and also environmental spending. This lead to the conclusion (p669) that “concern about population issues and behavioural involvement are tapping dimensions of environmental concern which are distributed in the general public in somewhat different ways than is concern about pollution and natural resources”. Concerning

8 Though derived from socially shared norms, what distinguishes personal norms is that the consequences of violating or upholding them are tied to one’s self-concept. To violate a personal norm engenders guilt, and to uphold a personal norm engenders pride” (Hopper and Nielson, 1991, p200).
composite scales, they warn (p669) that "the common practice of combining items that focus on a wide range of substantive issues into a single measure of environmental concern may be unwise".

Samdahl and Robertson (1989) present a causal model of determinants of environmental concern. The measures of environmental concern employed were perceptions of environmental problems, support for environmental regulations, and ecological behaviour. Explanatory variables included size of residential community, education, income, age, and two notions of liberalism based on the distinction made by Buttel and Flinn (1978a, 1978b): anti-laissez-faire liberalism, and welfare-state-liberalism. The former is concerned primarily with government regulations designed to protect the nation's collective well-being, whereas the latter focuses on welfare assistance to those in need. LISREL analysis indicated that sociodemographic variables were not statistically significant determinants of any of the three types of environmental concern. Anti-laissez-faire liberalism was however a strong predictor of support for environmental regulation.

In a comparative study of Canadians and Americans, Steger et al (1989) investigated the relationship between postmaterialist values and the New Environmental paradigm. It was hypothesised that Canadians will exhibit greater support than Americans for the NEP, and that the expected relationship between postmaterialist values and NEP support would be weaker in Canada than in the U.S. The latter hypothesis is based on the assumption that the Canadian culture is more collectivist overall, and hence "individuals would be predisposed to support the NEP world view regardless of their relative attachment to postmaterialist values" (p237). In addition to measurement of postmaterialist values and NEP scores, the mail questionnaires also included eight measures of general political orientations and three measures of the risk associated with acid rain deposition. Results clearly supported the above hypotheses. Steger et al (1989) thus concluded that Canadian political culture is significantly different to that of the United States.

Pettus and Giles (1987) investigated the relationship between environmental attitudes and the personality characteristics: internal-external locus of control, openness of

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9 According to the authors (1989, p234), "both sets of values...are said to reflect the transformation of politics brought about by the relative affluence and security characterising postindustrial democracies since the end of World War II."

10 Canadians gave significantly different responses to the Americans on every variable except liberalism-conservatism. The postmaterialist distinction was a stronger predictor of NEP score in the U.S. than in Canada.
belief system, and perceptions about self. Results indicated that persons who are self-controlled, well-organised and goal orientated are more likely to display environmentally friendly behaviours, and that self-controlled individuals are less likely to favour environmental laws or restrictive measures.

C.5 ENVIRONMENTAL BEHAVIOUR

In a comparison of relevant knowledge, motives and demographic characteristics of recyclers and non-recyclers, Vining and Ebreo (1990, p55) found that nonrecyclers were “more concerned with financial incentives to recycle, rewards for recycling, and with matters of personal convenience”. The relative importance of different motivations was assessed by asking respondents to rate the importance of nine reasons for recycling and six reasons for not recycling. Factor analysis revealed five factors: environmental concern, nuisance, social reasons, household consequences, and economic motives. Mean values for both the environmental concern and social reasons factors did not significantly differ for recyclers and non-recyclers. The first result was taken to suggest that the “hypothesis that recyclers would endorse altruistic environmental reasons for recycling more than nonrecyclers would, was not supported”(p68). Although Vining and Ebreo suggested that intrinsic motives such as warm-inner-glow are likely to be associated with environmental reasons for recycling, no specific indicator of such a measure was used. The social influence result was attributed to the fact that the types of recycling behaviour involved were not highly conspicuous and hence social norm influences, or pressures to conform, were not that relevant. Recyclers were found to have greater knowledge and awareness regarding different aspects of recycling, and demographic variables had little explanatory power.

De Young (1985-86, 1986) has investigated motives behind conservation behaviour such as recycling, distinguishing between external motives and internal motives. External motives involve externally imposed incentives such as financial rewards for recycling, the chance to win prizes, and subsidies for any costs incurred. Social approval and disapproval is also seen as an external incentive. Internal motives, on the other hand, involve deriving personal satisfaction from the act itself. This satisfaction may be in the form of ‘feel good’ motives such as warm-inner-glow, or it may be “derived from a frugal lifestyle, a sense that one’s actions matter, a feeling of coherence between one’s efforts and the larger world, [or] an overall sense of well-being” (De Young, 1985-86, p282). In order to investigate the relative importance or

11 They refer to the study of De Young (1985-86, 1986) on this matter.
internal and external motivations in recycling behaviour, a questionnaire was developed containing 15 items dealing with motivation and non-materialism, and 39 items dealing with different types of satisfaction\textsuperscript{12}. Dimensional analysis of the satisfaction items resulted in three satisfaction scales: frugality, participation and prosperity\textsuperscript{13}. Respondents appeared to gain personal satisfaction from the frugal use of resources, and from participating in community activities, in addition to the more commonly discussed prosperity/affluence sources. A strong positive relationship was also found between recycling behaviour and the intrinsic motivation and non-materialism scales, which in turn were both significantly and positively related to the frugality and participation scales. As De Young (1985-86, p289) identifies, a "remaining critical question is why environmentally appropriate behaviours...would be found satisfying and intrinsically motivated".

De Young and Kaplan (1985-86) investigated the structure of satisfactions associated with conservation behaviour, through content analysis of responses by conservation-orientated individuals to loosely structured open-ended interviews. As expected, conservation behaviour was found to be multiply determined\textsuperscript{14}. Eighteen distinct types of satisfactions or justifications were identified, falling into several themes. Dominant themes included 'Conservation Ethic' involving notions of duty and responsibility, 'Money', and 'Comfort and Convenience' (eg minimising time wastage). Secondary themes included 'Independence', 'Sensual Quality and Experience', 'Image', 'Quality', 'Helping Others', 'Social Change', Community Involvement', and 'Challenge'. Interestingly, the authors concluded that "people who conserve are not different from other people, they are not members of a spartan elite. Furthermore, conservation does not depend on having a special outlook" (p240). This point was investigated in more detail by De Young (1988-89) in a comparison of attitudes of recyclers and non-recyclers. The two groups were found to be "no different with respect to their attitudes about recycling, the degree to which they derive personal satisfaction from frugal actions, their assessment of whether recycling ought to be extrinsically motivated, and the degree to which they view recycling as a trivial activity"(p349). Significant differences were however found for perceived difficulty of recycling. In a survey-based study of desired lifestyle patterns, De Young (1990-91) recently found that an ecologically focussed lifestyle was most preferred, more so than a pro-technology lifestyle, a self-reliance lifestyle, and a

\textsuperscript{12} Two behaviour scales were also developed: recycling and reusing.

\textsuperscript{13} De Young (1986) identifies 'self-sufficiency' as a fourth scale.

\textsuperscript{14} That is, reflecting "a multitude of motives for a given activity"(De Young, 1986, p234).
‘waste-is-OK’ lifestyle. This lends further support to the claim that conservation behaviour can potentially bring intrinsic satisfaction to individuals, and the fact that pro-conservation-behaviour attitudes do not appear to be limited to those engaging in such behaviour.

A further approach to the study of environmental attitudes and their influence on behaviour is provided by consumer behaviour scientists. Early work in this field tended to focus on the identification and characterisation of Ecologically Concerned Consumers (ECC) and/or Socially Concerned Consumers (SCC). In describing the rationale for such a task, more than twenty years ago, Kelley (1971, p1) explicitly acknowledges some sort of consumer-citizen continuum:

*With growing consumer sensitivity to social and environmental problems, market segmentation based on consumers’ societal orientation is emerging: markets will be evaluated [increasingly] according to the degree to which consumers accept the consumer-citizen concept and buy as individuals concerned not only with their personal satisfactions, but also with societal [and environmental] well-being (emphasis added).*

Taking up Kelley’s lead, Anderson and Cunningham (1972) used responses to the eight-item Social Responsibility Scale (SRS) developed by Berkowitz and Daniels (1964) and Berkowitz and Lutterman (1968) to code individuals (using a median split) on a dichotomous social consciousness variable. Discriminant analysis using six demographic and six sociopsychological characteristics resulted in the typical socially conscious consumer being seen as a “pre-middle age adult of relatively high occupational attainment and socioeconomic status... He is typically more cosmopolitan, but less dogmatic, less conservative, less status conscious, less alienated, and less personally competent than his socially conscious counterpart... The findings of the research support the conclusion that markets can be segmented on the basis of consumer’s social consciousness.” (Anderson and Cunningham, 1972, p30)

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15 According to Gill et al (1986, p537), reviews of the environmental attitude and behaviour literature have “regularly omitted the stream of research conducted by consumer behaviour scientists”.

16 Not all early work was directly concerned with this theme. Kassarjian (1971), for example, investigated consumer reactions to an advertising campaign for a less polluting gasoline and attempted to identify various marketing relevant correlates to air pollution attitudes.

17 He seems to acknowledge dual roles of consumer and citizen in the following sentence: “Just as marketers must now perceive buyers in their dual roles as citizen- consumers, managers must develop a new concept of corporate citizenship appropriate to the social marketplace of the 1970’s” (Kelley, 1971, p1).

18 Anderson and Cunningham (1972) also discuss implications for future research. Among the questions deserving investigation are whether consumption patterns actually differ for individuals
Kinnear et al (1974) attempted to improve on the SRS as a measure of social concern, by utilising their Ecological Concern Index (Kinnear and Taylor, 1973). The claimed advantage of this index is that it represents a combination of behavioural and attitudinal measures of ecological concern, rather than just attitudinal measures. Scores on the ecological concern index were regressed (multiple classification analysis) on variables pertaining to socioeconomic characteristics and psychological makeup. Results suggested the following profile of ecologically concerned consumers. They tend to score high in perceived consumer effectiveness against pollution; they are high in openness to new ideas (tolerance); high in their need to understand the workings of things and satisfy intellectual curiosity (understanding); and they are moderately high in their need to obtain personal safety (harm avoidance) (Kinnear et al., 1974, p22).

Other early studies directed at green consumerism include Webster (1975), Brooker (1976), and Antil and Bennett (1979). Antil and Bennett (1979) developed a scale to measure socially responsible consumption behaviour. In order to explain an apparent divergence in consumer/voter preferences on an environmentally related issue, Crosby et al (1981) conducted a survey that allowed voting intentions to be regressed on variables representing ecological concern, importance of litter problem, concern about macroeconomic impact (unemployment) of environmental protection, concern that deposit law would result in increasing beverage prices, socioeconomic status, and interestingly, alienation. The alienation index was designed to measure the extent to which respondents experienced feelings of powerlessness, meaninglessness, social isolation, and also items expected to correlate with alienation levels such as social integration and community involvement. Results indicated greater support for the deposit law amongst those who were more ecologically concerned, more litter concerned, less concerned about unemployment and rising prices, less alienated, and scoring high on the SRS compared with those scoring lower, especially with respect to "products and services which enhance social or environmental well-being"; and whether high SRS individuals are "willing to pay a higher price" for such products (p31).

Variables making it to this stage of the analysis included (i) income, (ii) perceived consumer effectiveness, (iii) depression, (iv) sentience, (v) understanding, (vi) desirability, (vii) dominance, (viii) rebelliousness, (ix) tolerance, and (x) harm avoidance.

In the case of consumption of products for which negative externalities occur, the authors are lead to further conclude that environmental education may be sufficient to alter environmental preferences in a more socially desirable direction, thereby allowing the market to proceed without regulation.

Voter support for the Michigan bottle bill was high when demand in the marketplace for throwaways was strong.
of higher socioeconomic status. Discriminant analyses and multiple classification analyses were also performed. In a follow up study, Crosby and Taylor (1982) conducted a telephone survey several months after the law had been introduced, in order to ascertain consumer reactions to the law, and in particular, whether consumer attitudes toward the law had become more negative as a result of having engaged in recycling.

More recent attempts by consumer behaviour scientists to investigate the impact of environmental concern on consumption and voting behaviour has focussed around Ajzen and Fishbein’s (1980) Theory of Reasoned Action. An excellent example of such a study is that of Gill et al (1986). Hypotheses were directed at (i) testing the basic model as postulated by Ajzen and Fishbein, (ii) testing whether environmental concern has a direct or indirect relationship with environmental behaviour, and (ii) testing whether environmental concern has a direct or indirect relationship with behavioural intention. According to Ajzen and Fishbein (1980), attitudes toward targets or objects, such as that pertaining to the environment, people or institutions, should only influence behaviour and/or behavioural intention indirectly, the effects being mediated by the model’s endogenous normative and attitudinal variables (the sufficiency assumption). Gill et al tested their hypotheses using survey data collected before and after an election concerning the proposal to require deposits on beverage and other recyclable containers. Survey questions were designed to measure (i) ecological concern, divided into pollution and natural resource items, and regulation and spending items, (ii) cognitive structure, belief that a given behaviour leads to certain outcomes, (iii) evaluations of those outcomes, (iv) normative structure, beliefs about the normative expectations of specific significant others, and (v) motivation to comply with each of these expectations. Structural Equation Analysis (LISREL) was applied to the model, with different paths being systematically tested. Final results supported the above hypotheses. The influence of environmental concern on behaviour/behavioural intention was indirect, being mediated through cognitive and normative structure. This supports claims that environmental concern should be

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22 Crosby and Taylor (1983) note that the distinction between voting and consumer behaviour may not be as pronounced as once thought, and that both forms of behaviour may be governed by similar behavioural principles. In an empirical study of voter support for a ‘bottle ban’ in Michigan, they hypothesised (p419) that since research “indicates that ecologically concerned consumers attach greater importance or utility to the ecological attributes of products, and less to price and functional attributes, than do nonecologically concerned consumers...It is reasonable to expect that ecologically concerned voters would evaluate the Michigan bottle ban more on its societal effects (perceived reduction in litter) than on its personal effects (perceived convenience)”. Results lead the authors to conclude (p428) that “concepts borrowed from consumer research on postpurchase decision making have predictive and explanatory power within the political domain”.


treated as a background variable when investigating environmentally related consumer and voting behaviour. This lead Gill et al (1986, p549) to conclude that “the influence of ecological concern, measured as a generalised or global attitude, is mediated by more specific attitudinal, normative, and behavioural intention variables” and that research would benefit from greater incorporation of such factors. The usefulness of broad measures of environmental concern in studies of individual differences on specific matters is questioned as a result: “By operationalising attitude and behaviour at the same level of specificity (in terms of action, time, target, and context), prediction is greatly enhanced without diminishing the importance of ecological concern.”

A stepwise discriminant analysis of yes and no voters also revealed a number of significant entries by various (belief)*(outcome evaluation) multiplicative terms and (normative belief)*(motivation to comply) multiplicative terms.

The sufficiency assumption is only one of the assumptions of the original Ajzen and Fishbein (1980) model that has been the subject of subsequent research. Studies such as Bagozzi (1981) and Ryan (1982), for example, have suggested that cognitive and normative structures may not be unidimensional as first hypothesised, and that attitudinal and normative factors may not be independent. Interdependencies or ‘cross-over’ effects may work in either direction. According to the ‘false consensus’ hypothesis whereby an individual’s own beliefs are seen as being shared by others more than they actually are, it would appear that personal beliefs influence normative beliefs. Alternatively, when normative beliefs are adopted by individuals they become personal beliefs as well, and causality appears to operate in the opposite manner. In applying the Theory of Reasoned Action (TRA) to coupon usage by consumers, Shrimp and Kavas (1984) investigated the TRA assumptions. Although results indicated support for the sufficiency assumption, significant cross-over effects were found, and the unidimensional model of cognitive structure was not supported. Other environmental applications of the TRA include Jones (1989-90) and Goldenhar and Connell (1992-93) (both recycling behaviour), and Kantola et al (1982) (water conservation).

23 A further empirical result of this study was the finding of a strong relationship between normative and cognitive structure, suggesting that behavioural beliefs may be influenced by normative considerations. Previous work pertaining to the likelihood of such an interdependence is discussed, and reasons are given for still believing that there is “utility in separating attitudinal and normative variables,...despite the fact that they are correlated” (Gill et al, 1986, p550).
**APPENDIX D**

**GLOSSARY OF SELECTED STATISTICAL METHODS**

*ANOVA (Analysis of Variance):* a statistical technique used to determine whether samples come from populations with equal means. If the ANOVA F-statistic suggests that at least one pair of means are unequal, then multiple comparison tests such as Scheffe’s test and the Least Significant Differences (LSD) test are used to establish which of the pairs of means are in fact significantly different.

*Causal Relationship:* a dependence relationship between two or more variables in which the researcher specifies that one or more variables "cause" or create an outcome represented by at least one other variable. Must meet certain requirements for causation to exist.

*Causation:* the principle by which "cause and effect" is established between two variables. It requires that there be sufficient degree of association (correlation) between the two variables, that one variable occur before the other (ie one variable is clearly the outcome of the other), and that there be no other reasonable causes for the outcome. Although in its strictest terms causation is rarely found, in practice strong theoretical support can make empirical estimation of causation possible.

*Confirmatory analysis:* the use of a multivariate technique to test (confirm) a prespecified relationship. For example, suppose we hypothesise that only two variables should be predictors of a dependent variable. If we empirically test for the significance of these two predictors and the non-significance of all others, this test is a confirmatory analysis. It is the opposite of exploratory analysis.

*Construct:* a concept that the researcher can define in conceptual terms, but which cannot be directly measured (eg the respondent cannot articulate a single response that will totally and perfectly provide a measure of the concept) or measured without error. Constructs are the basis for forming causal relationships as they are the "purest" representation of a concept possible. A construct can be defined in varying degrees of specificity, ranging from quite narrow concepts (eg total household income) to more complex or abstract concepts, such as intelligence or emotion. Yet no matter what its level of specificity, a construct cannot be measured directly and perfectly, but instead must be approximately measured by indicators.

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1 The definitions and descriptions included in this glossary are taken largely from Hair *et al* (1992).
Cronbach's alpha: a commonly used measure of reliability for a set of two or more construct indicators. Values range between 0 and 1, with higher values indicating higher reliability among the indicators.

Exploratory analysis: the opposite of confirmatory analysis, exploratory analysis defines possible relationships in only the most general form and then allows the multivariate technique to estimate a relationship based on its methodology. The researcher is not looking to “confirm” any relationships specified prior to the analysis, but instead lets the method and the data “do the work” and define the nature of the relationship. An example is the use of stepwise multiple regression, in which the method adds predictor variables until some criterion is met.

Factor: a linear combination of a set of indicator variables for a given construct. A factor may also refer to the underlying construct.

Factor analysis: is a multivariate statistical procedure involved in analysing the interrelationships among a number of variables and then explaining these variables in terms of their underlying dimensions or factors. Factor analysis can perform at least four functions, of which two are most relevant to the thesis. Firstly, it can be used to identify a set of dimensions that are latent in a large set of variables. Thus given responses to a large number of attitudinal questions, we may wish to know what the main underlying dimensions ‘hidden’ within the data are. Secondly, we may wish to create a new set of variables to partially or completely replace the larger original set of variables. These new composite variables, can then be used in regressions and other statistical procedures.

Factor extraction: the process of determining the factors in a factor analysis. Common methods include principal components analysis and principal axis factor analysis.

Factor rotation: the process of manipulating or adjusting the factor axes in a factor analysis to achieve a simpler and pragmatically more meaningful factor solution.

Indicator: an observed value used as a measure of a concept or latent construct.

Identification: the degree to which there is a sufficient number of equations to ‘solve for’ each of the coefficients (unknowns) to be estimated.

Latent construct or variable: the operationalisation of a construct in structural equation modelling, a latent variable cannot be measured directly, but can be represented or measured by one or more variables. For example, a person’s attitude
toward a product can never be measured so precisely that there is no uncertainty. But by asking various questions we can assess many aspects of the attitude. In combination, the answers to these questions give us a reasonably accurate measure of the latent construct (attitude) for an individual.

**Measurement error**: the degree to which the variables we can measure (the manifest indicator variables) do not perfectly describe the latent construct of interest. For all practical purposes, all constructs have some measurement error even with the best indicator variables. However, the researcher’s objective is to minimize the amount of measurement error. Structural equation modelling can take measurement error into account and provide more accurate estimates of the causal relationships.

**Measurement model**: A submodel in structural equation modelling that (1) specifies the indicators for each construct, and (2) assesses the reliability of each construct for use in estimating the causal relationships. The measurement model is similar in form to factor analysis; the major difference lies in the degree of control provided by the researcher. In factor analysis, the researcher can only specify the number of factors, but all variables have loadings (i.e., act as indicators) for each factor. In the measurement model, the researcher specifies which variables are indicators of each construct.

**Modification indices**: the modification index values for a specified unestimated relationship indicate the improvement in overall model fit (the reduction in chi-square statistic) that is possible if a coefficient is calculated for that untested relationship. A modification is calculated for each unestimated relationship in a model.

**Oblimin**: a general criterion for obtaining an oblique rotation which tries to simplify the pattern matrix by way of reference axes.

**Oblique factor solutions**: a factor solution computed so that the extracted factors are correlated.

**Orthogonal factor solutions**: a factor solution in which the factors are extracted so that the factor axes are maintained at 90 degrees. Each factor is independent of other factors.

**Path analysis**: the process of employing simple bivariate correlations to estimate the “true” causal relationships between two variables/constructs in a system of structural equations. The method is based on specifying all possible effects that are contained in a correlation and then estimating the amount of correlation attributable to each
effect. When employed with the multiple relationships among latent constructs and a measurement model, it is then termed structural equation modelling.

**Path diagram**: a graphical portrayal of the complete set of relationships among the model’s constructs. Causal relationships are depicted by straight arrows, with the arrow emanating from the predictive variable and the arrowhead "pointing" to the dependent variable. Curved arrows represent correlations between constructs or indicators, but no causation is specified.

**Pattern Matrix**: in factor analysis-a matrix of coefficients where the columns usually refer to common factors and the rows to the observed variables; elements of the matrix represent regression weights for the common factors where an observed variable is assumed to be a linear combination of the factors; for an orthogonal solution, the pattern matrix is equivalent to correlations between factors and variables.

**Principal axis analysis**: factor extraction that is similar to principal components analysis, except that the diagonals of the correlation matrix are replaced by estimates of the communalities.

**Principal components analysis**: factor extraction involving linear combinations of the observed variables. The first principal component is the combination that accounts for the largest amount of variance in the sample. The second accounts for the next largest amount, and so on. A set of correlated variables is transformed to a set of uncorrelated variables, or factors.

**Reliability**: the degree to which two or more indicators ‘share’ in their measurement of a construct. Highly reliable constructs are those in which the indicators are highly intercorrelated, indicating that they are all measuring the same construct.

**Significance level**: typically refers to the maximum allowable probability of a Type 1 error (reject null hypothesis when it is true), below which it is assumed that the null hypothesis is rejected. When included in Tables in this thesis, significance level refers to the probability that a calculated T-value is less than the critical t-value (alpha=0.05).

**Structural Equation Modelling**: a multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts - factors - with multiple variables) to estimate a series of interrelated dependence relationships simultaneously.
**Structural Model:** the set of one or more dependence relationships linking the model constructs. The structural model is most useful in representing the interrelationships of variables between dependence relationships.

**Structure matrix:** in factor analysis-a matrix of coefficients where the coefficients refer to the correlations between factors and variables; it is equivalent to a pattern matrix in the orthogonal case.

**Validity:** the ability of a construct’s indicators to measure the concept under study accurately.
APPENDIX E

VALUES

E.1 INTRODUCTION

The purpose of this appendix is twofold: first, to provide background to the discussion of values in the main text, and second, to present further empirical analysis of the measures of values included in the AFAS, supplementing the discussion in Chapter 9.

E.2 BACKGROUND TO LITERATURE ON VALUES

E.2.1 The Concept of Values

Morris (1956) and Williams (1968) were among the first to distinguish between two types of values, values that people have, and the values of different objects. Williams (1968, p283) believes that an individual’s values serve as “the criteria, or standards in terms of which evaluations are made... Value-as-criterion is usually the more important usage for purposes of social scientific analysis”. In his well known book The Nature of Human Values, Milton Rokeach (1973, ix) comments that “the concept of values, more than any other, is the core concept across all the social sciences”. As the title suggests, he is concerned with values people have, and offers the following two definitions (p5):

A value is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence. A value-system is an enduring organization of beliefs concerning preferable modes of conduct or end-states of existence along a continuum of relative importance.

The enduring quality of values is seen to arise from the fact that they are “initially taught and learned in isolation from other values in an absolute, all-or-none manner”(Rokeach, 1973, p6). “Gradually, through experience and a process of maturation, we all learn to integrate the isolated, absolute values we have been taught in this or that context into a hierarchically organized system, wherein each value is ordered in priority or importance relative to other values”(p6). In this respect, we might say that an individual with lexicographic preferences toward the environment either (i) only has the one value in his or her value system, or at least this value has a relative importance in relation to other values that causes it never to be traded off, or (ii) the person has an immature value system in the sense that he or she has not
progressed beyond the isolation stage. As Williams (1968, p287) states, “It is the rare and limiting case ... when a person's behaviour is guided over a considerable period of time by one and only one value”. A value is a prescriptive or proscriptive belief, “wherein some means or end of action is judged to be desirable or undesirable” (Rokeach, 1973, p7). Like all beliefs, values have cognitive, affective and behavioural components. As stated above, values may refer to modes of conduct or end-states of existence. The former may be referred to as instrumental values, and the latter as terminal values. Terminal values may be either personal (self-centred) or social (society-centred), or in other words, intrapersonal or interpersonal. Different people have different priorities regarding these two types of terminal values. Two types of instrumental values may also be identified, moral values and competence values. The former refers only to those instrumental values that have an interpersonal focus which, when violated, arouse pangs of conscience or feelings of guilt for wrongdoing. Other instrumental values, those that may be called competence or self-actualization values, have a personal rather than interpersonal focus and do not seem to be especially concerned with morality. Their violation leads to feelings of shame about personal inadequacy rather than feelings of guilt about wrongdoing. Thus, behaving honestly and responsibly leads one to feel that he is behaving morally, whereas behaving logically, intelligently or imaginatively, leads one to feel that he is behaving competently. A person may experience conflict between two moral values (eg behaving honestly and lovingly), between two competence values (eg imaginatively and logically), or between a moral and a competence value (eg to act politely and to offer intellectual criticism) (Rokeach, 1973, p8).

Individual differences in value systems and system stabilities can thus be explained by such factors as intellectual ability, political identification, religious upbringing, degree of internalization of cultural and institutional values, and identification with sex roles.

Values and value systems serve a variety of functions. Values provide standards that guide behaviour in such areas as (i) taking particular positions on social issues, (ii) favouring certain political or religious ideologies, (iii) presentations of self to others, (iv) evaluating and judging ourselves and others, (v) comparisons of self with others, (vi) persuading, influencing and questioning others, and (vii) justification and rationalisation in order to maintain and enhance self-esteem. Value systems provide us with general plans for conflict resolution and decision-making, serving adjusive (utilitarian), ego-defensive, knowledge, and self-actualizing functions. Although instrumental and terminal values represent two “separate yet functionally interconnected systems, wherein all the values concerning modes of behaviour are instrumental to the attainment of all the values concerning end-states” (Rokeach, 1973, p12), they can be separately organized into hierarchial organisations along a continuum of importance. Although Maslow (1954) focuses more on needs and
hence end-states than Rokeach, the basic concept of his hierarchial organisation involving a continuum from lower to higher order needs can be applied to the utilitarian, ego-defensive and self-actualizing value-functions stated above.

Values as defined by Rokeach differ to attitudes in several respects. Whereas an attitude refers to "an organisation of several beliefs around a specific object or situation", a value refers to "a single belief of a very specific kind" (p18). A value transcends objects and situations whereas an attitude is focussed on a specified object or situation. Values are also determinants of attitudes. Many attitudes can be explained by just a few values. Individuals will have many more attitudes than values. The substantive content of values may involve functions such as self-actualization, whereas with attitudes this link can only be made by inference. Values also differ from social norms in several respects. Social norms usually concern modes of behaviour whereas values may also concern end-states. Social norms are also specific to certain situations, whereas values transcend specific situations. As Williams (1968, p284) states "Values are standards of desirability that are more nearly independent of specific situations". A value is also more personal and internal than a consensual social norm. Contrary to the ideas advanced by Maslow (1954), it appears that values are not equivalent to needs, despite the fact that they may appear to have many conceptual properties in common. As Rokeach points out, if there is no difference between the two, then even the 'lowly rat' must have values, as will any other animal species that has needs. He argues that humans are the only species capable of transforming needs into values, and hence in the case of humans, the need for sex may be cognitively transformed into values concerning love, intimacy, and spiritual union. Non-humans thus have needs but not values, whereas humans have both. Human needs often find expression through values.

E.2.2 Measurement of Values

Rokeach

To enable the measurement of an individual's values and value system, Rokeach (1973) developed a Value Survey, in which individuals are presented with 18 alphabetically arranged instrumental and terminal values, and asked to "arrange them in order of importance to YOU, as guiding principles in YOUR life". Several versions of the survey were tested, including one in which respondents record their ranking by writing the numbers 1 to 18 next to the stated values (Form E), and another in which each value is printed on separate removable gummed labels (Form D). In the latter case, respondents are instructed to peel off the most important value and place in box
Rokeach (1973) performed a factor analysis to see whether the 36 values are independent from one another. Results suggested that seven factors were identifiable, although they did not account for the majority of the variance. Table E.1 lists the 18 terminal and 18 instrumental values employed in the Rokeach Value Survey.

<table>
<thead>
<tr>
<th>Terminal</th>
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<tbody>
<tr>
<td>A Comfortable Life (a prosperous life)</td>
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<tr>
<td>An Exciting Life (a stimulating, active life)</td>
</tr>
<tr>
<td>A Sense of Accomplishment (lasting contribution)</td>
</tr>
<tr>
<td>A World at Peace (free of war and conflict)</td>
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<tr>
<td>Equality (brotherhood, equal opportunity for all)</td>
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<tr>
<td>Family Security (taking care of loved ones)</td>
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<tr>
<td>Freedom (independence, free choice)</td>
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<tr>
<td>Happiness (contentedness)</td>
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<tr>
<td>Inner Harmony (freedom from inner conflict)</td>
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<tr>
<td>Mature Love (sexual and spiritual intimacy)</td>
</tr>
<tr>
<td>National Security (protection from attack)</td>
</tr>
<tr>
<td>Pleasure (an enjoyable, leisurely life)</td>
</tr>
<tr>
<td>Salvation (saved, eternal life)</td>
</tr>
<tr>
<td>Self-Respect (self-esteem)</td>
</tr>
<tr>
<td>Social Recognition (respect, admiration)</td>
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<tr>
<td>True Friendship (close companionships)</td>
</tr>
<tr>
<td>Wisdom (a mature understanding of life)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Instrumental</th>
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<tbody>
<tr>
<td>Ambitious (hard-working, aspiring)</td>
</tr>
<tr>
<td>Broadminded (open-minded)</td>
</tr>
<tr>
<td>Capable (competent, effective)</td>
</tr>
<tr>
<td>Cheerful (lighthearted, joyful)</td>
</tr>
<tr>
<td>Clean (neat, tidy)</td>
</tr>
<tr>
<td>Courageous (standing up for your beliefs)</td>
</tr>
<tr>
<td>Forgiving (willing to pardon others)</td>
</tr>
<tr>
<td>Helpful (working for the welfare of others)</td>
</tr>
<tr>
<td>Honest (sincere, truthful)</td>
</tr>
<tr>
<td>Imaginative (daring, creative)</td>
</tr>
<tr>
<td>Independent (self-reliant, self-sufficient)</td>
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<tr>
<td>Intellectual (intelligent, reflective)</td>
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<tr>
<td>Logical (consistent, rational)</td>
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<tr>
<td>Loving (affectionate, tender)</td>
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<tr>
<td>Obedient (dutiful, respectful)</td>
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<tr>
<td>Polite (courteous, well-mannered)</td>
</tr>
<tr>
<td>Responsible (dependable, reliable)</td>
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<tr>
<td>Self-Controlled (restrained, self-disciplined)</td>
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Test-retest exercises also pick up value-changes that have occurred during the intervening period.
Once the values of a sample of individuals have been measured, there are several ways in which they can be utilised. Firstly, we can investigate how the values or value systems for different segments of society differ. This involves splitting the value dataset according to the required segmentation (eg splitting it into those pertaining to blacks and whites) and making comparisons for given values or sets of values.

Instead of treating values as dependent variables, they can also be seen as independent variables that help us to explain attitudes and behaviour. Consider the case of attitudes first. If the hypotheses of Rokeach are correct, we can expect that any given attitude is "an expression or manifestation of and should therefore be significantly related to some subset of terminal and instrumental values" (Rokeach, 1973, p95). Analysis can involve splitting the value dataset according to different responses to the opinion or attitudinal questions, and testing for significant differences in median rankings between subsets. Attitudes toward a great variety of things can be investigated in this way.

The influence of values on actual behaviour proceeds in a similar fashion to that of attitude investigation. The main difference is that instead of partitioning the value-dataset according to different responses to attitudinal questions, we now partition it according to actual differences in behaviour. Thus, instead of partitioning according to attitudes to religion, we may partition according to number of actual church attendances. Those with high church attendance may have different value systems to those who attend in moderate, low, or zero frequencies. Those who have common professions may tend to exhibit certain degrees of commonality in value-systems. How do the value-systems of academics differ to that of the rest of society? How do the value-systems of hippies or greenies compare with the rest of society, or with that of say loggers? Rokeach (1973, p156) reports that small entrepreneurs and salesmen tend to "place higher than do other Americans on personal values centering around individual achievement, strivings for independence, material success and comfort, hedonism, and the security of the family. Both groups generally rank the social values- a world at peace, a world of beauty, equality, freedom, and national security-lower than do other Americans. Both also value relatively less intimacy, affection, and the welfare of others". Business executives exhibit similar tendencies.

Having analysed value-differences for many different attitudinal and behavioural segmentations, Rokeach (1973) concludes that the values 'a comfortable life', 'equality', and 'salvation', corresponding to socioeconomic, political and religious values respectively, are generally the most powerful determinants of attitude and behaviour. Values will clearly not be able to predict attitudes or behaviour with
perfect accuracy, but rather are perhaps best thought of as predicting different kinds of 'gross behaviours'. More precise predictions “will, however, require more precise specifications of the actions to be predicted, the objects toward which the action is directed, the situations within which the objects are encountered, and the values and attitudes that are activated by the object and situation” (p162). In the case of behaviour in particular, it is important to note that the direction of causality between values and behaviour cannot be ascertained from a significant relationship. It is possible, that a certain type of values come with a certain type of job, rather than certain jobs attracting individuals with certain values.

Rokeach (1973) has also proposed a two-value model of political ideology, in which variations in political orientation can be explained to a large extent by different positions with respect to the two terminal values freedom and equality. Four extreme types of value orientation are thus conceivable, where communism is seen to correspond to a high value on equality and a low value on freedom, socialism corresponds to high levels of both freedom and equality, capitalism corresponds to a high value for freedom but low value for equality, and fascism corresponds to low values for both. In American society where communist and fascist ideologies are rare, Rokeach (1973) found that equality alone could account well for different political ideologies. The Rokeach two-dimensional model of political ideology has not found widespread empirical support, largely due to the lack of discriminatory power of the freedom dimension (Braithwaite, 1994, discusses such studies).

Braithwaite and Law

Braithwaite and Law (1985) have investigated the comprehensiveness and representativeness of the 36 item Rokeach Value Survey. The only types of values, identified using factor analysis but not found to be adequately covered by the Rokeach Value Survey pertain to ‘physical well-being’ and ‘individual rights’, and possibly ‘thriftiness’ and ‘carefreeness’. The pro’s and con’s of the rank-ordering procedure employed by Rokeach (1973) are also discussed and an asymmetrical 7-point rating scale is proposed as an alternative. Of relevance to the citizen/consumer distinction, Braithwaite and Law (1985, p253) found that at the inventory development stage, interviewees “consistently differentiated personal goals (eg a sense of accomplishment) from societal goals (eg a world of peace), regarding the latter as something they do not have direct influence over.” As a result, their inventory of specific values involved a separation of the 18 societal goals from the 36 personal goals, each set with its own instructions.
In order to shed further light on the validity of Rokeach's two-dimensional model of political ideology, Braithwaite (1982) first used intensive interviews to develop a more comprehensive instrument for the measurement of values underlying political evaluations. Factor analyses of responses to this 18-item Social Values Inventory (SVI), for two separate samples, both suggested two major dimensions underlying political evaluations. The first dimension, *international harmony and equality* included such items as 'international cooperation', 'a good life for others', 'social progress and social reform', 'greater economic equality', 'equal opportunity for all', 'rule by the people', and 'a world at peace'. Since these items together suggest "an ideology directed toward the attainment of a more cooperative, equitable and humanistic social order", it could be expected that this dimension is left wing. If however, it is associated with freedom in the sense of a laissez-faire economic system, it could be considered right. The second major dimension, *national strength and order*, includes such items as 'national greatness', 'national security', 'national economic development', and 'rule of the law'. This dimension could be interpreted as nationalistic or even authoritarian, and again may be considered either left or right wing, depending on the notion of freedom employed. Braithwaite (1982) sees parallels with Fromm's (1949) typology of humanistic and authoritarian consciences. Braithwaite (1982, p209) concludes that her results "support the notion that there are two orthogonal dimensions underlying the political ideology domain, but suggest an alternative interpretation of the constructs they represent" to that of Rokeach. Studies by both Heaven (1991) and Braithwaite (1994) found that Australians with left wing political preferences tended to score more highly on the *international harmony and equality* dimension, and individuals with right wing political preferences tended to score more highly on the *national strength and order* dimension. In relation to attitudes regarding salient social issues, high scorers on *international harmony and equality* were more likely to favour income redistribution, to oppose mining and selling of uranium, and to oppose deterrence strategies for crime control (Braithwaite, 1994).

Braithwaite (1994) also found that individuals' personal value systems tend to be linked to their social value systems in a coherent manner, although they did not divide neatly into two groups, reflecting the above two social value dimensions, as expected. Scores on the *international harmony and equality* social dimension were found to be related (multiple regression analysis) to personal values such as 'positive orientation toward others', 'personal growth and inner harmony', 'secure and satisfying interpersonal relations', and 'social standing and accomplishment', the latter

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2 The concept of freedom is thus multidimensional.
variable being contrary to expectations. Similarly, the dimension *national strength and order* was found to be related to the personal values of ‘propriety and effectiveness’, ‘social standing and accomplishment’, ‘religiosity’, ‘secure and satisfying interpersonal relations’, and ‘personal growth and inner harmony’. The latter value’s significance was contrary to expectations. The fact that ‘secure and satisfying interpersonal relations’ was significant in both regressions was seen to reflect the fact that this value is concerned with the wellbeing of both self and others.

Schwartz and Bilsky

In attempting to provide a theoretical basis for the grouping of Rokeach’s values into a limited number of dimensions, Schwartz and Bilsky (1987) derived and presented a set of eight motivational domains of value, each differing in content, and each involving a subset of the 36 values identified by Rokeach. The domains of value are derived from three universal human requirements (needs of individuals as biological organisms, requisites of coordinated social interaction, and survival and welfare needs of groups), and reflect needs of (i) security [survival and avoidance of threats to integrity], (ii) enjoyment, (iii) achievement [developing and using skills, and feeling competent], (iv) self-direction [being able to exercise internal control on one’s behaviour—which can be contrast with social motives], (v) restrictive-conformity [the smooth functioning of social interaction and groups requires that individuals restrain unruly impulses and inhibit actions that might hurt others’ interests], (vi) pro-social domain [concern for promoting the welfare of others, rather than involving restriction of impulses], (vii) social power [dominance, status, influence, social control, or power], and (viii) maturity [concerning goals that are reached only through experience and coming to terms with one’s life, such as self-actualization goals].

These motivational domains are arranged in three broad groups (individual, collective, mixed) reflecting the entity whose interests the values serve. In addition to testing several hypotheses relating to the appropriateness of the above distinctions, Schwartz and Bilsky (1987) also tested several hypotheses concerning structural organisation among motivational domains. Some degree of incompatibility or contradiction was expected, for example, between the domains of self-direction and restrictive conformity, achievement and security, achievement and prosocial, enjoyment and prosocial, the latter of which best represents the opposition between collectivistic and individualistic, or altruistic and egoistic interests. With few exceptions, smallest space analysis indicated support for all hypotheses, for the given Israeli and German data. The use of smallest space analysis rather than the more common factor or multidimensional scaling approaches (Braithwaite and Law, 1985, Feather, 1975)
reflects the authors’ concerns that use of the latter approaches often involves the identification of factors or dimensions for which “no convincing theoretical rationale has been offered”, thereby resulting in ad hoc, and potentially culture specific, interpretations.

Schwartz and Bilsky (1990) continue their search for a theory of the universal content and structure of values. The universality of their theory is tested by examining data from several more cultures, including Australia. Three new values were added to the list of values. These were ‘power (position of authority and importance)’, ‘self-determination (ability to determine one’s destiny)’, and ‘equity (each person rewarded according to how much effort he or she has put in)’. The relevance of the latter to power is that effort should lead to differential rather than equal reward. A fourth value, ‘social justice (fairness, no discrimination)’, was added, and expected to fall within the prosocial domain. Results indicated that this did indeed occur, and that the social power domain, containing the four new values plus social recognition and freedom, emerged as expected.

Feather (1991) has investigated the structure of human values by using both principal components factor analysis and the classification of value domains outlined by Schwartz and Bilsky (1987, 1990), and examining similarities between the factors/domains of the two approaches. Results indicated that the two procedures produced overlapping but not identical solutions. The Schwartz and Bilsky prosocial domain, for example, appeared as two separate domains, labelled universal prosocial and prosocial concern, in the principal components factor analysis. Feather (1991) also measured attitudes regarding belief in a just world and the respondent’s assessments of their own self-esteem (using the Rosenberg Self-Esteem Scale), and related these to the values measures.

In a further refinement, Schwartz (1992) has made several significant modifications to the above theory. To begin with, a further three new value types (a replacement term for value domains) were added. ‘Stimulation’ values represent an assumed organismic need for variety and stimulation in order to maintain an optimal level of activation, and ‘traditional’ values represent the need to preserve and respect the symbols and practices of one’s culture or religion. Values of ‘spirituality’ represent an assumed basic human need to find meaning in life, be it through theological or philosophical avenues. The earlier value types of enjoyment, maturity, prosocial and security were also modified in definition and content, the former three being relabelled as hedonism, universalism, and benevolence respectively. Benevolence is narrower in definition than the earlier prosocial value type, since the former includes only concern for the
welfare of close others in everyday interaction, whereas the latter permits concern for
the welfare of all others in any situation. Loyalty, for example, is thus a key value in
the new definition. Universalism includes the portion of prosocial behaviour omitted
from the new Benevolence value type, in addition to the values previously falling
within the domain of maturity. As usual, these changes reflect Schwartz’s intention to
ensure that the final value types are derived a priori from universal human
requirements. Results of further extensive empirical analyses indicated that of the
eleven value types, only spirituality values failed to receive empirical support.

Inglehart

A further notable measure of values, and one that has found greatest use amongst
sociologists and political scientists, is Inglehart’s (1971) notion of materialism/post-
materialism. Drawing on the work of Maslow (1954), Inglehart (1971) argued that
individuals pursue goals in a hierarchial order, giving most attention at any point in
time to the most important unsatisfied need at that time. He argues that in post-
industrialised societies, many individuals will have passed beyond the ‘materialist’ (or
acquisitive) stages in which primary concern is with different aspects of economic
security, such as food, shelter, stability in one’s life, and will instead be pursuing
‘post-materialist’ (or post-bourgeois) goals that are not concerned with economic
security, such as social bonding, self-esteem and self-actualization. It is argued that a
significant proportion of the population will have been socialized during a period of
“unprecedently high affluence. For them, economic security may be taken for
granted” (Inglehart, 1971, p991).

3 Inglehart (1990) doubts that a hierarchy actually exists above the security level, arguing that
Maslow’s hierarchy of needs is not a universal pattern of humans but rather is contingent on culture.

4 Inglehart (1990, p56) sees the materialism/postmaterialism thesis as based on two key
hypotheses:” (1) a scarcity hypothesis, that one’s priorities reflect one’s socioeconomic environment
so that one places greatest subjective value on those things that are in short supply; and (2) a
socialization hypothesis that, to a large extent, one’s basic values reflect the conditions that prevailed
during one’s pre-adult years. Taken together, these two hypotheses imply that as a result of the
historically unprecedented prosperity and the absence of war that has prevailed in western countries
since 1945, younger birth cohorts place less emphasis on economic and physical security than do
older groups, who have experienced a much greater degree of economic insecurity, and that,
conversely, the younger birth cohorts tend to give a higher priority to non-material needs, such as a
sense of community and the quality of life.”

5 Inglehart (1990) claims that his materialist/post-materialist value-priority distinction is the result
of short-term period effects superimposed on long-term cohort effects. The former reflects short-
term changes in the socioeconomic environment (e.g. recession) whereas the latter reflects the
conditions prevailing during a given age group’s formative years. For a given age, two individuals
may have different value priorities, if one is socialized during a different time (e.g. pre-war versus
post-war) to the other. If value priorities change as a result of getting married or having children,
this represents a lifecycle or ageing effect. Changes in value priorities are held to not be
Inglehart (1971) provides a four-item materialism/post-materialism scale for incorporation in questionnaires, and a twelve-item scale is later provided (Inglehart, 1990). Individuals with more post-materialist value priorities are held to be more likely to support social change, freedom of speech and be politically active. Post-materialists tend to place less emphasis on economic growth than materialists, and place greater emphasis on quality of life factors such as environmental preservation. "When environmentalism raises questions of environmental quality versus economic growth, it pits Materialist priorities squarely against Postmaterialist ones." (Inglehart, 1990, p267) In a recent study of community attitudes to the environment, forests and forest management in Australia, McAllister (1990, p30) found that overall

materialists are almost as likely as other groups to exhibit a generalised concern for the environment, but once they are presented with options—such as sacrificing lower living standards—they are less willing to give their support. In that sense, their concern for the environment is conditional on other factors; in contrast, postmaterialists are generally unconditional in their support and concern for the environment.

We thus expect a significant relation between postmaterialism and responses to the citizen type questions employed in the re-analysis of the RAC’s CV studies presented in Chapter 4.

Postmaterialists also tend to oppose nuclear power. Inglehart (1990, p271) sees the debate over nuclear power to be “based on contrasting visions of the good society, with pronuclear and antinuclear advocates talking past each other because their arguments are implicitly based on different value priorities.” The insensitivity of each side to the arguments of the other is also held to reflect a process of “cognitive screening in which given facts are retained and weighed in accord with the individual’s basic values”(Inglehart, 1990, p270). Inglehart argues that although there may be ironies among both the materialist and postmaterialist camps, both types of goals are essential elements of a good society. The postmaterialists can be seen to provide a “rational response to changing conditions”(Inglehart, 1990, p272). Inglehart also argues that the left-right dimension of political polarization actually subsumes two distinct components: the traditional left-right polarization reflecting established political party loyalties (eg communist and socialist); and a New Politics dimension,

manifestations of such ageing effects. A given cohort should thus not become more materialist as it ages.

It is argued (p253) that there seems to be a “long-term tendency for the pursuit of economic self-interest itself to reach a point of diminishing returns in advanced industrial societies, and gradually give way to postmaterialist motivations, including a greater emphasis on social solidarity”, and through a greater appeal to the public’s sense of justice.
reflecting stances on political issues such as environment, abortion, nuclear power etc. The two dimensions may not always point in the same dimension on any one issue. Today, it is the New Politics issues that provide the strongest indicator of Left-Right alignment. Western politics are seen to polarize according to traditional Left-Right ideology based on social class and religiosity, and materialist/postmaterialist values. A third factor, particularly important in explaining behavioural intentions or actual behaviour is cognitive mobilisation. This involves the dissemination of skills needed to cope with the politics of a large scale society (Inglehart, 1990, p337,372), and is measured by an index based on (i) political discussion rates, measured using a self-report question, and (ii) the respondent’s education level. Support for New Politics parties, and ecology parties in particular, has been shown to increase significantly with cognitive mobilisation, for postmaterialists only. Inglehart (1990) argues that “long-term predispositions play a major role in shaping political orientations and political behaviour”, although situational and external mobilising factors also play important roles. Political support for ecology parties tends to come disproportionately from individuals of middle-class, left alignment and post-materialism.

Higher socioeconomic groups are more likely to have post-materialist value-priorities, apparently since current socioeconomic status as an indicator “is understood to be important chiefly in so far as it reflects affluence during one’s formative years”(p1001). It is clear that the public-regardingness of Wilson and Banfield (1964, 1971) falls in the post-materialist realm. Inglehart (1971, p1013) found that score on the materialism scale tends to be related to political choice: “the presence of post-bourgeois values is linked consistently with a relative tendency to remain loyal to the Left, among those who were brought up in that tradition, and with a tendency to shift to the Left among those who were raised in other political climates”. Inglehart (1990) argues that rational choice models of sociopolitical preferences have overemphasised economic variables at the expense of cultural factors, such as ‘sociotropic orientation’. It is argued (p64) that “the linkage between economics and politics seems largely shaped by sociotropic concerns”. The rising role of postmaterialist concerns is hypothesised to have made “sociotropic concerns

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7 The core meaning of the Left-Right dimension is held to be “whether one supports or opposes social change in an egalitarian direction”(Inglehart, 1990, p293).

8 Individuals are asked “when you get together with your friends, would you say you discuss political matters frequently, occasionally, or never?” (Inglehart, 1990, p342).

9 Analyses involving respondents own socioeconomic statistics suggests that once education is controlled for, post-materialists tend to lose their income-advantage, and that postmaterialists tend to earn less than materialists from comparable family backgrounds.
increasingly important, particularly among the more politically aware segments of the electorate" (Inglehart, 1990, p64).

How does the materialist/postmaterialist dimension relate to comprehensive value listings such as that of Rokeach and Schwartz? According to Inglehart (1990), Rokeach’s items ‘a comfortable life’, ‘family security’ and ‘national security’ load on the materialist cluster, and ‘equality’, ‘inner harmony’, ‘wisdom’ and ‘a world of beauty’ load on the postmaterialist cluster. Braithwaite (1993, pi) argues that the materialism/postmaterialism distinction is a “unidimensional manifestation” of the two orthogonal value orientations national strength and order and international harmony and equality (described earlier), and that the “difference in strength of commitment to these two value dimensions is the value basis of one’s position on materialism/postmaterialism”.

The items in Inglehart’s four or twelve item survey question deliberately refer to broad societal goals with a long-term orientation. As such, it can be expected that responses will take on a citizen flavour. Importantly, however, Inglehart does not claim that such choices will tend to be independent of personal goal fulfilment. Rather, he argues that one’s “choice of long-term societal goals tends to be integrated with one’s immediate personal goals” (Inglehart, 1990, p170). This is supported empirically in cross-tabulations of societal materialism/post-materialism with personal materialism/postmaterialism, the latter being measured using a personally orientated version of the original four-item question. In their personal lives, postmaterialists were found to give “less emphasis to safe jobs and a high income, than to interesting, meaningful work and working with congenial people” (p162).

These cultural values are seen as enduring but not immutable. In accordance with the assumption of hierarchical need satisfaction, a given society’s level of economic development is held to be one of the most important sources of cultural variation. In contrast to Converse’s (1964, 1970) Black and White model of political attitudes, in which citizens are not seen to have coherent or stable preferences about major political issues, Inglehart (1990, p110) favours the 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”. The divergence between actual and observed attitudes is held to be mainly a function of time and motivation, but also often due to vague or confusing question wording.

E.2.3 Values and Cognitive Structure
Values are involved in how people reason about social issues, and hence in how people make tradeoffs and resolve conflicts. Abelson (1959) argued that people attempt to resolve belief dilemmas by first denying certain aspects of the object in question and/or bolstering their attitudes by exaggerating the relevance of those values that support their attitudes. Festinger (1964) describes this process as ‘spreading of the alternatives’. If these processes do not resolve the conflict in the individual’s mind, he or she may then turn to differentiation (dividing an object into good and bad parts) and/or transcendence (combining the positive and negative attributes of an object into a larger superordinate unit) (Kristiansen and Matheson, 1990). In correspondence with the processes of denial and bolstering, Kristiansen and Matheson (1990) present a value justification hypothesis, derived from accentuation theory. Briefly, this hypothesis suggests that people with different attitudes will appeal to different values to account for their attitudes, even when the importance they place on the relevant values is the same. Related to the concepts of differentiation and transcendence, Tetlock (1986) has proposed a “Value Pluralism Model of Moral Reasoning”. Briefly, this model asserts that “people are likely to think about an issue domain in integratively complex ways to the degree that issue domain activates conflicting values that people perceive as (a) important and (b) approximately equally important” (Tetlock, 1986, p819). Integrative complexity is defined by differentiation and integration, the former referring to the extent to which people recognise the various pro’s and con’s associated with the issue in question, and the latter refers to the development of conceptual connections among differentiated characteristics and hence guidelines or criteria for dealing with the tradeoff (Tetlock, 1986). Simple cognitive solutions such as denial, bolstering and value justification can be expected when conflicting values are less important, or less equal. Tetlock (1986, p821) sees lexicographic decision rules as reducing the complexity of choice processes, by basing “policy stands on whatever value captures their attention at the moment”.

Tetlock (1984) attempted to explain individual differences in political reasoning in terms of his value pluralism model. Content analysis studies of political elites representing different ideological positions indicated that certain ideological groups tend to undergo more complex tradeoff reasoning, as indicated by their score on the integrative complexity coding system. Studies such as this lead Tetlock to identify a tendency of groups on the political left to reason in more complex ways than groups on the right: “conservatives were prone to view competing proposals in rigid, black-
and-white terms, with only good consequences flowing from proposals they endorsed and only bad consequences from proposals they opposed" (Tetlock, 1986)\(^{10}\).

In their study of attitudes, values and value conflict regarding nuclear weapons in Canada, Kristiansen and Zanna (1988) investigated the occurrence of both their own value justification hypothesis, and Tetlock's value pluralism model of ideological reasoning. Results suggested the occurrence of value justification: subjects with different attitudes regarded peace and national security as differentially relevant to the nuclear weapons issue. The integrative complexity of subject's reasoning was not, however, a function of the extent to which they deemed national security and peace to be highly and equally important values. It was, however, found to be a function of their attitudes: those who opposed or favoured nuclear weapons displayed less complex reasoning than those with more neutral attitudes.

E.2.4 Values and the Environment

A small number of studies have investigated the relationship between core values and environmental attitudes, beliefs and/or behaviour. As Dunlap et al (1983, p146) state:

> Despite the emphasis placed on the role of values in contributing to our ecological problems, there is near absence of empirical research on this topic. Thus, while there have been hundreds of studies of attitudes toward environmental issues, very few studies have attempted to study the more fundamental question of values.

Value considerations are, however, addressed by Dunlap et al (1983) in their study of the determinants of recycling behaviour. Rankings of Rokeach's instrumental and terminal values were compared for recyclers and the general public. Value differences were analysed in relation to the theoretical perspective of Maslow (1954) and Inglehart (1971), among others. As hypothesised, compared to a national sample, recyclers were found to emphasise higher-order terminal values such as 'a sense of accomplishment', 'inner harmony', 'self-respect', 'wisdom', 'a world of beauty', and instrumental values such as 'imaginative', 'independent', 'intellectual', and 'logical'. Values ranked significantly lower by recyclers include 'a comfortable life', 'a world at peace', 'family security', 'national security', 'salvation', 'obedient', 'polite', 'ambitious', and 'clean'. Such values clearly reflect lower order needs. Overall,

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\(^{10}\) In this respect the right may be viewed as more of a monistic rather than pluralistic ideology. Tetlock (1986, p820) defines a monistic ideology as one in which high priority is attached to only one value or set of values that are claimed to be highly consistent with each other, whereas pluralistic ideologies involve attaching high priority to values that are recognised to be in frequent conflict with one another. Citizen preferences will ideally follow a pluralistic ideology, since questions of the form "I want to protect the environment, but do not want to slow economic growth" will have to be addressed (Tetlock, 1986, p820).
twenty of the thirty-six Rokeach values significantly differentiated between recyclers and the general public. Although the differences were reduced when demographic variables were controlled for, the basic patterns remained unchanged11.

Rather than investigating the relations between values and environmental behaviour, Rankin (1983) investigated the relationship between values and beliefs; more specifically, between Rokeach terminal values and beliefs regarding energy shortages in the U.S. Comparisons between the Washington general subsample and a subsample of environmentalists revealed much the same trends that were found in the Dunlap et al (1983) study reported above, but with two exceptions. Firstly, environmentalists ranked equality significantly higher than the Washington sample, and secondly, environmentalists ranked 'a world at peace' higher than the Washington sample. Rankin argues that 'a world at peace' can easily be seen as a higher-order need, rather than the lower-order safety need that Dunlap et al (1983) see it as. Little support was found for the hypothesis that values influence beliefs about the significance of energy shortages, although values did have some explanatory power in explaining how the problem could be addressed12.

In a study of commitment to energy conservation, Neuman (1986) investigated the relationship between conservation beliefs and behaviour, and a set of personal and contextual variables including Rokeach's terminal values. A factor analysis of the terminal values combined with nine additional values13, revealed the following five factors: security, environmental, traditional success, personal growth, and well-being. Correlations between scores on these value dimensions and broad commitment to conservation revealed statistically significant but weak correlations for all factors except traditional success for which no significant correlations were found. The result pertaining to the personal growth factor is seen as reflecting "the recent social movement toward voluntary simplicity (VS), in which material consumption is de-emphasised in favour of more inward forms of fulfilment and satisfaction (Elgin,

11 Dunlap et al (1983, p161) note that as the public becomes increasingly aware that pollution is unhealthy as well as simply uneaesthetic, public support for environmental policies may increase in the materialist sector where lower-order needs such as health and security are important.

12 Rankin (1983) also requested individuals to "list those values that they believed nuclear power helped them to attain and those values that they believed nuclear power hindered them from attaining" (p179) This notion that some (environmental) act might be instrumental to the attainment of personal values is referred to as Value Instrumentality. It provides an interesting alternate way of investigating attitudes and beliefs in relation to values.

13 These were: Good health, self-reliance, having control over one's life, personal growth, preserving the natural environment, personal mobility, closeness to nature, accumulation of personal wealth and a life of material simplicity.
1982)" (Neuman, 1986, p61-62). The significant relationship between broad behavioural commitment and well-being was tied to Maslow's (1954) hierarchy of needs: "Because a commitment to conservation is likely to develop from (higher-order) concern for the collective good as well as personal self-interest in cutting costs, it may be that individuals focussing on higher-order needs (which well-being values here clearly reflect) will be more apt to develop the capacity and interest in building such a commitment" (Neuman, 1986, p63).

In order to shed further light on the apparent weak links between broad behavioural commitment and values, Neuman turns to other variables that could potentially be playing a mediating role between the two. Multiple regression analyses suggested that demographic variables were not important in this respect. Nor were (i) beliefs concerning the efficacy of conservation in providing personal as well as collective benefits, (ii) beliefs pertaining to the acceptance of some personal responsibility to conserve, and (iii) beliefs regarding the perceived seriousness of the energy situation. Values did however enter as significant variables in explaining beliefs. Although contextual variables were found to be statistically significant determinants of behavioural efforts to conserve, they were not found to systematically mediate the influence of personal values on behavioural commitment. Multiple regressions containing values, beliefs and contextual variables as independent variables suggested that once belief and context were controlled for, values added little to the total variation explained. Neuman was lead to the conclusion (p70-1) that "Adherence to certain personal values ... may be consistent with and contribute to a conservation ethic, but in themselves remain a weak determinant of conservation-directed activity, relative to other, primarily situational, factors".

Pierce (1979) has investigated the role of personal (Rokeach) values in the public's attitudes toward water resource preservation. Support for water resource preservation was measured according to the ranking 'preservation' was given out of a total of seven possible management options. Results indicated that the relationship between values and preservation-support was stronger among individuals with an identifiable (self) interest in the option chosen. In a regression of preservation ranking on the twelve values most correlated with it, 30% of the variance in support for preservation was found for waterfront property owners, and only 15% was explained for non-waterfront owners.

Kristiansen and Matheson (1990) examined the relation between the value priorities of a sample of Canadian students (as measured using the Rokeach value survey) and their attitudes toward nuclear weapons (using semantic differentials as discussed in
Appendix C), and found that attitudes toward allowing nuclear weapons in Canada were a function of their value priorities, and in particular the relative importance of the values national security and peace.

E.3 ADDITIONAL ANALYSIS OF AFAS DATA

E.3.1 The AFAS Values Measures

As noted above, different measures of values are employed both between and within disciplines. As noted in Chapter 6, several measures of values and ideology were included in the AFAS. Our focus here is on comparing the explanatory power of the Social Value Inventory, SVI (Braithwaite and Law, 1985), with the key political science measure, postmaterialism (Inglehart, 1979). Two other measures will, however, be included in the comparison: one relating to liberalism, and one to left-right political alignment. When comparing the explanatory power of such values measures, one must bear in mind any differences in abstractness in the measures. Since values are abstract by definition, it should not be assumed that a measure with higher explanatory power is necessarily “better”. It may be better at predicting behaviour, but if this was our primary objective, more specific attitudes would be sought. If, however, a more specific value measure offers no improvement in explanatory power, it may be inferred that either that factor has not been well measured, or that it is less theoretically relevant to the CV context.

At this stage some interesting differences between the postmaterialism and SVI measures of value are noted. Firstly, postmaterialism is measured using a ranking procedure (Question A3 in AFAS) whereas the SVI items (E3) are simply rated. Postmaterialism thus involves an expression of relative worth to a greater extent than the SVI. Individuals can be expected to be aware of their responses to other items in the case of the SVI question, and hence assignments of relative worth or desirability will still occur. Such tradeoffs are however, more central to the postmaterialism measure.

It is worth noting that the tradeoffs involved in the postmaterialism questions lack a context, which on the basis of pretest results, may result in a degree of protest. The fact that postmaterialism requires individuals to tradeoff quite specific attitudes in the absence of a context, raises questions regarding the consistency and validity of the measure. The SVI can be seen as more consistent with the abstract and context free notion of value.
Secondly, the SVI may provide a more generalised or abstract measure of value. As a consequence, postmaterialism may have greater explanatory power with respect to attitudes relating to environmental issues. A third difference between the postmaterialism and SVI measures concerns the way the composite scores are calculated. In the case of postmaterialism, all items receive equal weighting when the numbers of postmaterialism and materialism responses are added to form the postmaterialism index. The SVI offers greater flexibility, since one can assign different weightings to different items, through the use of congeneric models. These weightings are assigned on the basis of how strongly they tap the common underlying trait. This is clearly the preferred approach, since it is unrealistic to expect that all items capture a construct to the same extent. Some will also be more prone to measurement error than others.

A third measure of held values, which arises in both the political science and psychological literature relates to two different notions of liberalism, anti-laissez-faire liberalism and welfare-state-liberalism. Buttel and Flinn (1978b) found that the former was a stronger prediction of support for environmental regulations, and in the context of potential restrictions on logging, is hypothesised here to be of greater explanatory power. Several items relating to these notions of liberalism are included in question E1 of the AFAS.

A fourth measure of value might also be gained from respondents’ left-right self-placement, as measured in the Australian Electoral Survey (1993), and question F9a of the AFAS.

Measurement Models

(i) Postmaterialism

As noted in Chapter 6, a twelve item postmaterialism scale was chosen, divided into four item and eight item subscales following Inglehart (1979). Depending on their responses to Question A3, respondents were assigned to one of 4 value types, following the procedure of Inglehart (1979). Respondents were classified as either Materialist, Mixed (Materialist), Mixed (Postmaterialist) or Postmaterialist. A variable, pmideol was created on this basis, taking on values from 1 to 4 respectively\(^\text{14}\). The distribution of postmaterialist value types in the AFAS study is presented in Chapter 9.

\(^{14}\) The procedure of Inglehart (1979) was followed with one exception. The item ‘more beautiful cities’ was treated as postmaterialist rather than neutral. This is in accordance with Australian experiences (Bean, 1994 pers comm).
An initial perusal of frequency distributions for the 17 items in Question E3 revealed that, as expected, responses were generally skewed in the direction of goal acceptance. With the exception of "domination of nature", all values were accepted as important to some degree by at least 80% of the sample. The top six values were 'a world at peace', 'the rule of the law', 'human dignity', 'freedom', 'equal opportunity for all', and 'preserving the natural environment'.

As noted in Section E.2.2, past factor analyses of the SVI have produced two major dimensions or value orientations, one representing national strength and order, NS&O, the other international harmony and equality, IH&E (Braithwaite and Law, 1985).

In order to identify the factor structure in the AFAS data, and to identify items to be used in a smaller measurement model to be conducted in LISREL, some exploratory factor analyses were undertaken using SPSS. Given our theoretical expectation of a dual-factor-structure, and the correlations between factors found in non-student samples (Braithwaite, 1994), a principal-axis factor analysis with oblimin rotation was run, with a restriction of two factor extraction being imposed. The percentage variation explained by the two factors was 38.7% which is quite acceptable for scales of this type. The factors were quite highly correlated, the factor correlation matrix indicating a correlation of 0.51. The resultant sorted structure matrix is included below. This indicates the correlations between the factors and variables.

Structure Matrix

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor1</th>
<th>Factor2</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3L</td>
<td>equal opportunity for all</td>
<td>0.68147</td>
</tr>
<tr>
<td>E3J</td>
<td>human dignity</td>
<td>0.66787</td>
</tr>
<tr>
<td>E3H</td>
<td>a world of beauty</td>
<td>0.64424</td>
</tr>
<tr>
<td>E3Q</td>
<td>preserving the natural environment</td>
<td>0.62537</td>
</tr>
<tr>
<td>E3C</td>
<td>international cooperation</td>
<td>0.62501</td>
</tr>
<tr>
<td>E3A</td>
<td>a good life for others</td>
<td>0.60233</td>
</tr>
<tr>
<td>E3G</td>
<td>a world at peace</td>
<td>0.59246</td>
</tr>
<tr>
<td>E3E</td>
<td>social progress and social reform</td>
<td>0.58566</td>
</tr>
<tr>
<td>E3N</td>
<td>greater economic equality</td>
<td>0.56079</td>
</tr>
<tr>
<td>E3M</td>
<td>freedom</td>
<td>0.54981</td>
</tr>
<tr>
<td>E3B</td>
<td>rule by the people</td>
<td>0.52673</td>
</tr>
<tr>
<td>E3P</td>
<td>national economic development</td>
<td>0.38479</td>
</tr>
<tr>
<td>E3K</td>
<td>national security</td>
<td>0.32843</td>
</tr>
<tr>
<td>E3O</td>
<td>the rule of the law</td>
<td>0.35795</td>
</tr>
<tr>
<td>E3F</td>
<td>national greatness</td>
<td>0.35869</td>
</tr>
</tbody>
</table>
A first observation is that all of the items correlated most highly on the factor that a priori considerations lead us to expect. The eleven items correlating on factor 1 are all expected to load highest on the IH&E dimension, and the 4 items correlating most highly on factor 2 are expected to load highest on the NS&O dimension.

To test for further confirmation of the hypothesised dual factor structure, the restriction of 2 factors can be relaxed, and number of factors extracted according to the eigenvalue criterion or scree plot observed. In the event that additional factors are extracted, the theoretical meaningfulness of such factors is then assessed. As always, structural decisions should be based on substantive theoretical reasoning. Results indicated that only the above 2 factors could be extracted before the eigenvalue fell below one, and that allowing 2 additional factors with eigenvalues of 0.64 and 0.53 produced a total explained variance for these factors of 6.8%.

In order to obtain a parsimonious measurement model for these two factors, and one that is not misspecified, for example due to correlated error terms amongst items, a basic 8 item measurement model was estimated in LISREL and subsequently refined. In this initial model, the four items correlating most highly on each of the two factors, as indicated in the above structure matrix were selected and included as measurement items for their respective factor. Results indicated that item E3l had numerous correlated error variances, and loaded on the NS&O dimension in addition to the IH&E dimension. This item was subsequently dropped. It was also decided to permit only one of the 2 items relating to the environment (E3h and E3q) to be included in the model, since E3q was largely redundant given E3h, and it is not desirable for present purposes to allow environment related items to dominate any of the latent variable measures. Items E3l and E3q were thus dropped and replaced with the next items indicated in the structure matrix, E3c (international cooperation) and E3a (a good life for others).
FIGURE E.1 MEASUREMENT MODEL FOR SVI DIMENSIONS

Although modification indices suggested that some paths between error terms for various items be freed up, there was little clear substantive justification for making such modifications and given that the modification indices were not very high, no changes were made. Results for this 2 factor measurement model, corresponding to the path diagram presented in Figure E.1, are presented in Table E.2. The fit is very good, indicating that the scale is valid to the extent that the items appear to be tapping the same construct. Item-reliabilities (see Section 9.2.6) can be calculated as (1.0-Error Variance).
### Table E.2 LISREL Measurement Model Results: SVI

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>iharmony</td>
</tr>
<tr>
<td>E3a (IH&amp;E)</td>
<td>0.60</td>
<td>0.64</td>
<td>0.17</td>
</tr>
<tr>
<td>E3c (IH&amp;E)</td>
<td>0.65</td>
<td>0.57</td>
<td>0.21</td>
</tr>
<tr>
<td>E3f (NS&amp;O)</td>
<td>0.70</td>
<td>0.51</td>
<td>0.03</td>
</tr>
<tr>
<td>E3h (IH&amp;O)</td>
<td>0.69</td>
<td>0.52</td>
<td>0.24</td>
</tr>
<tr>
<td>E3j (IH&amp;O)</td>
<td>0.81</td>
<td>0.34</td>
<td>0.43</td>
</tr>
<tr>
<td>E3r (NS&amp;O)</td>
<td>0.79</td>
<td>0.38</td>
<td>0.04</td>
</tr>
<tr>
<td>E3o (NS&amp;O)</td>
<td>0.76</td>
<td>0.42</td>
<td>0.04</td>
</tr>
<tr>
<td>E3p (NS&amp;O)</td>
<td>0.80</td>
<td>0.36</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**Goodness-of-fit Measures:**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOF Index</td>
<td>0.99</td>
</tr>
<tr>
<td>Adj GOF Index</td>
<td>0.98</td>
</tr>
<tr>
<td>RMSR</td>
<td>0.034</td>
</tr>
</tbody>
</table>

Table E.2 indicates the factor score regressions obtained from the LISREL output. The weights shown in the Table can be used to form two composite variables from the respective sets of observed variables. These composite variables are then used in the path analysis. Two composite variables were subsequently created, the relevant SPSS code being:

\[
\text{compute natstren} = 0.02*E3a + 0.02*E3c + 0.19*E3f + 0.03*E3h + 0.05*E3j + 0.29*E3k + 0.25*E3o + 0.32*E3p.\
\]

\[
\text{compute iharmony} = 0.17*E3a + 0.21*E3c + 0.03*E3f + 0.24*E3h + 0.43*E3j + 0.04*E3k + 0.04*E3o + 0.05*E3p\
\]

The composite variable natstren provides a single measure of the NS&O latent variable, and the variable iharmony provides a measure of the IH&E latent variable.
Both composite variables take on higher values as their respective latents become more prominent in individuals.

(iii) Liberal Ideology

In response to a number of findings indicating that support for "environmental reform crosscuts traditional left-right societal cleavages", Buttel and Flinn (1978b, p19) proceeded to clarify matters by specifying and empirically investigating two components of the 'left' dimension of the left-right cleavage. The first of these, 'welfare-state-liberalism' involves the belief that the national government has responsibility to provide welfare assistance of various forms to those in need. In contrast, 'anti-laissez-faire-liberalism' involves the belief that the national government should "compel private individuals and legal entities to obey regulatory laws when such laws protect the collective well-being of the nation" (Samdahl and Robertson, 1989, p60).

It is this latter type of liberalism that past studies have found to be most highly correlated with measures of environmental concern and regulation, since environmental protection tends to involve the imposition of regulations on individuals, corporations etc, more than it involves welfare concerns in the above sense. Both measures of liberalism tend to be positively correlated with measures of environmental concern, however, and the two measures tend to be quite highly correlated themselves. Buttel and Flinn (1978b) found statistically significant relationships between the two respective measures and environmental concern, with the two measures also exhibiting significant third-order partial correlation coefficients when education, age and place of residence are controlled.

More recently, Samdahl and Robertson (1989) presented a causal model of determinants of environmental concern. 'Laissez-faire-liberalism' was broadened and renamed 'pro-regulatory liberalism' and 'welfare-state-liberalism' was renamed 'social-welfare liberalism'. Results of their causal model indicated that pro-regulatory liberalism was a strong determinant of support for environmental regulation, and only mildly related to perception of environmental problems and personal behaviour in relation to the environment. In contrast, social-welfare liberalism was not a significant determinant of any of these variables.

Since pro-regulatory liberalism has been shown to be an important determinant of some measures of environmental concern, it is included here as a third measure of value, along with its sister measure, social welfare liberalism. Based on the above results and theoretical considerations, it is expected that pro-regulatory liberalism will
provide the stronger determinant of environmental orientations and hence CV response.

Now consider the measurement of these orientations in Question E1 of the AFAS. An initial principal axis factor analysis with oblimin rotation and a two factor restriction indicated that E1f and E1b correlated with the opposite factor to that which was expected on a priori theoretical grounds. Since there is a degree of redundancy with respect to the several 'controlling big business' items in this scale, these items were omitted from further consideration, as was E1c (relating to faith in technology) which did not correlate well with either factor. LISREL analysis of the 2-factor measurement model resulted in the model presented in Table E.3. Note that E1h has been dropped, again on the basis of redundancy and the desire for a parsimonious model. Composite variables were again created using the factor score regressions, the variable awelfare measuring anti-welfare-state liberalism, and the variable proreg measuring pro-regulatory liberalism. Higher scores on these variables reflect higher degrees of the respective latent construct.

**TABLE E.3: LISREL MEASUREMENT MODEL RESULTS: LIBERALISM**

<table>
<thead>
<tr>
<th>Item</th>
<th>Parameter Estimate</th>
<th>Error Variance</th>
<th>Factor Score Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>awelfare</td>
</tr>
<tr>
<td>E1a</td>
<td>0.54 (w)</td>
<td>0.71</td>
<td>0.18</td>
</tr>
<tr>
<td>E1d</td>
<td>0.69 (pr)</td>
<td>0.53</td>
<td>-0.02</td>
</tr>
<tr>
<td>E1e</td>
<td>0.50 (pr)</td>
<td>0.75</td>
<td>-0.01</td>
</tr>
<tr>
<td>E1g</td>
<td>0.82 (w)</td>
<td>0.33</td>
<td>0.59</td>
</tr>
<tr>
<td>E1i</td>
<td>0.65 (w)</td>
<td>0.58</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Goodness-of-fit Measures:
- GOF Index: 0.99
- Adj GOF: 0.97
- RMSR: 0.49
(iv) Left-Right Self-Placement

Left-right political alignment has not always had the explanatory power in the environment realm that researchers have hoped. As noted above, some authors have argued that environmental concern may cross-cut such traditional cleavages. The work of Buttel and Flinn (1978a, 1978b) and Samdahl and Robertson (1989), however, makes such a claim dubious. In the Australian context, Forgas and Jolliffe (1994) found that environmental concern was positively correlated with left-wing political attitudes and other measures. The Australian Electoral Survey (1993) asks respondents to place themselves on a 10-point left-right scale, with 10 indicating extreme right wing political alignment. For the above reasons, and given the short single item nature of the question, a measure of left-right self-placement was included in the questionnaire (F9a) and used in our analysis of the effect of various values measures on CV response.

It can be argued that measures of political ideology pertaining to liberalism and left-right self-placement do not represent values measures, in the true psychological sense. Nonetheless, they are considered here for comparison purposes, and whether defined as values or not, such ideological measures have been shown to be important determinants of environmental concern measures in the literature.

E.3.2 Comparison of Values Measures

Table E.4 presents the bivariate correlations for the different values measures employed in this chapter. These results are generally as expected. Note however, how pmideol correlates most highly with Natstren and F9a, these being negative correlations, suggesting it picks up ‘right wing’ orientation rather well. Some correlations, such as that pertaining to Pmideol and Iharmony are surprisingly low. The high positive correlation between iharmony and natstren confuses interpretation of correlations involving these variables somewhat. Of greater interest is how well these variables explain CV response, given their highly abstract nature.
<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.53 (5.0)</td>
<td>0.62 (4.7)</td>
<td>-0.16 (2.2)</td>
<td>0.48 (3.6)</td>
</tr>
<tr>
<td></td>
<td>0.003 (0.3)</td>
<td>-0.63 (5.2)</td>
<td>0.004 (0.3)</td>
<td>-0.06 (0.4)</td>
</tr>
<tr>
<td></td>
<td>0.006 (0.1)</td>
<td>-0.02 (1.3)</td>
<td>-0.19 (2.9)</td>
<td>0.008 (0.6)</td>
</tr>
<tr>
<td></td>
<td>0.48 (4.5)</td>
<td>0.63 (4.8)</td>
<td>-0.19 (2.9)</td>
<td>0.66 (4.5)</td>
</tr>
<tr>
<td></td>
<td>-0.01 (0.8)</td>
<td>-0.57 (4.5)</td>
<td>-0.01 (0.9)</td>
<td>-0.03 (0.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.02 (1.3)</td>
<td>-0.19 (2.9)</td>
<td>-0.02 (1.4)</td>
</tr>
<tr>
<td>3</td>
<td>0.52 (4.7)</td>
<td>0.77 (5.3)</td>
<td>-0.28 (4.2)</td>
<td>-0.58 (4.1)</td>
</tr>
<tr>
<td></td>
<td>0.005 (0.3)</td>
<td>-0.79 (5.6)</td>
<td>-0.01 (1.0)</td>
<td>-0.08 (0.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.01 (0.9)</td>
<td>-0.28 (4.2)</td>
<td>0.02 (1.2)</td>
</tr>
<tr>
<td>4</td>
<td>0.50 (4.7)</td>
<td>0.51 (3.8)</td>
<td>-0.17 (2.5)</td>
<td>0.35 (2.4)</td>
</tr>
<tr>
<td></td>
<td>-0.06 (4.5)</td>
<td>-0.61 (4.9)</td>
<td>-0.07 (4.5)</td>
<td>0.05 (0.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.07 (4.8)</td>
<td>-0.17 (2.5)</td>
<td>-0.07 (4.6)</td>
</tr>
</tbody>
</table>

The focus here is on the significance of the various values measures as independent variables in valuation functions. Given the large number of regressions involved, goodness of fit measures for each regression run are omitted from the Table for presentation reasons.
Logistic regression results. Cells contain parameter estimates, and t-statistics in brackets.

A first observation is that the SVI measures, iharmony and natstren, and the postmaterialism measure, pmideol, generally reach higher significance levels than the left-right self-placement measure and the two measures of liberalism. The former two appear to have similar significance levels, with pmideol reaching higher levels than at least one of the SVI measures in scenarios 1 and 4 and pmideol being slightly less significant than both SVI measures in scenarios 2 and 3. There is not much in it however and it is concluded that the measures are probably equally relevant to CV responses. Given that the SVI items are more abstract and involve less explicit focus on tradeoffs, the SVI measure may be considered to have surprisingly high statistical significance. Although the full 17 item SVI scale is lengthy and hence more limited in application than the postmaterialism measure, the 8 item SVI composite scale employed here is shorter than the 12 item postmaterialism scale, and potentially less prone to protest responses.

As expected, the international harmony and equality (IH&E) dimension is positively related to CV response and the national strength and order dimension (NS&O) is negatively related. Note also that where the 2 dimensions have approximately equal significance levels in scenarios 1 to 3, the significance level of the NS&O variable (natstren) becomes relatively higher in the 4th scenario. This could be interpreted as a function of the more individualistic orientation of the trust fund question compared with the referendum versions, where collectivist preferences are more relevant.

Turning now to the liberalism measure, it is immediately apparent that anti-welfare state liberalism fails to reach statistical significance in any of the four scenarios. As expected, the most relevant measure of liberalism is clearly proregulatory liberalism with the coefficient for this variable being statistically significant in all scenarios. As with IH&E, the significance of this factor seems to fall in the fourth scenario. This may be interpreted as a consequence of the greater regulatory connotations of a referendum compared to a trust fund. The trust fund involves leaving matters to markets to a greater extent than the referendum format, even though the latter is clearly as democratic. As noted in the previous chapter, the referendum format also appears to stimulate consideration of the opportunity costs of preservation and when one is considering the whole environment-development question, regulatory issues quickly arise.
The results for left-right self-placement indicate that as individuals become more right-wing the likelihood of ‘yes’ CV responses becomes smaller. This is as expected, given the results of the Forgas and Jolliffe (1994) study noted above. In terms of statistical significance in the above valuation functions, left-right self-placement is, however, the weakest of the four values measures when it comes to CV responses. It is also particularly prone to item non-responses, with 280 recorded in the AFAS questionnaire, accounting for 17% of questionnaire respondents. This far exceeds the item non-response rates for the other 3 measures, which average about 20 in the case of postmaterialism (1%), 50 in the SVI (3%) and 45 in the case of the liberalism measures (2.7%). On the basis of these results, left-right self-placement is not recommended as a worthwhile choice of explanatory variable in CV studies. Not only is it subject to protest and/or lack of understanding, but alternate measures of value or generalised attitude offer significant improvement in statistical significance.

For the purposes of structural equation modelling, pmideol will be used. It is accepted that Natstren and Iharmony could equally have been used. Use of the single variable measure has some attractions in terms of keeping the structural models fairly simple.

E.3.3 Values and Environmental Involvement

Individuals with more postmaterialist value types are more likely to be involved with environmental groups and movements, and adopt environmentally conscious behaviours such as recycling and the purchase of environmentally friendly products (McAllister, 1990).

In this section the relative influence of pmideol, natstren and iharmony, and envorien, on a range of dichotomous measures of environmental involvement is considered. Of particular interest is how the significance of pmideol in predicting CV response compares with that for the other dichotomous measures. If respondents do not pay full attention to the constraints associated with Option B such as price, it might be expected that CV responses will be influenced by values and attitudes to a greater extent than measures of actual behavioural involvement, where constraints (such as time) are more salient.

Five dichotomous variables were created for the purpose of these comparisons. These are created from variables F1 to F5 in the questionnaire as follows:

\[
\text{member} = \begin{cases} 
1 & \text{if } F1 = 1, 2 \text{ or } 5; \\
0 & \text{if } F1 = 3 \text{ or } 4.
\end{cases}
\]

\[
\text{recycle} = \begin{cases} 
1 & \text{if } F2 = 1 \text{(Yes)}; \\
0 & \text{if } F2 = 2 \text{(No)}.
\end{cases}
\]
holiday = 1 if F3=1 (Yes); 0 if F3=2 (No).
shopping = 1 if F4=3; 0 if F4=1 or 2.
domore = 1 if F5=1 (Yes); 0 if F5=2 (No).

‘Member’ relates to a willingness to be involved in environmental groups. ‘Recycle’ relates simply to whether or not the individual recycles newspapers regularly. ‘Holiday’ relates to whether the individual would like to spend some of his/her holidays in the next 12 months increasing his/her understanding and appreciation of nature. ‘Shopping’ relates to whether or not the individual usually purchases environmentally friendly products. And ‘Domore’ relates to whether or not the individual thinks that he/she should do more to protect the environment.

It is important to note that none of these measures represents a completely satisfactory indicator of actual behaviour. The least ambiguous measures of behaviour are recycle and shopping, since they are actual reports of present behaviour. Although a dichotomous measure of involvement in environmental groups is preferred to that represented by ‘member’ the fact that only 6% of respondents indicated that they were currently a member prevented the use of such a measure. Instead, responses such as “would like to join, but cannot” were included in the same category as “I’m already a member”. The ‘yes’ category becomes more ambiguous and prone to social desirability biases as a result. ‘Holiday’ is more of a self-report of behavioural intention than an indicator of any actual behaviour. Similarly, ‘Domore’ is a reflective belief relating to how acceptable the individual’s current and past environmental involvement is perceived to be. Finally, ‘shopping’ provides a self-report of actual shopping behaviour. Again, some degree of social desirability bias can be expected here, however, since individuals who sometimes purchase environmentally friendly products may be tempted to indicate that they usually make such purchases. In short, none of the above measures can be considered an accurate measure of ‘green’ behaviour. To varying degrees, they will be subject to biases in which individuals respond in terms of their general attitude toward the environment. The more green an individual’s values, the more he or she will like to be seen as involved in ‘green’ activities, even when he/she is not.

Results of the logistic regressions are presented in Table E.6. With the exception of the final CV results which correspond to the trust fund scenario, the results in this table were obtained for the combined referendum formats. One of the three generalised measures (Pmideol, Harmony and Natstren, Envorien) was included as the sole independent variable in any one regression.
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Value or Attitude Measure</th>
<th>Value or Attitude Measure</th>
<th>Value or Attitude Measure</th>
<th>Value or Attitude Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pmideol</td>
<td>Iharmony</td>
<td>Natstren</td>
<td>Envoren</td>
</tr>
<tr>
<td>member</td>
<td>0.63 (9.7)</td>
<td>0.88 (10.2)</td>
<td>-0.62 (-8.5)</td>
<td>1.33 (12.3)</td>
</tr>
<tr>
<td>recycle</td>
<td>0.36 (3.3)</td>
<td>0.69 (5.7)</td>
<td>-0.47 (-3.7)</td>
<td>0.57 (4.5)</td>
</tr>
<tr>
<td>holiday</td>
<td>0.46 (7.0)</td>
<td>0.77 (9.4)</td>
<td>-0.38 (-5.1)</td>
<td>0.84 (10.3)</td>
</tr>
<tr>
<td>shopping</td>
<td>0.30 (4.8)</td>
<td>0.46 (6.2)</td>
<td>-0.36 (-5.1)</td>
<td>0.59 (7.6)</td>
</tr>
<tr>
<td>domore</td>
<td>0.30 (4.0)</td>
<td>0.49 (5.5)</td>
<td>-0.41 (-4.7)</td>
<td>0.77 (8.3)</td>
</tr>
<tr>
<td>CV</td>
<td>0.51 (8.2)</td>
<td>0.66 (8.5)</td>
<td>-0.65 (8.8)</td>
<td>1.32 (14.6)</td>
</tr>
<tr>
<td>CV*</td>
<td>0.51 (4.9)</td>
<td>0.49 (3.8)</td>
<td>-0.57 (4.8)</td>
<td>1.44 (7.3)</td>
</tr>
</tbody>
</table>

* Logistic Regression Models estimated for the three referendum scenarios combined.

# Results in this row only, were estimated for the trust fund scenario.

Results indicate that postmaterialism is positively related to all of the involvement measures and that in all cases the coefficient for the pmideol is statistically significant at the 95% level.

Although the referendum CV question is among the variables most strongly related (in terms of parameter estimates and statistical significance) to pmideol, it is not as strongly related as ‘member’. This is consistent with the claim that postmaterialists are likely to become involved in ‘new social movements’ such as environmental groups and the fact that postmaterialism is known to be closely related to both environmental attitudes and voting behaviour (Inglehart, 1979, McAllister, 1990). In the case of the trust fund scenario, the t-statistic for pmideol is middle of the range when compared to that of the other involvement variables. The parameter estimates are, however, the same for the two CV regressions.

Similar trends exist for the SVI variables, and as one would expect, envoren is a relatively stronger influence on CV response than the two values measures.

Although no firm conclusions can be drawn in this section relating specifically to CV responses, limited evidence has been found to suggest that the influence of values on trust fund CV responses may be no greater (or less) than with other behavioural self-
reports contained in questionnaires. The extent to which some of these other measures accurately reflect the individual’s true behaviour or behavioural intention may be questioned. The influence of values on CV response is also quite similar to the influence of values on responses to the more reflective question regarding whether the individual should do more to help protect the environment.

Although it is desirable to compare these results with those listed in Section E.2.4, the comparisons are limited by the different approaches of the studies. It is not clear what a realistic explanatory power of values is, when it comes to predicting various forms of pro-environmental behaviour.
APPENDIX F

SENSITIVITY OF SEM RESULTS TO INPUT MATRIX AND ESTIMATION METHOD

<table>
<thead>
<tr>
<th>cell entries: parameter estimate and t-statistic</th>
<th>PM</th>
<th>KM(ord)</th>
<th>KM(ord) &amp; ACOV</th>
<th>PM &amp; ACOV</th>
<th>CM</th>
<th>CM &amp; ACOV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BETA element</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>env’t orient-forest orient</td>
<td>0.805</td>
<td>0.675</td>
<td>0.681</td>
<td>0.803</td>
<td>0.586</td>
<td>0.663</td>
</tr>
<tr>
<td>(22.49)</td>
<td>14.95</td>
<td>11.66</td>
<td>10.815</td>
<td>14.95</td>
<td>17.56</td>
<td></td>
</tr>
<tr>
<td>forest orient -conseq</td>
<td>0.760</td>
<td>0.641</td>
<td>0.854</td>
<td>0.658</td>
<td>0.780</td>
<td>0.818</td>
</tr>
<tr>
<td>(18.561)</td>
<td>13.37</td>
<td>20.06</td>
<td>10.21</td>
<td>13.37</td>
<td>17.29</td>
<td></td>
</tr>
<tr>
<td>conseq - CV</td>
<td>0.508</td>
<td>0.390</td>
<td>0.211</td>
<td>0.812</td>
<td>0.301</td>
<td>0.322</td>
</tr>
<tr>
<td>(10.320)</td>
<td>7.12</td>
<td>2.36</td>
<td>8.80</td>
<td>7.12</td>
<td>8.29</td>
<td></td>
</tr>
<tr>
<td><strong>GAMMA element</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>postmat - env’t orient</td>
<td>0.290</td>
<td>0.254</td>
<td>0.240</td>
<td>0.303</td>
<td>0.262</td>
<td>0.232</td>
</tr>
<tr>
<td>(4.89)</td>
<td>4.24</td>
<td>4.47</td>
<td>6.10</td>
<td>4.24</td>
<td>4.071</td>
<td></td>
</tr>
<tr>
<td>inc - env’t orien</td>
<td>-0.016</td>
<td>-0.034</td>
<td>-0.051</td>
<td>-0.041</td>
<td>-0.012</td>
<td>-0.018</td>
</tr>
<tr>
<td>(-.26)</td>
<td>-0.568</td>
<td>-0.97</td>
<td>-0.65</td>
<td>-0.568</td>
<td>-93</td>
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<tr>
<td>inc - forest orient</td>
<td>0.137</td>
<td>0.129</td>
<td>0.130</td>
<td>0.120</td>
<td>0.039</td>
<td>0.055</td>
</tr>
<tr>
<td>3.82</td>
<td>2.86</td>
<td>3.06</td>
<td>1.191</td>
<td>2.86</td>
<td>4.015</td>
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</tr>
<tr>
<td>inc - conseq</td>
<td>-0.054</td>
<td>-0.024</td>
<td>-0.070</td>
<td>-0.162</td>
<td>-0.009</td>
<td>-0.035</td>
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<tr>
<td>-1.31</td>
<td>-0.50</td>
<td>1.60</td>
<td>0.933</td>
<td>-0.496</td>
<td>-2.233</td>
<td></td>
</tr>
<tr>
<td>inc - CV</td>
<td>0.032</td>
<td>0.025</td>
<td>-0.014</td>
<td>-0.157</td>
<td>0.007</td>
<td>0.007</td>
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<tr>
<td>0.641</td>
<td>0.45</td>
<td>-0.29</td>
<td>-0.975</td>
<td>0.452</td>
<td>0.502</td>
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<tr>
<td>price - CV</td>
<td>-0.277</td>
<td>-0.214</td>
<td>-0.230</td>
<td>-0.197</td>
<td>-0.020</td>
<td>-0.021</td>
</tr>
<tr>
<td>-5.621</td>
<td>-3.90</td>
<td>-5.18</td>
<td>-1.80</td>
<td>-3.90</td>
<td>-4.433</td>
<td></td>
</tr>
<tr>
<td>Chi-Sq-9df</td>
<td>132.9</td>
<td>44.87</td>
<td>20.73</td>
<td>12.59</td>
<td>44.88</td>
<td>42.07</td>
</tr>
<tr>
<td>GOF Index</td>
<td>0.88</td>
<td>0.96</td>
<td>0.99</td>
<td>0.99</td>
<td>0.96</td>
<td>0.99</td>
</tr>
<tr>
<td>Adj GOF Index</td>
<td>0.63</td>
<td>0.87</td>
<td>0.96</td>
<td>0.98</td>
<td>0.87</td>
<td>0.96</td>
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<tr>
<td>RMSR</td>
<td>0.073</td>
<td>0.072</td>
<td>0.059</td>
<td>0.07</td>
<td>0.33</td>
<td>0.34</td>
</tr>
<tr>
<td>SMCSE (CV)</td>
<td>0.35</td>
<td>0.20</td>
<td>0.33</td>
<td>0.61</td>
<td>0.20</td>
<td>0.21</td>
</tr>
</tbody>
</table>
APPENDIX G

SPSS CODE FOR SIMULATION MODEL

VECTOR LEX(21).
VECTOR CV(21).

COMPUTE BB=RV.UNIFORM(0,90).
COMPUTE WTP=RV.NORMAL(100,120).
COMPUTE LXCQDE=RV.UNIFORM(0,100).

DO IF (WTP GE 300).
  COMPUTE ORIENT=6.
ELSE IF (WTP GE 200).
  COMPUTE ORIENT=5.
ELSE IF (WTP GE 100).
  COMPUTE ORIENT=4.
ELSE IF (WTP GE 0).
  COMPUTE ORIENT=3.
ELSE IF (WTP GE -100).
  COMPUTE ORIENT=2.
ELSE IF (WTP GE -200).
  COMPUTE ORIENT=1.
END IF.

IF (BB LT 10) BID=2.
IF (BB GE 10 AND BB LT 20) BID=5.
IF (BB GE 20 AND BB LT 30) BID=10.
IF (BB GE 30 AND BB LT 40) BID=20.
IF (BB GE 40 AND BB LT 50) BID=50.
IF (BB GE 50 AND BB LT 60) BID=100.
IF (BB GE 60 AND BB LT 70) BID=200.
IF (BB GE 70 AND BB LT 80) BID=300.
IF (BB GE 80 AND BB LT 90) BID=500.

LOOP I=1 TO 21.
  COMPUTE XX=5*(I-1).
  IF (LXCQDE LT XX) LEX(I)=1.
  IF (LXCQDE GE XX) LEX(I)=2.
  DO IF (LEX(I)=1).
    IF (WTP GT 0.0) CV(I)=1.
    IF (WTP LE 0.0) CV(I)=0.
  ELSE IF (LEX(I)=2).
    IF (WTP GT BID) CV(I)=1.
    IF (WTP LE BID) CV(I)=0.
  END IF.
END LOOP.
LOGISTIC REGRESSION CV1
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV1
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV3
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV3
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV5
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV5
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV7
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV7
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV9
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV9
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV11
/METHOD=ENTER BID ORIENT
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).

LOGISTIC REGRESSION CV11
/METHOD=ENTER BID
/CRITERIA PIN(.05) POUT(.10) ITERATE(20).
APPENDIX H

IDENTIFYING THE APPROPRIATE VALUATION STRUCTURE

Whether or not the effect on WTP of embedding and sequential aggregation and disaggregation CV valuation structures can be explained in terms of economic theory, CV practitioners must still decide on the appropriate structure for a given application of CV. This Appendix briefly discusses some of the issues involved in this decision, and offers some initial suggestions regarding how one might proceed.

The most common approach would appear to be to ignore embedding and sequential valuation structures, and to simply focus on the valuation of a single environmental issue, perhaps reminding individuals that ‘there may be other environmental goods that they may have to pay money for’. Although the simplest to implement, this is not necessarily the most appropriate approach.

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. 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. Hoehn and Loomis (1993) demonstrated that for goods that are substitutes, the economic value of a policy change is overestimated by summing independent valuations of the changes for those goods. This arises because some of the services are essentially double-counted. Results of their empirical investigation indicated that “the conventional benefit aggregation approach of independent valuation and summation overstates the benefits of two and three program policies by an average of 24 and 54% respectively” (p56).

In a study of seal and whale preservation values, Samples and Hollyer (1990) found

---

1 Single-issue valuation involves an incremental cost-benefit approach to decision-making, when, from a sustainability perspective, a more holistic approach is required. From a sustainability perspective, the valuation for each good in a bundle should reflect the relative importance of those goods, and not the order in which they are valued.

2 Hoehn and Loomis (1993) outline two ways of obtaining theoretically correct valuation of a policy change. One involves valuing the policy change as a whole, rather than summing the independent valuations of component goods. The other involves sequentially valuing the changes in each of the constituent goods, whilst adjusting the information set to remove the possibility of double-counting.
that jointly estimated WTP was less than the summation of individually estimated values and that this result holds whether individual species values are obtained from valuation first in a sequence or second. A problem with sequential valuation is also identified that cannot be eliminated through adjustment of information sets as outlined by Hoehn and Loomis (1993). Respondents “may tend to anchor their responses to valuation questions based on responses to earlier questions in a sequence” (Samples and Hollyer, 1990, p191). This reflects a desire to have valuations in sequence retain their ordinal properties. Given this, and the greater complexity involved in estimating joint WTP through sequencing, it appears that the most appropriate way to estimate the joint WTP for a bundle of goods, is to estimate all at once in a single question, and to possibly disaggregate to provide individual valuations for each of the constituent goods. The question that arises is which goods or services should be valued jointly in a given questionnaire, and how many levels of disaggregation should be employed. Kahneman and Knetsch (1992a, p63) “were unable to identify in the existing CVM literature, any compelling principles that could guide the choice of the appropriate embedding level for the good to be valued”.

One response to the dilemma is to adopt that level of embedding which is policy-relevant. Although this appears to be the majority stance of environmental economists on the matter (as advocated by Hoehn and Randall, 1987), few instances exist where it has been used to justify multiple levels of embedding (or sequential disaggregation). 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 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

3 Samples and Hollyer (1990) found that when presented with whales as a second valuation in a sequence, respondents were reluctant to indicate a lower value than for the first item in the sequence (Seals) because whales are generally seen to be more popular than seals.
issues currently on government agendas, whether or not they have CV funding, and irrespective of which government department they are of interest to⁴.

Consider Figure H.1, which indicates a hypothetical set of arrangements concerning a government’s policies, departments, departmental agendas and funding. To simplify matters, only four policies are included. Each policy is considered directly relevant to one or more government departments (D1 to D5): Departments 1 and 2 are concerned with policy 1, departments 1 and 2 with policy 2, departments 2,3, and 4 with policy 3, and departments 4 and 5 with policy 4.

FIGURE H.1 POLICIES, DEPARTMENTS AND AGENDAS

⁴ In the context of a CV study involving forestry operations on Fraser Island, Australia, Blamey (1994, p178-79) has asked “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.”
Each department has an agenda, each agenda item indicated as ag(p,d,r) where p represents the policy it (primarily) falls under, d indicates the department, and r indicates its importance ranking for that department. Agenda items with a star superscript are those for which the department has funding to conduct or commission a CV study. In the majority of cases, departments will have to apply for this funding. Although funding requests are more likely to accompany items higher in the agenda, some departments (or department heads) will see greater value in a CV study than others. To a large extent, the funded/not funded status of an agenda item will be a consequence of contextual factors such as political considerations, departmental interest, branch head interest etc. It is thus not obvious that agenda items for which CV studies have been funded are the highest on government agendas.

Now assume that P1 is the particular government’s policy relating to sustainability. Note that two departments have a total of three funded CV studies falling under P1. What is the appropriate level of embedding for each? The following initial options arise: (i) All three should be valued together in the one CV study?; (ii) The two in D1 should be valued together and the one in D2 valued alone; (iii) All three should be valued separately, if the two in D1 are in different branches of D1.

Now from a true policy-agenda perspective none of these approaches are appropriate. Rather, a comprehensive policy agenda would include at least all P1 agenda items in D1 and D2 ranking at least as high as the funded items (5 items in total). Indeed, one could argue that all 8 items should be valued together, since all are on agendas relating to P1.

Thus in this hypothetical example, a true policy agenda CV study would involve several environmental issues being addressed in a given CV study and at least one level of disaggregation (possibly more depending on the issues at hand). As typically operationalised, however, only 3 separate CV studies would be conducted, each involving a single issue-valuation, and no mention of any of the other agenda items relevant to that policy at the time. Such a process can hardly be seen as consistent with a holistic approach to environmental decision-making, although it may be sustainable, by default. In practice, identifying the appropriate embedding design will be more complex than the above, since different levels of government will have to be considered, and some ambiguity may exist regarding what constitutes a policy.

Blamey (1994) suggests that a question along the following lines, which involves a single level of disaggregation, may have been appropriate at the time of the Fraser Island Public Inquiry in Australia in 1990/91, when the other issues listed were also high on government agendas. The preservation values obtained for Fraser Island and
Kakadu with this question would almost certainly be less than those obtained through the separate single-issue CV studies.

**Question X**

Preserving the environment often means forgoing the economic benefits associated with various types of developments.

The costs (eg tax revenue, research costs) of foregoing such benefits will most likely be borne by the average Australian.

What is the maximum amount of money you personally are willing to forgo each year to preserve the environment at the expense of other economic benefits?

S .......... Total Environmental Budget

Below is a list of such environmental concerns that are currently on government agendas. Could you please read the entire list of issues first and then allocate a portion of your total environmental budget (your answer to above question) to each of the listed issues. Issues that you feel most warrant preservation should receive the highest proportion of your budget. You may respond by simply giving percentages rather than dollar figures if you wish.

Logging on Fraser Island

Mining in the Kakadu Conservation Zone

Logging the Chaelundi Forests

Preventing the decline of Australia’s Fisheries resources

Preventing forest dieback in WA

Reducing Soil Erosion in Agriculture Areas

Reducing salinity problems in the Murray Darling Basin

(If you used percentages please check these add to 100. If you used dollar figures please check these add to your total environmental budget.)

This example involves a two-stage budgeting process. Individuals are first required to optimally allocate income among broad groups of goods of services, in this case simply environmental goods (E) versus all other goods combined (M). Once an optimal budget allocation has been made between E and M, E then has to be optimally allocated amongst the listed goods, with no further reference to purchases
in M. The reverse is true for allocations within M, although not explicitly required in the above question.

A necessary requirement for the adoption of two-stage maximisation procedures is weak separability. This requires the marginal rates of substitution for goods/services within any one group to be functionally independent of the quantities of goods/services in M. In the above example, this implies a utility function

\[ U = F_1(x_1, ..., x_7) + F_2(x_8, ..., x_n), \]

where \( x_1 \) to \( x_7 \) are the environmental issues listed in the example, and \( x_8 \) to \( x_n \) are all other goods and services. The weakly separable utility function appears as a utility tree, with branches corresponding to each of \( f_i \). The separability assumption allows us to conduct a partial analysis and employ conditional demand functions, in which the demand for a commodity in a branch can be expressed as a function of the prices in, and the budget allocation to, that branch. In the above example, total income and the prices of goods outside branch E, enter the demand functions for goods inside the branch only through their effect on \( Y_E \). Thus, if \( Y_E \) is known, other prices and total income can be ignored.

As Nayga and Capps (1994, p89) state, if “separability restrictions are inconsistent with the true preference ordering of the representative consumer, empirical estimates of structural demand parameters are invalid. Thus it is worthy to consider tests of separability”. Tests of separability can be divided into those using parametric methods, which are conditional on the functional form of the utility function, and nonparametric tests, which do not have such a requirement, but are nonstochastic (Nayga and Capps, 1994). Phlips (1983) discusses measures of substitutability and complementarity that might be used to identify or test for appropriate partitioning. Principal Components Analysis is considered one of the more useful approaches (Phlips, 1983). Some insight can also be gained by analysing residuals obtained after fitting a system of demand equations based on an additive utility function. To the extent that ignored interdependencies cause the utility function to be misspecified, the interdependencies may show up in the residual correlations (Phlips, 1983). Substitutability can also be investigated using multiplicative terms in valuation function regression equations, as illustrated by Cummings et al (1994).

The above separability requirements raise the question of whether environmental goods can be separated from other goods, as in the above example. Some evidence suggests that this may not be the case. Cummings et al (1994), for example, found that non-environmental goods such as programs to reduce fire department response
time can act as substitutes in consumption for environmental goods. This suggests that a multipolicy valuation framework may be required, in which individuals first indicate WTP for a joint policy package such as environment, health, transport and social security, and then disaggregate until WTP for the primary good of interest is isolated. There are, however, several reasons why a broad multi-policy approach such as this may not be appropriate. Firstly, it is likely to lack face validity, with the package being too large and inclusive to be realistic. If individuals are asked WTP questions regarding improvements in each of the 4 policy areas outlined above, they are likely to respond by asking ‘what are my current taxes paying for? Focussing on the environment or sustainable development sphere may be a more realistic option.

Secondly, and as noted by Cummings et al (1994), respondent lack of familiarity with many public goods means that providing information pertaining to many programs or services may result in cognitive overload.

Thirdly, although some degree of substitutability may exist between goods in an environment branch and goods in other branches, one might expect that a principal components analysis would identify the goods in the environment domain as loading on a distinct and common factor. Thus although some violations of the assumed utility tree structure will still occur, partitioning initially with the environmental policy domain may represent an optimal solution given the other constraints involved, such as face validity.

The separability requirements discussed above in relation to two-stage maximisation procedures also apply to utility trees involving several levels of disaggregation, as employed in the studies by Kahneman and Knetsch (1992a), Kemp and Maxwell (1993) and Loomis et al (1992) discussed earlier. The separability assumption requires that for any given level of the disaggregation tree, allocations to goods in different branches are independent. As an example, suppose that a further level of disaggregation was added to the above example. For simplicity, consider only that part of the tree relating to reducing soil erosion in agricultural areas, and preventing forest dieback in WA. The two levels of disaggregation might be as illustrated in Figure H.2.
The assumption of separability means that the allocation to prevention of forest dieback in WA's agricultural areas is independent of the allocation to prevention of soil erosion in agricultural areas in each of the states. Although this may well be the case for most states, it is unlikely to be the case for WA, where forest dieback and soil erosion may be interrelated. Although the separability condition thus does not hold in this hypothetical example, the onus is on the researcher to design the disaggregation tree such that violations of the assumption are minimised. The second level of disaggregation employed in the example is clearly asking for trouble. The extent to which violations of the separability assumption occur will also depend on the exact nature of the goods under investigation, the relevant policy-agenda of the time, and the information required for decision-making purposes.

The assumption of separability will be more likely to hold when the goods in different branches of the disaggregation tree are geographically separated and fundamentally different in nature. The more levels of disaggregation, the greater the difficulty in
avoiding widespread violations. For this reason, use of minimal levels of disaggregation and careful choice of issues/categories included in the tree is probably preferred. As usual, a tradeoff between face (or content) validity and theoretical requirements will ultimately be required. Despite these problems associated with sequential disaggregation, resultant estimates of WTP will be more consistent with the notion of ecological sustainability, providing greater attention to alternate budget demands and substitute and complements goods. The better balance of information is consistent with a more holistic approach to environmental decision-making than the commonly practiced single-good valuation approach. As always, results will still be sensitive to subjective decisions made in the design of the survey instrument.

The proper identification of an appropriate set of partitionings requires conducting preliminary investigations into how utility functions are structured when it comes to public and quasi-private goods. One possibility here would be to conduct focus groups to identify an appropriate pool of such goods, and to follow this with a questionnaire containing questions relating to each of these goods. A principal components analysis could then be used to establish the most appropriate groupings.