On the Validity of Contingent Valuation: A Psychological Perspective

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Abstract

This thesis addresses the validity of the Contingent Valuation (CV) methodology. Unlike conventional economic approaches, this is based on stated preferences in hypothetical market scenarios and is used in attempts to estimate economic benefits of non-marketed public goods, most notably natural resources. However, the methodology is not without controversy and many researchers question people's ability to provide valid economic values for environmental amenities in these contexts. The present research applies a psychological perspective to this area, and hence adopts a different approach than mainstream work in the field that has traditionally been more concerned with methodological procedures and how well data fit with economic theory. The first section presents the rationale of the CV methodology and reviews a number of conceptual problems and empirical anomalies that have been demonstrated across studies and contexts. It sets these within a theoretical framework that, it is envisaged, will contribute to our understanding of people's responses to CV questions.

In the empirical section a number of hypotheses derived from this theorising are tested. The results indicate that statements of economic value, particularly for complex amenities, are unresponsive to the magnitude or importance of the resource being valued. Some people also tend to provide, often seemingly 'reasonable' responses, irrespective of their ambivalence toward the valuation procedure. It is further demonstrated that there is a high degree of uncertainty involved in reported economic value, indicating that CV responses are quite imprecise representations of underlying preferences. Finally, hypothetical willingness to pay are shown to be a poor indicator of real economic commitments, resulting partly from the self-image people strive to achieve in these contexts, particularly when choices appear inconsequential. The major conclusions of the thesis are that responses in CV studies to a large extent are motivated by expressive rather than instrumental considerations, that respondents' interpretations of the valuation task do not always correspond with the intention by the researcher, and that situational and contextual factors have important implications for the assessment of environmental benefits.

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Overview of Thesis

In environmental economics there has been an increasing interest over the last decade in order to assign economic values to natural resources. The argument is that environmental policy-decisions will be better informed if the 'economic' benefits accrued to these resources are compared to their costs of provision. This has lead economists to seek and develop methodologies that are capable of measuring citizens' Willingness To Pay (WTP) for a variety of amenities, such as air quality, wildlife and recreation sites. By far the most popular approach of economic benefit estimation is the Contingent Valuation Method (CVM), which deduce economic value of a particular amenity on the basis of respondents' WTP statements in hypothetical market scenarios. It thus facilitates a valuation of non-marketed goods, and has the advantage of also including benefits that extend beyond a use of the resource. The first attempt to assign economic values to natural resources through the CVM dates back to the early 1960's, but its popularity did not take off until the late 1980's, spawned by the investigation of lost passive use-values resulting from the Exxon Valdez oil spill in Alaska. In the same year the methodology was acknowledged by U.S. courts as a legitimate basis for assessing natural resource damage liabilities (Mitchell and Carson, 1989).

Notwithstanding its potential merits, the CVM has encountered widespread criticism (*e.g.*, Kahneman and Knetsch, 1992; Diamond and Hausman, 1994; Vatn and Bromley, 1994; Blamey, 1998; Kahneman *et al.*, 1999), and the frequent use of the method has given rise to a vehement debate that exceeds most other controversy in social research. Scepticism, both within the economic profession and in other branches of social science, is maintained by a variety of anomalies that have been demonstrated in empirical research. Many of these were realised in early research, which was attentive to problems such as strategic behaviour, anchoring effects, sponsor bias, hypothetical bias, etc. The main concern among Contingent Valuation (CV) practitioners was therefore how these could be overcome by methodological refinements, because "if the CV study is well designed and carefully pre-tested, the respondents' answers to the valuation questions should represent valid Willingness To Pay (WTP) responses" (Mitchell and Carson, 1989; p. 3). However, a large body of research has challenged the

assertion that the failure to assess valid and consistent welfare estimates is mainly due to flawed methodological procedures. The central theme of this objection is that CV responses may not be anchored in economic preferences, and as such represent something different than economic value. Thus, this perspective entails a shift in focus from methodological concerns to the basic nature of stated economic value.

Unfortunately, this interest in examining whether data corresponds to the intended theoretical construct is yet to be fully integrated with mainstream research on CVM, and too often, the fundamental problems of preference assessment are neglected by CV practitioners Attending a conference-session on CVM today one is more likely to see presentations revolving around statistical analysis and technicalities of established methodological procedures, with no serious attempts to scrutinise the essence of economic values in these contexts. The aim of this thesis is to renew the debate regarding what people's responses in CV studies really involve. It adopts a perspective that facilitates an investigation of the extent to which statements of economic value are 'intuitively plausible', and conducts empirical research on the validity of the underlying value construct. A key starting-point of the thesis is that, before we ask how much citizens value environmental resources, we ought to ask *how* and *why* they provide economic values for these in hypothetical market scenarios. Thus, emphasis is placed on the content validity of CVM and other Stated Preference Methods (SPMs), with the objective of investigating widely overlooked, yet important issues that, it is envisaged, will enhance our understanding of economic value in these contexts.

In chapter one the objectives and perspectives of the present research are presented. A brief history of monetary valuation of environmental resources is provided, along with a summary of valuation techniques in general and CVM in particular. This includes a description of the procedures of a standard CV study and those of alternative approaches to benefit estimation that will be applied throughout the thesis. The chapter also sets out the theoretical framework of the estimation of welfare effects associated with public goods. Chapter two presents a state-of-the-art survey of conceptual problems and sources of bias of the CVM. It reviews empirically based criticism and theoretical objections that have been put forward against a monetary valuation of non-marketed goods, in particular natural resources. The text naturally focuses on the CVM

and provides a discussion about its feasibility and appropriateness. On the basis of this, relevant aspects of validity that set the agenda for later chapters are put forward.

Chapter three presents the theoretical underpinnings, both from an economist's and a social psychologist's perspective, relating to anomalies of preference formation and decision-making. Hence, a more in-depth analysis of the conceptual problems and sources of bias presented in chapter two is set out here. The chapter is divided into two parts. In the first, axioms of standard economic theory are presented, including a review of empirical findings that challenge specific assumptions of the dominant theory. Additionally, it illuminates the research paradigm in economics that has given rise to these assumptions, whereby the aim is to make their foundations more explicit. On the basis of this, the second part of the chapter aims to put the CVM in a broader context by incorporating insights from other areas of research. It offers an account of how alternative perspectives from psychology and social psychology are likely to result in different approaches to testing the validity of CV responses, and that ultimately may improve our understanding of economic values in these contexts. Cognitive, affective and contextual processes of survey measurement and human decision-making are explored in this section.

The remaining part of the thesis presents the findings of four separate, but theoretically linked, case studies. The first, presented in chapter four, examines the internal consistency of WTP estimates, investigating if and to what extent stated values are responsive to the scope (*i.e.*, magnitude, urgency or importance) of the environmental problem. It further addresses if the WTP for one particular amenity varies with how many other public goods are included in the valuation scenario and valued simultaneously. The study originates from a considerable body of research that has specifically examined these issues (*e.g.*, Desvousges *et al.*, 1993; Hoevenagel, 1996), but which has failed to provide a conclusion about the matter due to different views among advocates and critics of the methodology regarding what constitutes a 'proper' CV design. Whereas studies demonstrating insensitivity to scope and 'part-whole' effects have been criticised for flawed methodological procedures and for not following established guidelines for CV studies, those suggesting that respondents are capable of providing valid responses have most commonly relied on tests that are considered

insufficient or inappropriate. This study relies on a design similar to a typical CV study, and employs experimental procedures that minimise the influence of external factors. It thus aims to constructively contribute to the debate on whether these effects are behavioural regularities, or if they may be overcome by an improved survey design.

The empirical approach in chapter five builds on the findings of the former and performs a qualitative analysis of people's thought-processes when confronted with a CV questionnaire. The objective is to reveal the strategies used by lay people when assigning economic values to global environmental resources, and to investigate if these correspond to rational models of economic behaviour. It is based on the findings by Schkade and Payne (1994) and Vadnjal and O'Connor (1994) who show that CV respondents are quite unresponsive to factors that ought to be relevant according to these models, but tend to be largely influenced by irrelevant considerations. Apart from merely taking notice of these results, the present study carefully examines the basis and motivations of WTP. An indication will implicitly be provided of whether the public understand and comply with the principles of an economic valuation of natural resources, and if economic values in these contexts are pre-defined concepts, or if people construct their preferences at the time of being interviewed. It argues that WTP assessed in CV studies should not be taken at face value since respondents' interpretation of the valuation question may be radically different from that of the researcher.

Chapter six presents the results of a study that focuses on the respondents' uncertainty when faced with a CV question. The ambivalence over trade-offs between money and environmental changes that the respondent feels has been analysed by Dubourg *et al.* (1994), Gregory *et al.* (1995), Ready *et al.* (1995), and Ready *et al.*, (1999). A general conclusion of these papers is that people only have a vague idea as to within which range their WTP is situated, which leads to imprecise estimates. However, previous research has not investigated to what extent varying conditions and contexts of valuation are responsible for such imprecise representations of economic value. Here a more inclusive response format is introduced in which the respondents express attitudes toward multiple dimensions of the public good, rather than only stating their support through a single measure embodied in WTP. Furthermore, in one setting respondents

are given extra time to think about the valuation issue before a response is elicited, which may facilitate important social processes of opinion formation. Overall, the study provides specific tests in order to understand how various response formats and contextual factors contribute to the preciseness of WTP in CV studies.

The last empirical study, presented in chapter seven, employs a choice experiment in order to estimate the economic value of selected environmental issues. The rationale is to investigate whether, as argued by various researchers (*e.g.*, Hanley *et al.*, 1998; Carlsson and Martinsson, 2001), this alternative approach to benefit estimation generates more valid responses, or if these are likely to suffer from the same limitations as the CVM. In particular, the experiment examines the correspondence between hypothetical and real WTP. Previous studies indicate that CV responses are poor indicators of real WTP, although no unambiguous conclusion can be drawn from these, partly due to different characters of the good being valued and varying methodological designs across studies. The experiment uses a public good, and is designed in order to investigate whether respondents try to act in an internally consistent way when expressing both hypothetical and real WTP in subsequent order. By using a split-sample design, a tool is provided to test the impact of self-image and cognitive dissonance in these contexts, which will indicate whether within-subject tests are appropriate ways of testing for various anomalies. An underlying aim of the study is also to assess the impact of the financial incentives introduced in the experiment.

Chapter eight provides the overall conclusions of the thesis, where the results of separate empirical studies are summarised. On the basis of what has been found, implications for the current and future application of the CVM are discussed. The discussion centres on the possibility and limitations of assigning economic values to non-marketed environmental resources, and to what extent alternative theoretical perspectives and notions, most notably from social psychology, may contribute to our understanding of observed anomalies and problems with the methodology. The thesis concludes by suggesting some directions for future research in the area, addressing both the current methodology and alternative valuation approaches.

1. Introduction

"What is a cynic? A man who knows the price of everything and the value of nothing"
(Oscar Wilde)

Over the last decade monetary valuation of environmental resources has become a common practice in the field of environmental economics. Innumerable attempts at making economic impact analyses of environmental deterioration and improvement have been made in order to inform policy decisions, and by far the most popular approach of benefit estimation is the Contingent Valuation Method (CVM). This is a survey- or interview-based technique by which respondents are posed Willingness To Pay (WTP) questions for environmental amenities in hypothetical market scenarios. Hence, the approach enables an economic valuation of non-marketed public goods and services. On the basis of the results from Contingent Valuation (CV) studies, the prospects of environmental preservation are indeed promising; relatively large WTP amounts have been demonstrated for preserving various types of environmental resources in a variety of contexts (*e.g.*, Mitchell and Carson, 1989; Carson *et al.*, 1992; Kramer and Mercer, 1992).

However, the CVM has encountered strong criticism (*e.g.*, Kahneman and Knetsch, 1992; Diamond and Hausman, 1994; Vatn and Bromley, 1994; Fischhoff, 1997; Blamey, 1998), and the frequent use of the method has given rise to a heated debate among researchers in various fields. The scepticism, both within the economic profession and in other branches of social science, is maintained by the variety of anomalies and biases that potentially pose a threat to the validity of the methodology. In early CV research the main concern was that respondents would act strategically in hypothetical survey contexts in accordance with Samuelson's (1954) exposition of the 'free-rider' problem, but more recently the critique has focused on a variety of other sorts of problems that represent more fundamental difficulties. Some of these are common for many types of measurement in social research (*e.g.*, anchoring, order effects, compliance, context and framing-effects), whereas others are more specific to the CVM. For example, WTP estimates assessed through hypothetical markets have

been indicated to be insufficiently associated with the specific characteristics of the resource (Kahneman and Knetsch, 1992), assessed economic values are conditioned by the suggested payment scheme (Mitchell and Carson, 1989) and depend on whether the environmental change is pictured as a loss or a gain (Diamond *et al.*, 1993), and hypothetical statements seem to correspond poorly with real economic commitments (Seip and Strand, 1992; Neill *et al.*, 1994).

1.1. Objectives and Structure of Thesis

The purpose of this thesis is to examine the validity of WTP estimates derived from hypothetical market scenarios, particularly the CVM. It adopts a social psychological perspective to address some key aspects of economic value assessment that have been widely overlooked in the CV literature. In addition to conducting quantitative analyses of some conceptually important anomalies, focus will also be placed on whether statements of economic value in these contexts are plausible, which includes an examination of whether these correspond to the underlying theoretical construct. Thus, I will not merely investigate the predictive quality of WTP responses, but also illuminate their motivational basis, which hopefully will provide insights into the possibility of assigning economic values to complex non-marketed public goods.

A tremendous amount of work has been devoted to the CVM throughout the last decades, covering a whole range of topics, but although there are a number of examples that have been more concerned with the foundations of CV results (*e.g.*, Anderson, 1993; Diamond and Hausman, 1993; Sagoff, 1994; Barry, 1995; Arrow, 1997), insights from and perspectives among these efforts have not been fully intertwined with mainstream research in the area. Consequently, the overwhelming majority of CV papers have either solely dealt with rather specific and technical methodological issues, such as optimal bid-design, theoretical justifications of substitution and income effects, the development of sophisticated econometric models, etc., or have on other occasions been written purely from an economist's perspective, pertaining to theoretical underpinnings of neo-classical economic theory. This thesis attempts to address some, I will argue, of the more fundamental issues that lay the foundation of CVM. This endeavour evolves to questions of the following character:

- What motivates people in their responses to CV studies?
- Do they adequately understand the valuation procedure, or how do they otherwise make sense of this?
- Are respondents committed to their stated WTP, and do hypothetical statements correspond with actual (economic) behaviour?
- To what extent is value assessment determined by situational and contextual factors?

I believe that answers to such questions are crucial for the future application of the CVM. They address the core question of whether more valid responses can be elicited by improving the methodology, or if observed anomalies are behavioural regularities, thereby implying that hypothetical value assessments of environmental resources are 'inherently' flawed. Put in other words, before asking *how much* citizens are willing to pay for environmental improvements, we need an answer to *how* and *why* people value these, because only then is it possible to judge on what occasions and in what contexts CVM may be applied, how the methodology can be improved, or if economic value, given that it exists in the minds of people, could be better captured by alternative but conceptually similar methodologies.

As far as I am concerned, the mainstream research on CVM has to a large degree lost its relevance since, by and large, it tends to overlook such fundamental questions. In this respect there must be a greater willingness among CV practitioners to pay attention to factors traditionally viewed as outside the field of economics, since concepts such as altruism, socialisation and political action may not be adequately understood within the standard economic framework. If we do not understand the basis of the values people hold toward the environment, and furthermore, if we do not seriously consider the social and psychological mechanisms underlying a monetary valuation in the CV context, the prospects of deriving 'acceptable' welfare estimates of such public goods are undermined. Rather than relying on misdirected attempts at developing sophisticated quantitative models and rigorous analytical tools in order to fit data with standard economic theory, we need to ask: Do we ask the right questions? Are our questions interpreted as intended by the respondents, and are they meaningful to people? Are the implied property rights plausible and likely to be accepted? Do the public perceive the relation between scarce environmental resources and market valuations in the same way

as CV practitioners do? What is a relevant framework within which these questions should be analysed? The aim of this research is not necessarily to provide precise answers, but to clarify these and other relevant questions for the CVM.

The thesis is separated into eight chapters. In this first chapter, the history and rationale for economic valuation of environmental resources is provided, followed by a description of various approaches to benefit estimation, in particular the CVM. Chapter two provides a state-of-the-art survey of conceptual difficulties and various anomalies that have been discussed and demonstrated in previous research. In chapter three I will discuss the theoretical underpinnings, both from an economist's and a social psychologist's perspective, relating to anomalies of preference formation and economic decision-making. This is aimed to provide a framework for understanding the nature of hypothetical value statements, and it thus constitutes a theoretical background for the empirical research in this thesis.

The remaining part presents the findings of four separate but for the purpose of this thesis coherent case studies. The first of these examines if and to what extent stated economic value is responsive to the scope (*i.e.*, magnitude, severity or importance) of the environmental problem, and whether WTP depends on how many other resources are valued simultaneously. The second study builds on the former and performs a qualitative analysis of people's thought processes when presented with a valuation scenario. It aims at revealing how people make sense of CV questions, the strategies they use in order to assign economic values, and whether these correspond to the assumptions of standard economic theory. The third study captures the uncertainty people feel when providing their responses, and how this varies with various contextual factors of valuation. In particular, it addresses the role of social processes in value formation. In the final empirical study, an alternative approach to CVM is applied in order to examine the correspondence between hypothetical statements and actual monetary payments. Chapter eight presents the conclusions of the thesis. In addition to summarise the findings of each empirical chapter, it discusses the implications of this research regarding the possibility and limitations of environmental benefit estimation, and suggests some future avenues of research in the field.

1.2. Economic Valuation of Natural Resources

The public's concern for the natural environment has evidently increased over the last decades, arising from awareness of the side effects resulting form the development of the modern industrial welfare state. Today, the support for increased efforts at reducing pollution, along with a more sustainable approach to the use of natural resources, have become settled and widely shared, at least in the Western world, although the trend is cyclical according to economic fluctuations and does not rank highest among public concerns (Department of the Environment, 1992; Ladd and Bowman, 1996; Office for National Statistics, 1998).

However, our commitment to a cleaner and safer environment is not unproblematic. Although public opinion is arguably legitimate and, at least to some extent, must be taken into account in environmental policy-making, the matter is far more complicated than that. Firstly, in a number of cases the environmental effects and consequences are not clear-cut, leading to disagreements in the natural and medical sciences. Secondly, in the light of finite (public) resources and reluctant taxpayers, some difficult policy questions inevitably arise as the costs of accomplishing various environmental improvements are realised. For example, how much should be spent on cleaning up the North Sea? To what extent should we increase the safety standards for nuclear power plants in order to reduce the risk of future radioactive catastrophes? Should we have car-tolls in major cities, and if so, what would be an adequate fee? How high a level of impurity should we tolerate in our drinking water? Are we willing to make the trade-off between the construction of a hydroelectric power plant and higher electricity bills? By reflecting over comparable issues, the question of how much resources society should allocate to these and similar problems is not entirely clear. The allocation problem is further reinforced by the fact that we may not only want to consider our own well-being, but also incorporate that of future generations; what weight should we give to our descendants, and how far into the future could the analysis reasonably be extended? Similarly, to what extent and how should non-human welfare be accounted for?

The core logic in economics is that public goods, such as environmental amenities, should be judged on the basis of the costs and benefits related to their provision.

According to principles of Cost-Benefit Analysis (CBA), whenever the sum of benefits across all involved agents exceeds the aggregated costs, it would be economically worthwhile to provide the good. In addition to the weighting of costs and benefits in order to make environmental decisions, in many cases values are estimated in order to form a basis for subsequent actual payments. For example, licence-fees for fishing may be introduced to cover the estimated costs for a decrease of the fishing stock that this is causing, a higher charge for environmentally unfriendly activities creates an incentive for people to reduce such, and compensation may be paid to people who live nearby or enjoy the benefits of a recreational area that is diminished due to urban development.

As a result of these objectives, the last decades have witnessed the development of various environmental valuation techniques in order to facilitate an economic impact analysis of environmental improvements and deterioration. Unfortunately, such attempts are rarely without pragmatic difficulties. There are few endeavours more difficult than estimating the cost of the environmental damage caused by a run-a-ground tanker, the value of the establishment of a national park, or the preservation of a species on the verge of extinction, simply because no markets exist for these resources. In economics, welfare estimates are normally based on how much people pay for goods and services routinely bought and sold on markets, but for these kinds of environmental amenities, either there is no charge, or this would not be feasibly implemented due to their public character.[1] This has lead economists to search for new methodological approaches for

[1] Public goods differ from private goods in that they are characterised by the conditions of *non-excludability* and *non-rivalry* between people who wish to use the good. A good is non-excludable if other individuals cannot be excluded from consuming it, whereas non-rivalry is defined as the case when one person's consumption of the good does not reduce the amount available to others. Examples of pure public goods are streetlights, police, national defence, clean air, etc. There are also many in-between cases. Take for instance cable TV broadcasting, which is a non-rival good since one person's consumption does not reduce the consumption possibilities of other people. On the other hand, it is excludable in the sense that people who do not have a decoder will not have access to the broadcast. These types of goods are commonly called club goods. There are also goods that are rival but not excludable, for instance highways; anyone, assuming no car tolls exist, can use this, but heavy traffic reduces the space available to other motorists. Finally, some kinds of goods are essentially private in their character but are provided for publicly (*e.g.*, education) (Varian, 1992).

estimating the willingness among the public to sacrifice other consumption opportunities in the trade-off with improved (or unaltered) environmental quality.

1.3. The Contingent Valuation Method

The CVM relies on surveys or in-person interviews in order to elicit people's preferences when markets are absent, imperfect or incomplete. Preferences are assessed simply by asking for either people's Willingness to Pay (WTP) for an improvement, or their desired compensation for a deterioration of a specific amenity. The latter is termed Willingness to Accept (WTA), but more correctly refers to the compensation people require, rather than the compensation people would accept, for a deterioration of a resource. The social welfare effect is then estimated as the total sum of WTP (or WTA) across all individuals that have an interest in or somehow derive a benefit from the amenity. The term *contingent valuation* derives from the fact that estimates are contingent upon the hypothetical market presented to the respondents. Furthermore, its is conditioned by what is specified in the valuation scenario in terms of involved environmental changes, which may be varied according to the extent and character of future policy interventions.

The application of Contingent Valuation (CV) studies has increased dramatically over the last decade, and an inventory made by Carson *et al.* (1996b) comprises more than 2,000 studies, ranging from attempts to estimate the economic value of a wide variety of environmental services, to papers mainly concerned with theoretical and methodological issues.[2] The methodology dates back to the early 1960's when Robert K. Davis used surveys in order to estimate the benefits of outdoor recreation in Maine (Mitchell and Carson, 1989). However, its popularity did not take only off until the late 1980's, spawned by the investigation of lost passive use-values resulting from the Exxon Valdez oil spill in Alaska, estimated to the staggering sum of 2.8 billion dollars over the whole

[2] Apart from environmental resources, the CV method has been applied in attempts to value various other public and quasi-public goods, such as cultural heritage (Hansen, 1997), road safety (Dubourg *et al.*, 1994), and health issues (Propper, 1990).

population in the United States (Carson *et al.*, 1992).[3] In the same year the methodology was acknowledged by U.S. courts as a legitimate basis for natural resource damage liabilities (Mitchell and Carson, 1989).[4] As mentioned previously, in many cases there is thus an underlying aim to introduce fees or pay compensation on the basis of CV results. Table 1.1. illustrates some examples of CV studies applied to various environmental resources.

Table 1.1. Examples of conducted CV studies (WTP implies a one-time fee unless stated)

Authors	Type of environmental amenity	Average WTP
(Bishop and Heberlein, 1979)	Goose hunting permits	$21/permit
(Whittington *et al.*, 1990)	Improved drinking-water facilities in rural Haiti	$1.3/month
(Strand and Taraldset, 1991)	50% reduction of air-pollution in Norway	$18-37/month
(Kahneman and Knetsch, 1992)	Replantation of trees in cutover areas, Western Canada	$55
(Seip and Strand, 1992)	Membership in an environmental organisation	$24-31/year
(Desvousges *et al.*, 1993)	Protection of migratory-waterfowls; 2000–200000 birds	$78-88/year
(Neill *et al.*, 1994)	Preventing the extinction of the Colorado Squawfish	$26-44
(Ready *et al.*, 1995)	Wetland preservation	$1.3-30.2
(Hoevenagel, 1996)	Prevention of the greenhouse effect	$12-26/month
(Schulze *et al.*, 1996)	Improved visibility in three U.S. national parks	$8.50/month

[3] In this study, which is possibly the most cited CV study of lost passive use values, a median WTP of $31 was estimated among the interviewed respondents (Carson *et al.*, 1992). In another study about rain forests, people were on average willing to pay between $24 to $31, depending on the question format, for preserving 110 million hectares of tropical rain forests. Aggregating these amounts over the total number of households in the United States gives a total WTP of 2.18 and 2.82 billion dollars respectively (Kramer and Mercer, 1992).

[4] Eventually, the environmental damage-suits brought forward by the federal state and the State of Alaska against Exxon settled at $ 1.15 billion, to be paid over a period of 11 years (Portney, 1994). The study resulted in a heated debate between researchers regarding the validity of the methodology, and as a consequence, the legitimacy of basing policy decisions and damage liabilities on hypothetical value statements.

1.3.1. Structure of a Contingent Valuation Questionnaire

A conventional CV questionnaire has three parts. Although the order of these differ across studies, most commonly, the first section is focused on views and opinions toward the environment in general, as well as items relating to the respondents' attitudes and knowledge of the particular amenity that is to be valued. The main purpose of these questions (apart from illuminating the respondents' use and experience of the good that can be valuable input to policy decisions) is to examine the link between WTP estimates and non-economic opinions, which sometimes are used in order to validate obtained results. A common assumption is that people who are generally concerned with environmental issues, and those who have a direct interest in the resource, are willing to pay more for this.

In the core section of the questionnaire, the respondents are presented a scenario in which the amenity, its character and terms of provision, are described. The hypothetical scenario that precedes the valuation question seeks to present sufficient information in order for the respondents to carefully consider their personal value of the proposed good or service. This value is subsequently captured by asking how much the respondents are willing to pay for the specific provision or improvement of the environmental service (or what they are willing to accept in compensation for a withdrawal or deterioration of the same), other things being equal. Some important information should be included in the valuation scenario:

- the good, its qualities and reliability
- when and under what conditions it will be provided
- the payment vehicle, that is, in what way respondents are supposed to pay for it
- who is responsible for providing and maintaining the resource
- how many other people are deriving benefits of the good and thus are involved in paying for it

There are principally two different ways of eliciting the economic value of the resource. An Open-Ended (OE) question asks 'What is the maximum amount you are willing to pay for this environmental resource?' or 'How much would the proposed intervention

be worth to you?' A Closed-Ended (CE) format, on the other hand, suggests a price to be accepted or rejected by the respondents. This may take the form of a single Dichotomous Choice (DC) question in a referendum format where one specific amount is presented that the respondent is asked to accept or reject, or as Multiple Bounded (MB) questions, presented either in a step-wise process whereby the amount is increased or decreased depending on a yes or no answer to the preceding amount, or in some other manner. In these formats the respondents are presented a question similar to 'Are you willing to pay x dollars for the environmental service?', or 'Would you support the project if it would cost you x dollars?'[5] The valuation procedure is in some cases aided by an array of questions or items, such as 'Are you willing to economically support some or any of these initiatives?', or, 'Would you favour a public intervention of this kind, for example through higher taxes?'

The final section of the questionnaire contains a structured series of questions about respondents' socio-economic and demographic characteristics, such as gender, age, income, educational background, etc. The aim is to trace the determinants of the dependent variable and evaluate whether these factors explain WTP according to theoretical assumptions, that is, are consistent with rational choice as postulated in standard economic theory, or do behave in some other logical manner. This information is later used as a means of examining the internal validity of stated WTP.

1.3.2. Guidelines and Recommendations for Conducting CV Studies

The status of the methodology was significantly enhanced by the commission of a state-of-the-art assessment in 1983 by the U.S. Environmental Protection Agency, which included a review-panel of a number of eminent economists and other social scientists. The overall conclusion of the panel was that the method is a promising tool for future

[5] The Open-Ended format is sometimes supported by a 'payment card', which contains an array of numbers ranging from zero to a large amount. This could either be based on estimated values in a pre-test, or some other relevant benchmark, such as the average household spending on public goods, in order to enrich the context of the WTP question.

welfare estimation of environmental goods and services, but some important challenges remain (Arrow *et al.*, 1993). Therefore, future research on the CVM should be given highest priority, and today this assessment combined with later evaluations are summarised in the NOAA panel's report on the CVM, which sets out the recommendations and guidelines on how to carry out a CV study (Arrow *et al.*, 1993). Some of the most important of these are:

- CV studies should be conducted as in-person interviews rather than as telephone interviews or mail-surveys
- pre-testing of the questionnaire is essential and should include tests for interviewer effects and other biasing factors
- the scenario must accurately describe the environmental amenity in question, and the expected effects of the environmental change must be defined in a way that is relevant for damage assessment
- there should be an adequate time-lapse between the value assessment and the environmental damage or the project implementation
- a measure of WTP should be elicited instead of WTA
- the WTP question should be posed as a dichotomous choice question in a referendum context, rather than as an open-ended question
- respondents must be reminded of their budget constraint and possible substitutes of the environmental resource
- a 'no-answer' option should be explicitly allowed in addition to the 'yes'/'no' vote
- follow-up questions related to the WTP question and the overall understanding of the procedure should be asked

Apart from some general remarks on survey methodology, what these recommendations reflect is the establishment of a conservative design. The NOAA panel states that "generally, when aspects of the survey design and the analysis of responses are ambiguous, the option that tends to underestimate willingness to pay is preferred" (Arrow *et al.*, 1993; p. 4608). The major reason for this recommendation is to avoid the over-assessment of eventual damage liabilities that follow from CV-based welfare estimates.

1.3.3. Advantages of the Contingent Valuation Method

The CVM is located in the category of *hypothetical/direct* approaches to benefit estimation. Apart from the obvious advantage that it enables a monetary evaluation of non-marketed public goods and services, three important arguments are commonly put forward by proponents of the methodology. Firstly, economic value has the advantage of providing a *relative* measure of importance; monetary resources are limited, and therefore assumed to prevent an infinite assignment of importance that may result if other ratings and scales are used. It may further be considered as a widely familiar metric that does not need extensive explanation to the respondents. Thus, economic value is assumed to possess some desirable properties compared to, for instance, notions and scales of attitudes that are invented by the researcher, not necessarily with bearing in ordinary life, and hence which require additional information about their meanings and interpretation of relative importance.

Another advantage put forward is the flexibility of the direct hypothetical approach (Mitchell and Carson, 1989). The CV researcher can easily specify various states of the good to be valued and the conditions of its provision, and thereby estimate what type and extent of the environmental resource people want and do not want in the future. The approach hence allows ex-ante judgements of planned but not yet realised environmental projects. The resource can further be provided under 'novel' institutional arrangements. Alternative methodological approaches all rely on observed behaviour among people; either the preferences for the targeted commodity are derived from the effective demand for another good (implicit markets), or the measures need to be translated into monetary terms before they can be interpreted within an economic framework.[6] CV studies measure benefits and consumer trade-offs directly in monetary terms. Thus no complicated transformation of physical measures into economic value, with the risk of making wrong assumptions about the respondent's utility function, is necessary.

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[6] For example, the price people pay for bottled water may be used as basis for estimating their demand for clean and safe drinking water.

Of particular importance, and which has been routinely stressed in the literature, is the anticipated capacity of the CVM to capture the total economic value of the environmental amenity (*e.g.*, Mitchell and Carson, 1989; Kopp, 1992). It is hence regarded as a 'catch-all' approach. By definition, the total value of an environmental amenity is constituted by use-value, option-value and existence value. Whereas the former two refer to a use of the good (either at present or in the future), existence values arise from the knowledge of the mere existence of a natural resource.[7] An alternative categorisation that will be frequently used in this thesis separates use from *non-use* values, the latter category which incorporates 'option' values.[8] Moreover, in a CV scenario both the present and future benefits are assumed to be intuitively included in people's WTP responses, while other methods necessitate the discounting of future benefits and costs, which involves the difficulty of choosing an adequate discount rate. Accordingly, the price of the amenity is set after assessing the *total* and future change in welfare that it represents to people, whereas approaches based on observed behaviour only capture value related to a *present use* of the resource.

1.4. Alternative Approaches to Benefit Estimation

Techniques of benefit estimation are distinguished into Stated Preference Methods (SPMs) and Revealed Preference Methods (RPMs). Whereas the former relies on direct inquires related to the good or service being valued, for instance through interviews, the

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[7] An environment confers benefits on users and those who, while not using it directly, are glad that it is there. A key insight into this is commonly traced back to Krutilla (1967), who argued that there are people who obtain satisfaction from the knowledge that various environmental resources remain, even though there is no prospect that they will be exposed to them. Thus, even if the individual does not intend to consume the service, she may still be concerned about its existence (Rosenthal and Nelson, 1992). For instance, there are perhaps a number of citizens who value and support the preservation of the Siberian Tiger, although most will never see one or otherwise enjoy any of its benefits. Existence values are further separated into *bequest values* (which pertain to the enjoyment of a site by others, for instance by future generations), and *intrinsic values* (which are unrelated to human use of the resource).

[8] 'Option value' refers to the possible future use of the resource. Thus, although not deriving any benefits at present, the option to use or enjoy the resource in the future accrue a benefit to the individual.

latter extrapolates preferences from market behaviour, or actual choices made in other relevant contexts. A review of alternative SPMs to CVM and modifications of these applied in this thesis is provided below. In addition, the section briefly describes various RPM that sometimes are used in order to validate CV estimates.

1.4.1. Choice Experiments

Choice Experiments (CEs), or Contingent Choice Methods (CCMs), seek to measure the utility attached to a particular good by presenting choice sets in which the characteristics or attributes attached to this are varied. They involve asking people to choose between alternatives in such choice sets, and by modifying the attributes in a systematic manner, factors influencing people's choices are highlighted. By explicitly stating the cost or price associated with alterations of the good, the welfare effect involved is thus estimable. These methods are similar to the CVM direct hypothetical approaches to benefit estimation since choices are direct expressions of an individual's value, although this is elicited as a discrete rather than a continuous measure. The use of CEs to estimate economic benefits of natural resources have increased over the last decade and are considered by its pioneers as more viable approaches to environmental valuation (*e.g.*, Adamowicz et al., 1994; Hanley et al., 1998).

Among the several advantages of CEs advocated, probably the most important is that they are less hypothetical in their structure than CVM. Rather than directly asking people to assess the value of a, possibly, complex and unfamiliar environmental amenity, they are asked to make choices on the basis of project-like scenarios, a procedure that is thought to enrich the valuation context. Thus, they differ from CVM by investigating the trade-offs people are making between alternative scenarios instead of focusing on a single and fixed outcome. The procedure is therefore believed to be more realistic; rather than stating a value out of pure invention, respondents are asked to make judgements between (several) specific interventions and the costs they carry, an act more similar to ordinary market behaviour (e.g., Mitchell and Carson, 1989). Moreover, by including private as well as public goods in the choice-set, a comparison of what people otherwise may achieve or could afford with their monetary budgets is facilitated. Other advantages discussed in the literature are the avoidance of yes-saying

and the easiness of assessing the value of isolated and specific attributes rather than complete amenities (Hanley *et al.*, 1998).

Nevertheless, there are two obvious drawbacks of this technique of preference assessment. Firstly, in order to derive meaningful and fairly continuous welfare estimates of the amenity and judge how these vary with different levels of the attribute(s), a considerable number of choice sets must be elaborated. This implies that the procedure is cumbersome to carry out as long as the choice problem is not simple. Secondly, research in decision theory suggests that people only have thoughtful or pre-defined opinions on a very limited number of topics (*e.g.*, Harris et al., 1989; Fischhoff, 1991). If presented with many types of issues, or variations of these, an informed choice may be made between the most and least important issue, but the relative importance of intermediate items is likely to be arbitrary (Svedsäter, 1996). Choices may for this reason only be meaningful for a limited number of alternatives and levels of attributes.

1.4.2. Multi-Attribute Utility Theory

The methodological techniques developed on the basis of Multi-attribute Utility Theory (MUT) are similar to CEs in the sense that both attempt to identify and value specific attributes of a broader and more inclusive good. An important difference is however that, whereas CEs isolate various physical characteristics, such as the money to be spent, the type of good and the extent of environmental projects, MUT suggests various dimensions of value that serve as criteria to evaluate events and justify actions. This definition stems from research indicating that people form judgements on the basis of a vast array of motivations (Gregory *et al.*, 1993). These dimensions are further assumed to be shared within a culture or society, and thereby they function as types of social cognitions that are used in order to organise and make sense of the world (Grunert and Juhl, 1995). A more pragmatic modification of MUT is provided by Keeney and Raiffa (1976), which presents respondents with separate aspects and attributes of an event to be evaluated and that are assumed to reflect different motivational bases.

There are three steps needed in order to categorise the definitions discussed above. Firstly, values are considered to be associated with various motivational domains, such

as *universalism*, *conformity*, *power*, or *tradition* (Schwartz and Bilsky, 1987). These are hypothesised to result in certain interests and objectives among individuals. The *importance* of each of these domains is then evaluated for each individual. Finally, a set of *individualistic* or *collectivistic* principles that subsequently guide attitudes and behaviour are distinguished.[9] Motivations are assumed to be structured in a circular two-dimensional space as illustrated by Fig. 1.1., with separate regions representing different value-domains. These are positioned according to what interest they serve; the 'value-neutral' individual is situated in the origin of the schema, and the further out from the centre we move, the more importance is attached to that particular motivational domain. Adjacent regions in the figure are most compatible, whereas opposite regions indicate high conflict.

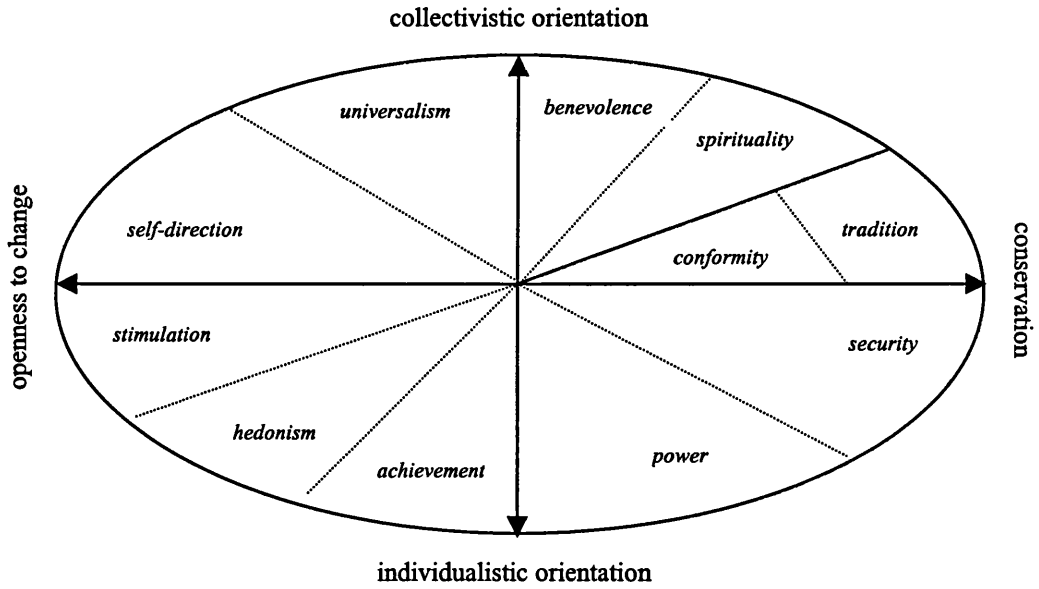

Figure 1.1. Relations between value domains and motivational orientation (Grunert and Juhl, 1995).

[9] Schwartz and Bilsky (1987) have defined eleven motivational domains that guide value formation; five are solely associated with individualistic action (*self-direction*, *stimulation*, *hedonism*, *achievement* and *power*), four exclusively linked with collectivistic action (*conformity*, *tradition*, *spirituality* and *benevolence*), and two are related to both an individualistic and a collectivistic action (*security* and *universalism*).

Grunert and Juhl (1995) have applied MUT specifically to environmental issues, albeit not within the context of CVM. Nevertheless, due to the multidimensionality and complexity of natural resources it seems fruitful to apply MUT and other conceptually similar approaches as support to CVM. Not only do these serve as tools for improving the validity of economic values assigned to environmental amenities by allowing for conflicting views to be expressed, but multiple responses may also prove vital in learning what motivates individuals in their valuation. They also provide policy makers with valuable information regarding how people think about and act in relation to these issues. Although support is measured on a single monetary scale, as in CV studies, by informing the respondents about underlying objectives, motives and purposes of valuation, or by asking them to explicitly consider each of these aspects before a response is elicited, they may be more capable of making informed decisions about their WTP.

1.4.3. Revealed Preference Methods

These methodologies are based on observations of actual choices and behaviour among the public. They are distinguished into Observed/Direct (OD) or Observed/Indirect (OI) methods. Some rare examples of OD methods are found in simulated market experiments (*e.g.*, Bishop and Heberlein, 1979), and so called 'parallel' markets. The latter approach implies that preferences are derived from the prices of another but similar good that is marketed. An example is to estimate the economic value of a lake on the basis of fishing licenses. However, there are few instances when the marketed good encompasses exactly the same benefits as the targeted amenity. For instance, in the above example we may argue that fishing permits capture some but not all utility aspects of the targeted resource.

In OI methods the value is inferred from another good to which the amenity has an established link. One example is hedonic pricing. The price of a property, say a house or a piece of property, reflects the value of a variety of facilities and benefits, including communications, access to schools and, possibly, environmental qualities. If two properties are very similar on all but the latter aspect, the one with a higher environmental quality should theoretically be priced higher, and the environmental

value is then estimated according to this price-difference. Examples of environmental benefits that could be assessed using hedonic pricing is the air quality in a particular neigbourhood, access to parks, and drinking water quality. The problem is however to isolate these aspects, since in reality there exist a number of reasons why people want to live in a certain area and not in another. Another example of OI methods is the travel-cost method, which is commonly applied in order to value recreational parks. The value of these is estimated on the basis of how much people spend in order to travel there, entrance fees, and sometimes the opportunity cost of time, generally calculated as the foregone income for a particular holiday. A final example is household production functions, which primarily are used to value health effects.[10]

1.5. Theoretical Framework of Economic Valuation

As mentioned previously, the rationale for assessing economic values of natural resources is to include these in economic impact analysis, which is assumed to be a powerful tool for judging what projects are worthwhile to carry through, and which are not. The following section aims to clarify the theoretical foundations of CVM and other SPMs, which have their basis in economic welfare theory, in particular the theory of consumer choice and public goods.[11] In its most simplistic form, the utility function of an individual facing a valuation scenario in a CV study may be stated as follows:

$$u\,(x, q)$$

where x is a vector representing market goods, and q is a vector of environmental (or public) goods. A fundamental assumption of this is that the individual *maximises* utility by choosing the level or amount of marketed goods, but not the level of public goods

[10] For a detailed description of these and various alternative environmental valuation techniques, see Winpenny (1991), or Freeman (1993).

[11] This section is by no means necessary in order to understand the objectives or results of this research, but due to its interdisciplinary approach, it provides a theoretical background of economic benefit estimation that may be of interest for some readers. The notions presented here may further be valuable in order to comprehend some of the econometric analyses performed in the empirical section.

since these, by definition, are not the subject of individual control. In order to have a definite and unique solution for this function, the income level and level of wealth must be specified. In other words we have the following constraint:

$$\max u\,(x, q) \qquad \text{s.t. } px = m^{12}$$

where p is a vector of market prices for goods belonging to category x, and m the total income level (*i.e.*, combined level of income and wealth). From this expression we may define the following function:

$$v\,(p, q, m) = \max u\,(x, q) \qquad \text{s.t. } p\,x = m$$

The expression above represents the *indirect utility function*, which gives the utility achievable at given prices, the given level of environmental goods, and income. The value of x that solves this problem is the *demanded* amount, or bundle, of this good. The demand for and exchange decision between two goods can principally be described by a traditional indifference-curve diagram, presented in Figure 1.2. below.

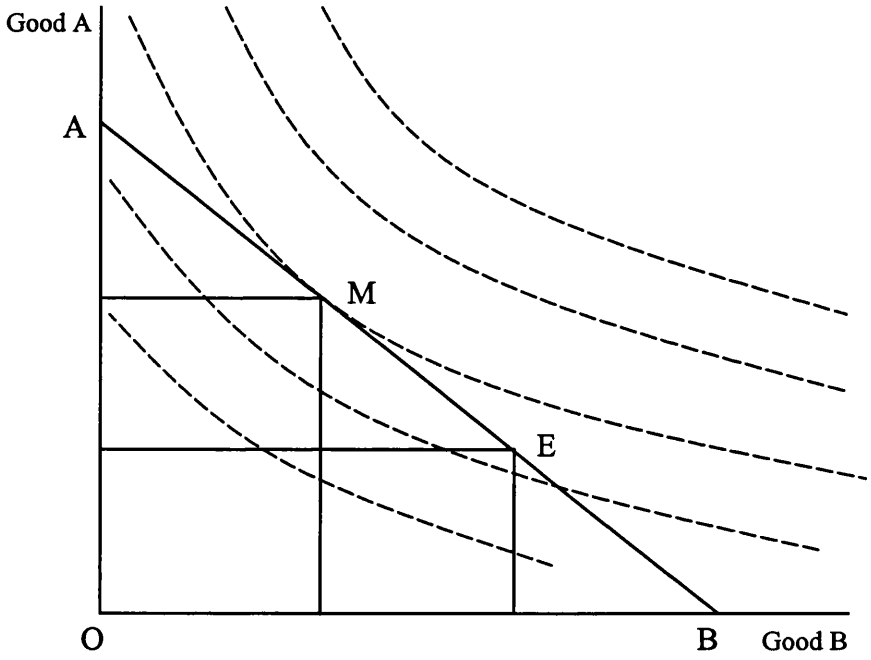

Figure 1.2. Maximisation of utility

[12] 'Subject to' the constraint.

Given the constraints p and m, the agent's budget constraint is represented by the line AB; she can trade up to but not above this line. Thus, all *possible* combinations of goods A and B are found within the area AOB.[13] The utility is visualised by the dotted indifference curves presented in the figure, which represent the contours of each utility level. Since one curve depicts the same level of utility but for various weights of good A and B, the agent is *indifferent* between any combinations along this. Hence, moving along the curve does not alter the level of utility. However, each curve represents a different level of utility, which increases by moving from left to right (*i.e.*, an indifference curve to the right and above implies a higher utility). Assuming that the agent's initial endowment (*i.e.*, the original amount of each good) is at point E, moving upwards along the budget constraint will result in a higher utility, and at point M utility is maximised. Any trade away from this point will put the individual on a lower indifference curve, and accordingly, a lower level of utility. Utility is maximised whenever the indifference curve is tangent to the budget constraint, which occurs when the price relation between the goods (p_A and p_B) equals the Marginal Rate of Substitution (MRS) between the goods.[14] Thus, the maximisation problem becomes:

$$\frac{\partial u(A,B)}{\partial A} \Big/ \frac{\partial u(A,B)}{\partial B} = \frac{p_A}{p_B}$$

Now, let us assume that the amount of environmental goods may vary, with no increase in any of the other elements (that is, keeping x and m constant). Moreover, we assume

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[13] If all funds are used for good A, the individual can consume A units of this, and by using all funds for good B, B units may be consumed. Accordingly, all combinations inside and to the left of AOB are economically possible.

[14] Marginal rate of substitution is defined as the number of units of good A the consumer requires in order to give up x units of good B. Any such change will restore the original level of utility. In the expression below, the symbol '∂' denotes the derivative (or change). Thus, the expression should be read as 'the change in utility with respect to a change in A', and so forth. It implies that the utility is maximised when the price ratio between good A and B (*i.e.*, the slope of the budget constraint) equals the MRS for these goods (*i.e.*, the slope of the indifference curve at this particular point). This implies that the ratio between the number of units of A required in order to compensate for x units of B, equals the price relation between good A and B.

that the increase in the environmental good q is discrete, where q^0 denotes the original state, and q^1 is the state after the increase. Since q is hypothesised to be a 'normal' good (*i.e.*, of which more is always consider better than less), we can claim that $q^1 > q^0$. The underlying relation of utility therefore becomes:

$$u^1 = v\,(p, q^1, m) > u^0 = v\,(p, q^0, m)$$

Thus, the utility after the increase in the environmental good or service will be higher than before the change. The objective of a CBA is to obtain an accurate measure of the benefits and costs of such changes, and in a CV study, the researcher is interested in measuring the benefits that follow from a change in environmental quality. The WTP (or WTA) provided is the amount of money that leaves the individual equally well-off with as without the change. The amount reflects the *marginal value* of the resource, and describes the additional WTP for one more unit of this.[15] In order to represent this problem, we may re-write the indirect utility function into an *expenditure function* that illustrates how much could be achieved of each good given a certain level of income:

$$e\,(p, q, u) = m$$

There are two conceptually different measures in order to account for the welfare changes involved. If the individual is assumed to be entitled to the *current* or *original* level of utility (*e.g.*, she has the right to access an undamaged natural resource), u^0, Compensating Surplus (CS) would be the appropriate measure:

$$CS = [e\,(p, q^1, u^0)] - [e\,(p, q^0, u^0)] = m^1 - m^0$$

This expression represents the amount of money ($m^1 - m^0$) that needs to be extracted from the individual in order to restore the original level of utility, given the change of the environmental good. If on the other hand the individual is entitled to a *new*, higher or lower, level of utility, Equivalence Surplus (ES) would be appropriate:

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[15] It is important to distinguish between *marginal* and *total* value; whereas the latter is a measure of the WTP for x units of a particular good, the former is defined as the WTP for an additional unit of x, which is also the appropriate measure in economic welfare analysis.

$$ES = [e\ (p, q^1, u^1)] - [e\ (p, q^0, u^1)] = m^1 - m^0$$

Thus, the difference between these measures is that, whereas CS holds the utility constant at the initial level, ES holds the utility constant at some alternative level.[16] Whether CS or ES should be applied depends on the assignment of property rights. For a quantity increase, given that the agent is entitled to the original level of utility, WTP reflects the amount of money the individual is willing to give up in order to attain this, and still maintain the original level of utility. Hence, WTP thereby represent CS (*i.e.*, the utility level is kept constant). If the individual on the other hand is considered as having a right to the quantity increase, WTA would be the appropriate measure, which should be interpreted as the amount of money she demands in order to do without the improvement (*i.e.*, she will in this case acquire a higher level of utility). For a quantity decrease, the reverse relationship holds.[17]

In order to calculate the total, or social benefits (or costs) of an environmental resource, all individuals' WTP (or WTA), represented either by CS or ES, are added across the whole population. Since public goods are *non-excludable* and *non-rivalry*, the appropriate method of valuing these is to summarise all individuals' WTP (WTA) that uses, have access to, or in some other way derive a benefit from the resource. Thus, since two or more individuals may consume a particular resource simultaneously, the value of this equals their added benefits. Then this welfare measure is compared to the involved costs of the project. Figure 1.3. below illustrates the maximisation problem, where *MWTP* is the aggregated marginal WTP for an extra unit of the resource, whereas *MC* represents the marginal costs of producing this.

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[16] These types of measure are based on the *Hicksian* (or *compensated*) demand function, developed in order to correct for the various problems of the ordinary observable Marshallian demand function. In the latter, income is held constant, implying an increased (decreased) utility when prices fall (rise). Thus, any change in demand is a reaction to both price and income elasticity. However, what is more interesting for subsequent benefit analysis is to examine only how the price change impact upon demand, and therefore CS and ES are considered as more adequate measures (Varian, 1992).

[17] The interpretation of a quality change is the same as for a quantity change in this respect.

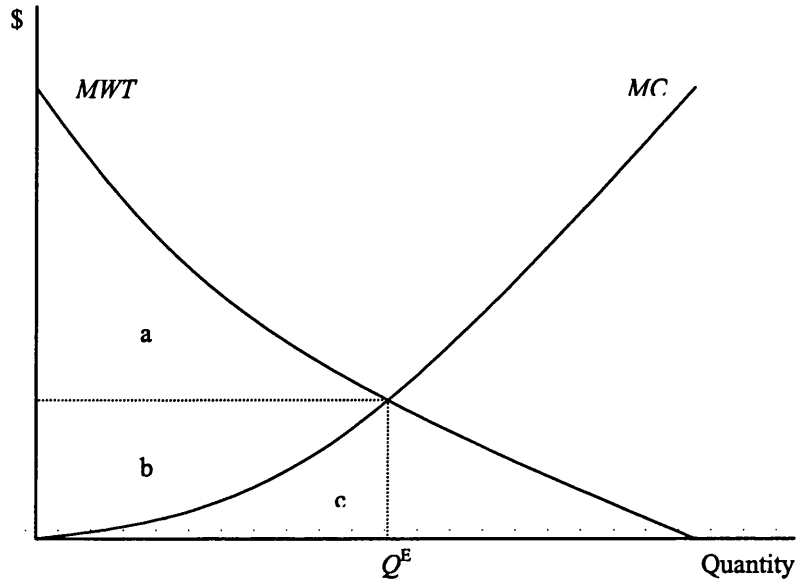

Figure 1.3. Optimal rate of output

The socially most efficient rate of output is to provide a quantity of the good equal to Q^E; at this point the marginal worth of the good is equal to what it costs society to produce the same, as measured by marginal costs. Put in other words, at this point the benefits of an extra unit of the good (marginal benefits) will be less than the costs of producing this (marginal costs), whereas up to this point, the benefits of an extra unit exceed the costs of this. Any other output is by definition inefficient, since the net value, defined as total marginal WTP minus total marginal costs, will in these cases not be as large. The net social value of this particular allocation is (a + b) - c, whereby a and b together represent the social benefits associated with the quantity Q^E, and c represents the costs of producing this.[18]

1.6. Conclusions

Traditionally, natural resources have been viewed as 'free' resources, much as a result of the lack of well-defined property rights. However, as the demand for environmental preservation has increased in modern society, a need has evolved to include benefits associated with natural resources in economic analysis. In this endeavour, the CVM has

[18] For further reading on estimation of welfare effects, see for instance Pearce and Turner (1990).

received prominent attention as a possible approach in the absence of markets or when markets are imperfect. Being a methodology assumed to measure economic value, with the exception of non-use values, ordinary concepts in conventional economic theory apply. Economic value has the advantage of providing a *relative* measure of importance; monetary resources are limited, supposedly preventing an infinite assignment of importance. It is also a widely familiar metric that presumably does not need extensive explanation to respondents and policy makers. Thus, economic value possesses some desirable properties compared to, for instance, notions of attitude.

Nevertheless, monetary valuation of issues and events that traditionally are not comprised by market transactions is not without difficulties. In this chapter I have presented the basic rationale of the methodology and conveyed a discussion about the theoretical underpinnings of economic benefit estimation. The following chapter presents various fundamental problems of the methodology and their possible causes, where emphasis is placed on issues that are relevant for the objectives of this thesis. The empirical research will be conducted on a variety of natural resources that have been the object of previous CV research, and the aim is to capture and investigate various aspects and anomalies that are anticipated to provide valuable information about the foundations of hypothetical value statements in these contexts. In order to investigate the possibilities, problems and limitations of the CVM and other SPMs, quantitative split-sample tests, as well as qualitative analyses, are performed. The studies are further conducted either as mail-surveys, face-to-face interviews, or as class-room experiments. The specific methodological approaches employed will be presented in more detail in each empirical chapter.

2. Criticism of the Contingent Valuation Method: Conceptual Problems and Sources of Bias

As indicated in chapter one, the assessment of monetary estimates by the use of Contingent Valuation (CV) studies is unfortunately not without difficulties due to some fundamental problems that arise when economics is brought outside traditional markets. Respondents may, for a variety of reasons, not provide valid, reliable or truthful answers to the WTP questions. The methodology is in this respect threatened by anomalies such as hypothetical bias, strategic behaviour, anchoring, payment-vehicle bias, embedding effects and compliance bias, some of which are discussed by the NOAA panel (Arrow *et al.*, 1993). Moreover, the welfare estimation of complex natural resources that are not well demarcated in terms of property rights and accrued benefits entail some important theoretical problems. Since the validity of the methodology is vulnerable to the extent of these and other problems, a thorough discussion of conceptual problems and different types of biases and anomalies, along with their possible causes, will be provided here.

2.1. The Inclusion of Non-Use Values

Non-use values are defined as the values an individual derive from a resource for reasons other than a personal use of this. They may thus arise from a mere knowledge that the resource exists. The rationale for including non-use values in economic analysis is that all benefits somehow ought to be reflected in damage assessment. Otherwise prices and damage awards will not signal the effective costs and benefits of the resource, giving rise to incentives for more environmental exploitation than is socially optimal (Whitehead *et al.*, 1995). However, a number of researchers oppose the idea of including non-use values in the economic assessment of environmental resources (*e.g.*, Edwards, 1992; Rosenthal and Nelson, 1992; Diamond and Hausman, 1993). They argue that the acceptance of non-use values is misguided, partly since these are more likely to represent matters of cultural symbolism and social ideology, concepts that are difficult to incorporate in economic measures (Anderson, 1993; Sagoff, 1994).

In defence of such criticism, Kopp (1992) illustrates the following example; consider a woman living in New York who receives pleasure from the existence of the wild trout in California, merely due to her ethical view of people's relationship with nature (that is, reflecting some kind of cultural symbolism). She later learns from the news that the fish has been killed by the dump of hazardous chemicals. Eventually, suppose that the state of California contemplates pressing damage charges or imposing stricter regulations, should not then the loss suffered by this woman, along with people living elsewhere that have similar feelings and motives, be accounted for? Kopp (1992) concludes that policies based only on the values among people who fish for sport, or otherwise use the resource in one way or another, would be inefficient.

To me, this argument is not very persuasive. Firstly, the term 'other places' deserves attention. Does it imply all the billions of people on this planet, or does it merely include the U.S. population, and if so, on what merit is such a distinction made? Given the core principle that 'all' values should be included in a cost-benefit analysis, then, when dollars and cents are multiplied, the estimated welfare effect will be nearly limitless and extend far beyond the intended application of the concept. For example, as Mead (1993) stresses, one must seriously question whether it is reasonable that the American public on average are willing to spend the sum of $11,950 in order to prevent the loss of one rather common seabird due to an oil spill, particularly in light of the fact that the population of this species will fully recover within ten years. Furthermore, what advocates of non-use values in welfare estimation seem to neglect is that the natural environment belongs to a radically different domain than goods and services normally bought and sold on markets. People are simply not used to including these in their monetary budget constraints. If someone told me that I have to pay for the air that I am breathing, or for the sea-urchins residing in the deep-sea, my future wage requirements would be quite another story than what they are today. To conclude, it is not the recognition of non-users' that is inadequate, but rather the belief that their views and opinions are readily reduced into dollar values.

Perhaps more importantly, how do we treat all those people who do not know that the resource exists, and hence do not derive any value from it, but when informed about its existence claim to have suffered a loss? Diamond and Hausman (1993) argue that there

is an important difference between a situation when a known resource is damaged, compared to when one learns simultaneously about its existence. Or can we say that an individual is equally worse off with prior knowledge as with no knowledge at all? The conventional definition of welfare does not take account of goods and services unknown to the consumer in the assessment of an individual's well-being, so why should these be included in the welfare estimation of environmental resources?

Apart from such philosophical criticism, Rosenthal and Nelson (1992) put forward a variety of technical arguments against the inclusion of non-use values in cost-benefit analysis, one major reason being the double accounting of values that may arise. For example, consider two employees who put a value not only on their own income, but also another person's earnings due to a concern for that person's wealth. If both employees reason in this way, and if all other employees' values are considered, then wage negotiations will surely get off the track. The same problem arises for environmental resources in so far as non-users value the resource out of sympathy with the users of it. We may even imagine cases where a resource is assigned a substantial value, although no one visits it, nor derives any obvious benefit from it. It therefore appears sensible to distinguish between the various reasons of 'claimed' non-use values; as long as people want to preserve an environmental resource due to the possibility of a future use (option value), or because they value the mere existence of it without taking into consideration the benefits accrued to users of the resource, no problem of double accounting occurs.[19] Yet, this unravelling does not eliminate other analytical problems.

2.2. Divergence Between WTP and WTA Estimates

Whether Willingness To Pay (WTP) or Willingness To Accept (WTA) should be used as a measure of economic value depends on the definition of property rights. If the agent is considered as having a right to use or have access to a particular resource, WTA is the appropriate measure. In this case the agent should be compensated if she loses that right.

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[19] For a discussion of various definitions of altruism and motivations of such non-use values (for example, genuine altruism, impure altruism, paternalistic altruism, etc.), see for instance Edwards (1992), and Johansson-Stenman (1998).

Measures of WTP are on the other hand appropriate if the affected parties are considered as not having this right.[20] A major criticism against the Contingent Valuation Method (CVM), among others put forward by Barry (1995), is the large differences repeatedly demonstrated between WTP and WTA measures (*e.g.*, Hammack and Brown, 1974), which violates the presumption that the range between values should be negligible when income effects are not too large (Willig, 1976). Table 2.1. provides some examples of studies that have estimated both WTP and WTA for the same good, and according to the figures, the latter measure on average overstates the former by a factor of 4.7.

Table 2.1. Disparities between WTP and WTA estimates

Authors and Year	WTP	WTA
Hammack and Brown (1974)	$ 247	$ 1,044
Sinclair (1976)	$ 35	$ 100
Banford *et al.* (1977)	$ 43	$ 120
	$ 22	$ 93
Bishop and Heberlein (1979)	$ 21	$ 101
Brookshire *et al.* (1980)	$ 43.64	$ 68.52
	$ 54.07	$ 142.60
	$ 32.00	$ 207.07
Rowe *et al.* (1980)	$ 4.75	$ 24.47
	$ 6.54	$ 71.44
	$ 3.53	$ 46.63
	$ 6.85	$ 113.68
Hovis *et al.* (1983)	$ 2.50	$ 9.50
	$ 2.75	$ 4.50
Knetsch and Sinden (1983)	$ 1.28	$ 5.18

Source: Pearce and Turner (1990)

[20]The defined property rights have important implications for subsequent Hicksian welfare analysis. Since we are dealing with quantity or quality changes, rather than price changes, when conducting welfare analysis in these contexts, either compensating surplus or equivalent surplus would be the appropriate measure; the former is used when there is an implied property right in the status quo, the latter if there is an implied property right in the change (see chapter one for further explanation).

Nevertheless, CV practitioners may at first interpretation survive this criticism since comparable discrepancies, although not equally large, have been demonstrated also for marketed goods (*e.g.*, Thaler, 1980; Kahneman *et al.*, 1990). It is evident that we tend to attach higher values to goods we have in possession than goods we do not have, regardless of whether they be chocolate bars, coffee mugs or environmental amenities. Thus, losses seem to loom larger than gains; there is extra value added to the good if we have it in possession, and hence this anomaly has been termed the 'endowment effect' (Thaler, 1980; Kahneman *et al.*, 1990). Other possible reasons for the divergence between WTP and WTA in CV contexts are due to incentives of strategic behaviour and a lack of budget constraints in the case of the latter measure, implying that this theoretically can be limitless. In order to present the respondents with a valuation context more closely related to real markets, thereby avoiding overestimation of benefits, WTP is therefore preferred over WTA, even when WTA is theoretically more correct (Arrow *et al.*, 1993). The divergence has also been explained by income and substitution elasticities, although these can reasonably only explain part of this.[21]

Furthermore, the cause of the discrepancy between WTP and WTA may be founded in imprecise preferences. Although Dubourg *et al.* (1994) believe that this is insufficient to explain more than part of the divergence, still, if respondents are very uncertain about their (economic) values for public goods, this could possibly give rise to a discontinuous utility function. Hence, the difference between WTA and WTP reflects an interval within which the 'true' value is located. Consistently higher values of WTA may also be the result of the respondent's perceived property rights, which lead her to

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[21] *Income effects* are the effects on demand due to changes in income, whereas *substitution effects* arise because other goods (*i.e.*, substitutes) have become relatively less or more expensive when the price of the good changes. However, according to Hanemann (1991), the concepts are quite different for natural resources since they involve quantity changes rather than price changes; for these types of goods, the 'consumer' is not free to choose the desired level of quantity and in case her preferences are lexicographic (that is, a certain level of the good can never be replaced by any amount of another good), or close to being lexicographic, large differences in WTP and WTA will result. For example, if the individual expects and prefers the existing amount of the resource, she is only willing to pay a very small (if anything) for an increase in this, whereas the required compensation in case the resource is to be withdrawn may indeed be very large or infinite.

think in gains or losses regarding access to the resource. The perception of fairness also plays an essential role here. It suggests that, when asked to estimate their WTP to acquire an environmental amenity that has never been available, people will consider this as an extra achievement not necessarily needed, nor deserved. On the other hand, when posed with a WTA question, implying that something will be taken away from them, this is more likely to be regarded as unacceptable and accordingly result in large(r) responses of value.[22]

Whatever the true reasons for the WTP - WTA disparity is, it provides an indication that the CVM may not accurately measure underlying economic values. The inconsistency is not, however, amended by adopting a conservative approach as suggested by the NOAA panel (Arrow *et al.*, 1993), because the acceptance of a 'lower-bound' estimate does not provide an answer to what responses of WTP and WTA are principally reflecting.

2.3. Hypothetical Bias

Hypothetical bias was originally defined by Rowe *et al.* (1980) as "the potential error induced by not confronting ... [the respondents] ... with the real situation" (p. 6). However, there is some confusion in the CV literature concerning the meaning of this notion; whereas some papers discuss its causes and sources of origin, others, such as Schulze *et al.* (1996), are solely concerned with outcomes, whatever their reason may be. Yet another definition is that the notion 'bias' is simply misleading in this context, because the effects arising from a lack of realism is random error not attributable to specific reasons (Mitchell and Carson, 1989). This is reflecting the idea among many CV practitioners that people do possess economic values for environmental amenities and other public goods, and that hypothetical bias arises due to the lack of realism in the particular scenario presented to respondents. Here I will mainly focus on the origins of hypothetical bias, but also discuss whether hypothetical value statements correspond to actual behaviour.

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[22] Related examples are found in Lewis (1990), who discusses fairness with respect to costs, prices and profits.

2.3.1. Origins of Hypothetical Bias

An obvious factor that determines the outcome of a CV study is the nature of the amenity being valued. Hypothetical bias, or information bias, is likely to arise if the respondents do not fully comprehend the amenity they are supposed to value and its terms of provision, or alternatively, are not convinced by the market scenario presented to them. A number of researchers argue that respondents' familiarity with the environmental amenity is a prerequisite for providing meaningful answers to CV questions (*e.g.*, Cummings *et al.*, 1986). Whitehead *et al.* (1995) found that responses of WTP were more reliable for users of the resource, and among those who had some information about this prior to participating in the survey.[23] Carson *et al.* (1996a), on the other hand, argue that familiarity is not a crucial condition, calling attention to the fact that familiarity is only one factor in the economic decision process; consumers make use of other cues, such as advertising. The authors also speculate that the time and effort spent on familiarising the respondents in a CV study are longer and more elaborate than what is normally the case for introducing consumer goods. Therefore, the eventual decision to buy any of these goods, public or private, may be equally arbitrary.

Nevertheless, the sort of consumer-related information the authors refer to is generally not available for environmental amenities. The respondents may be thoroughly informed about the amenity, but this information is of another kind and most likely unrelated to consumption as defined in market transactions. This problem is commonly used as a basis for more philosophical critiques of the CVM, which centre on natural resources being *incommensurable* (*e.g.*, Anderson, 1993; Barry, 1995). This implies that environmental amenities are simply not comparable with anything else, particularly not things that are traded on markets. They carry with them aspects and dimensions (such as ethical views about the relation between man and nature) that have no clear substitutes, and involved values can therefore not be adequately captured by a single currency.

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[23] Hanley *et al.* (1995) discuss the implications of poorly informed respondents in a CV survey, who found that a significant number of people were partly or completely ignorant about the meaning of biological diversity. The implications are firstly that CBA on the basis of stated preferences will lead to inefficient, or at best sub-optimal policy decisions, and secondly that CV responses may be highly sensitive to small variations in the information provided.

CRITICISM OF THE CONTINGENT VALUATION METHOD

When we face the decision to, for instance, buy a book or go to the cinema, it is not only the content and quality of these goods per se that matters. What also matters is the context within which these goods are valued, that is, what role they play in the overall framework of consumption. First of all we have to decide whether to pursue these activities at all, whereby we compare the book with, for instance, an article of clothing, and perhaps the film by going to a restaurant. These goods belong to a 'consumption-domain', something that environmental amenities normally do not. Thus, the latter are not easily weighted against other consumption alternatives.

There is however a major problem of restricting CV studies to familiar and tangible commodities. Indeed, most environmental amenities are unfamiliar and may not have any direct or personal relevance to people, and by excluding these from Cost-Benefit Analysis (CBA) also undermines the rationale of the methodology. Therefore, the nature and terms of provision of amenities that are complex and for which the benefits are unforeseen must be rigorously and clearly described in the CV scenario, because it cannot be taken for granted that respondents have sufficient prior information about the resource. The level of knowledge should therefore be ascertained at the piloting stage and form the basis of what would be an adequate amount of information in the valuation scenario (Hutchinson *et al.*, 1995). The scenario may also be modified in a way that translates a global and complex resource into its local or specific effects, thereby making the amenity more tangible and accessible.

The question still remains of whether these efforts are sufficient in order to yield an unbiased valuation. Ajzen *et al.* (1996) conclude that the quality of information and arguments presented in the scenario, although having a stronger impact under conditions of high personal relevance, had only a moderate influence under conditions of low personal relevance. The authors further found that the motivational orientation altered the responses; an altruistic motivational orientation, unlike an individualistic orientation, provoked in the scenario resulted in significantly higher WTP, and the effect was reinforced for goods not personally relevant (Ajzen *et al.*, 1996). This indirectly suggests that the valuation of geographically extensive, and therefore unfamiliar, amenities is not particularly responsive to further clarification.

These findings have two important implications. Firstly, a detailed description of the good and its provision may not offer a satisfactory solution to the problem of hypothetical bias. No matter if all the relevant facts and criteria are presented in the scenario, this may not have the intended effect on responses. Secondly, it is important to define the commodity's 'degree' of public character before the study is conducted. Either an altruistic (for public goods) or individualistic (for private goods) orientation should be emphasised in order to establish an appropriate basis of valuation. When valuing pure public goods, altruistic collective, rather than individualistic, arguments should be put forward since, theoretically, these are most relevant according to assumptions in economic welfare theory. Apart from these constraints, providing an extensive and rigorous valuation scenario may for some respondents result in 'information-overload', which would prevent them from developing a lucid picture of the amenity and its provision (Mitchell and Carson, 1989).

2.3.2. Correspondence with Real Economic Commitments

A strong test of validity is to compare hypothetical values with real economic commitments. Although occasions that permit such tests naturally are very rare, some attempts have nevertheless been made. According to a brief summary by Schulze *et al.* (1996) of auctions in laboratory experiments with real money trade-offs, these more frequently seem to support rather than reject the CVM. However, no unequivocal conclusion can be drawn from these examples; whereas in some studies hypothetical bids perfectly predict actual payment, in others the former overstates the latter by a factor of up to 9.1. The authors seem reluctant to discuss thoroughly this lack of correspondence, but intuitively it depends on the character of the good; the more private it is in its character, the more familiar would the valuation task be, and consequently more likely to reflect underlying preferences. Furthermore, rather than using split samples, generally in these experiments the same respondents first make hypothetical bids and are subsequently asked to pay for the good. The reliance on within-subject designs, instead of between subject designs, underestimates the impact of cognitive dissonance and self-image effects that lead subjects to strive for consistency, whereby value statements are being held irrespective of their consequences and regardless of changed opinions (*e.g.*, Festinger, 1957; Abelson, 1986).

On the basis of the growing acceptance of experimental research in economics, Schulze *et al.* (1996) conclude that "the experimental approach has the advantage of obtaining true values" (p. 98). This interpretation, however, ignores the fact that the individual is an actor in a dynamic environment. Experimental choices may be consequential by involving real payments, but these settings still lack "those social institutions and processes that form the key part of ... [people's] current reality - their paramount reality" (Gaskell, 1990; p. 253). This is not to argue that the experimental approach is necessarily inappropriate. On many occasions it may indeed provide important insights, particularly of highly structured markets such as the stock exchange. Because of the ability to manipulate key conditions, experiments present the possibility of researching phenomena that are otherwise difficult to isolate.

Nevertheless, it would be overoptimistic to believe that they can perfectly represent behaviour in real-world contexts. There are several reasons for this. First and foremost, experimental settings constitute largely context-free environments, but the general conclusion from research in cognitive psychology is that more or less all problem-solving is context-dependent. An illustrative example is provided by Ross and Ward (1996), who demonstrate that the outcome of a prisoner's dilemma game (*i.e.*, selfish versus cooperative behaviour) is dramatically different whether the 'Wall Street Game' or 'Community Game' is played. Besides such framing effects, social norms in a real-life setting may lead to very different choices than in an experimental context where people are faced with gambles and procedures alien to everyday life.

Participants are furthermore seldom indifferent to the experiment they take part in, and their concern for outcomes could lead them to convey stories and responses they believe the experimenter is hoping for (*e.g.*, Brown, 1986). Rosenthal (1966) reports that sometimes respondents are more worried about whether they have performed their role as experimental subjects, rather than focusing on the actual task, and respondents are likely to search actively for cues about how they are 'supposed' to behave. Lowenstein (1999) put forward another interesting criticism relating to the importance of repetition in order to represent real-world behaviour. In experimental economics, it is the last of a number of trials that is considered to be the most representative, and focus is, as a rule,

placed on the final outcome (*e.g.*, Coursey *et al.*, 1987; Shogren *et al.*, 1994).[24] However, stationary replication is not a normal feature of economic life. In real-life contexts people rarely have the ability to repeat choices in close succession, whereby the trial and error feedback eventually leads to a rational choice.

In a CV study, Seip and Strand (1992) show a rather poor correspondence between hypothetical and actual WTP for membership of an environmental organisation; only 9% of those who stated that they were willing to pay the membership fee actually did so when given the opportunity. Yet, this result may not come as a surprise; the issue has from a more conceptual perspective been widely discussed throughout the history of social psychology, evolving from LaPiere's (1934) early study of the link between attitudes and behaviour. Later research has concluded that, when people are confronted with 'consequential' choices that encompass influencing social conditions, they tend to act in an entirely different way than in a situation where the same task is posed as hypothetical or superficial (*e.g.*, LaPiere, 1934; Janis and Mann, 1977).

2.4. Strategic Behaviour

Strategic bias occurs when people deliberately shape their answers in order to influence a project's outcome. This could work in either of two directions. If they are concerned that they later will have to pay the amount stated in the survey, they may provide lower amount than their true WTP. On the other hand, if they truly believe that the implementation of a project that they are essentially positive toward depends on the aggregated WTP across interviewed individuals, they have an incentive to overstate their responses. The scenario should therefore be formulated so that it is not obvious whether it is good or bad for the respondents to provide high or low amounts. However, this carries the risk of making the valuation task appear less plausible, and it reduces the incentives among respondents to carefully consider their budget constraints.

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[24] The most common approach is the use of a so-called *Vickrey auction*, in which people's responses are elicited in repeated rounds. The key idea is that individuals must first be experienced with the mechanism in order to announce assumed 'true' estimates.

The fact that strategic behaviour may pose a problem was realised early among CV researchers. On the basis of Samuelson's (1954) theory of public goods, it was argued that it is in the interest of the selfish person to give false signals and to pretend to have less interest in a given collective consumption activity than she really has. There is thus a concern with the 'free-rider' problem, which is hypothesised to result in understatements of WTP. Nevertheless, studies testing for strategic bias have not been able to demonstrate that people actually behave strategically in CV contexts, and the issue is no longer regarded as a major methodological problem (Mitchell and Carson, 1989). A noteworthy reflection, however, is that this belief largely draws upon one particular study by Bohm (1972). Posavac's (1998) article is interesting in this respect as it shows that there is a tendency toward overbidding when this is 'encouraged' in the valuation context. Posavac found that students who were told that some facility improvements at the campus would be paid for by the school, provided higher WTP than those who were told that this would be financed through increased tuition fees.

Bearing in mind the conceptual criticism discussed earlier, experimental research offers another source of evidence for the negligible impact of strategic bias. The introduction of financial incentives to hypothetical choices seems to make little difference; the same patterns of behaviour are found irrespective of such incentives (Sugden, 1996). Research about social dilemmas nonetheless suggests that people act selfishly, not so much due to purely strategic reasons, but because they are aware of or suspect that other people are cheating. A possible explanation is that the agent identifies with the group, making it a prerequisite that everyone acts in a similar way (Gärling and Biel, 1995). These findings suggest that game theory is an adequate approach for studying the phenomenon, within which expectations about other agents' behaviour is the key issue.

2.5. Anchoring Effects

The effect is also called 'starting-point', or 'psychometric', bias and occurs when the respondents' WTP is influenced by the value introduced in a scenario. Closed-Ended (CE) questions pose a threat of this kind, since they directly confront the respondent with a proposed amount that is supposed to be accepted or rejected, either as a Dichotomous Choice (DC) question, or in a Multiple Bounded (MB) format. In a

situation where the respondents are uncertain about their valuation, the proposed amount may be regarded as conveying an approximate 'true' value of the amenity, and the respondents' adjustment up or down from this would be insufficient. Ericson and Svedsäter (1994) similarly found that respondents tend to interpret the suggested amount in a valuation scenario as the real cost for the amenity and feel inclined to pay this because they are expected to, or because it would be unfair to fellow citizens not to. The problem is also likely to occur when a payment card is used as a guidance to an Open-Ended (OE) elicitation question, as it has been found that people anchor their responses to roughly the median of the range of proposed values or numbers (Schwarz *et al.*, 1985).[25]

Although anchoring is a well-documented phenomenon in CV surveys (Mitchell and Carson, 1989), there is a prevailing disagreement among CV practitioners over which elicitation format is optimal. Favouring the CE format (*e.g.*, Hanemann, 1994), it is argued that this reduces the burden on the respondents in answering a WTP question; while we generally know if we are willing to pay the posted price for a certain good, it is a novel task to decide what is the most we would like to pay for it. People are simply inexperienced in such procedures. An additional argument for the CE format is that it is less 'incentive compatible', and hence would reduce strategic behaviour (Hanemann, 1994), whereas OE questions invite respondents to understate their true values. On the basis of these and other alleged advantages, the NOAA panel has recommended CV practitioners to rely on a referendum format (Arrow *et al.*, 1993).[26]

However, it is questionable whether the advantages of this approach outweigh its disadvantages. Firstly, anchoring may be a more serious problem than is suggested. The effect is not confined to CV surveys, and it has been demonstrated in diverse contexts

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[25] Anchoring is not just confined to economic or numerical decision problems. It has also been demonstrated for non-numerical problems, for instance in the form of positive and negative statements that subsequently affect opinions (Quattrone, 1982).

[26] In a referendum format, people are posed with a take-it-or-leave-it question. The rationale is to avoid the effect of anchoring by presenting respondents with different amounts allocated on a random basis.

and for various populations of respondents, including experts.[27] Furthermore, when people are ambivalent about their answer, they tend to use whatever anchor is at hand, no matter if they know that this is randomly produced and thus completely unrelated to the task, as in Tversky and Kahneman's (1974) experiment, in which the respondents' belief about the percentage of African countries in the United Nations was anchored to the outcome of a wheel-of-fortune. Finally, anchoring does not seem to disappear with monetary incentives for accuracy (Tversky and Kahneman, 1974).

Secondly, the assumption that CE questions in CV contexts would produce more reliable answers has not been unanimously verified. Loomis (1990) found no significant difference in a test-retest correlation between the two formats. The NOAA panel's recommendation to rely on a conservative design is also misguided since the DC format has actually resulted in higher, not lower value estimates as expected (*e.g.*, Lunander, 1998). In a summary of six independent studies that have applied both elicitation formats, Schulze *et al.* (1996) assess this upward bias to a factor of 1.9. Thirdly, the DC format requires at least a three or fourfold increase in sample size in order to yield the same statistical precision as an OE format (Schulze *et al.*, 1996), thereby making surveys and studies very costly to carry out. Fourthly, in cultures and societies where it is customary to answer questions in an affirmative manner and where any 'negative' response may be considered as 'rude' behaviour, the effect of implied value cues are likely to be even more pronounced (Ericson and Svedsäter, 1994).

Finally and conceptually more important, it is not certain that the referendum format will actually reduce possible incentive bias. In fact, both protocols can be framed to be incentive compatible if subjects are economically rational and think that their responses will be decisive. Respondents who are aware of the link between survey statements and (project) outcomes have exactly the same incentive to misrepresent their preferences in a CE format. To me the argument for incentive compatibility is unconvincing. Drawing on experimental economics and auction behaviour, Hanemann (1994) argues that, when

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[27] For instance, estate agents were shown to be influenced by a modified listing price of a property, even though they were given complete information about the characteristics of the property and the price level in the neighbourhood (Plous, 1993).

presented with a blank box to state a value for something, people are more likely to understate (or overstate) this due to strategic considerations, whereas when a value cue is implied, the temptation to deviate from their true preferences is reduced, since "...there is no reason for the respondent to do other than answering truthfully" (p. 23). However, even if this rather strong assumption is true, an implied value cue does not only meritoriously prevent strategic behaviour. Simultaneously it is 'manipulating' underlying preferences.

To summarise, while OE questions may yield 'unbiased' estimates with wide confidence intervals (due to the higher frequency of outliers and zero responses), CE questions result in anchored estimates but with tighter confidence intervals. I believe that it would be more sensible to start from an unbiased estimate and develop robust methods to reduce confidence intervals, rather than go in the other direction. One way of trying to solve the problem is to regularly ask the respondent for the reason(s) behind their answers, another to exclude outliers and zero responses of WTP from the statistical analysis in order to arrive at a more satisfactory distribution of responses.

2.6. Payment-Vehicle Bias

When subjects are asked to value a natural resource, they are, explicitly or implicitly, also told how the amenity should be paid for. There are typically two different types of payment schemes in a CV context; either a tax payment, or a voluntary contribution. In specific circumstances, entrance fees, access licenses, duty charges, etc. are used. Generally, payment-vehicle bias arises when the respondents dislike or are unconvinced by the suggested payment scheme. For example, people may have an aversion against raised taxes and for this reason vote against the provision of the good by stating a low or a zero WTP, even though they otherwise value the environmental initiative. These responses are classified as protest-bids and they result in an underestimation of benefits.

Thus, when valuing a natural resource, people are, similar to other types of consumption, unlikely to do so without considering other aspects of the proposal, including how this should be provided and paid for. A CV scenario should preferably be designed so that other influencing aspects are removed from people's responses of

WTP. However, these are often inseparable from the amenity, and although we may argue that the valuation context is relevant and that the whole 'package' should be considered, this is problematic for subsequent welfare analysis that aims to capture only the value of the resource per se. It is nonetheless recommended to ask follow-up questions about attitudes toward the payment scheme, trust in responsible authorities, belief in the effectiveness of the suggested intervention, etc. The impact of the payment scheme may be specifically investigated by presenting people with different modes of payment and examine how WTP varies accordingly.

2.7. Compliance and Interviewer Effects

Social researchers believe that people are prone to shape their answers in order to please the interviewer, especially when they do not have a well-defined view of the survey topic (Schuman and Presser, 1981).[28] This has lead critics to conclude that responses to CV questions are little more than expressions of political correctness that are demonstrated for the benefit of the researcher (Arrow *et al.*, 1993). Mitchell and Carson (1989), and Carson *et al.* (1996a), on the other hand, conclude that compliance bias does not represent a major problem in CV studies. In a study by the latter authors, half of the respondents answered the valuation question in a standard way, the other half was asked to write down their answer on a piece of paper, seal it and put it in a locked ballot box, and no significant difference was found between the groups.

Irrespective of such results, we know from research in social psychology that compliance is a complex phenomenon that should not be neglected. Apart from the mere desire to comply with fellow citizens and behave in an expected way, Milgram (1974) demonstrates that the profession and position of the researcher have a significant effect on authoritative behaviour; when the research leader was portrayed as an eminent

[28]Kelman (1958) identifies three processes of attitude change. *Compliance* occurs when respondents express views or change attitudes in order to please the majority or a significant person, *internalisation* when people are convinced by the validity of other people's views, and finally, *identification* when individuals alter their opinions to become more alike someone they admire. In this context we are concerned with the former of these processes.

scientist, people were much more prone to co-operate with the research objectives. The main point is that authorities are more or less automatically accepted, and in order to resist their powerful influence, people must be given the opportunity to actively search for their sincere opinions and beliefs. Compliance is also more likely to occur in countries where people are framed by an 'accepted-type' of answer, may it be for cultural reasons or due to political constraints. The effect is also related to strategic behaviour in the sense that responses are affected by the decision-power or presumed influence on the project by the interviewers (*e.g.*, Ericson and Svedsäter, 1994).

In order to reduce the undesired influence of compliance, respondents should be reminded that the study aims to capture their 'own' private opinions toward the issue. They may for instance be informed that there are no 'right' or 'wrong' answers to the questions asked, and they should be convinced that responses will be treated anonymously, whereby no association is made between their name and their answers. In addition, although important for other reasons, the respondents should be encouraged to think through all relevant aspects of valuation, such as their budget constraint, whether they at all support the project, or believe in the institutional arrangements before a response is elicited. Finally, interviews should be conducted by experienced practitioners and enumerators, and procedures should be designed in ways that make each interview as uniform in structure as possible.

2.8. Embedding Effects

Embedding has received prominent attention in the CV literature and is considered as one of the most important objections to the use of CV studies. The notion was originally defined by Kahneman and Knetsch (1992) and is distinguished into two different kinds of effects. *Perfect embedding*, or *insensitivity to scope*, occurs when the WTP is the same, or not sufficiently differentiated, between environmental amenities that (substantially) differ from each other in their quantities or qualities. In other words, perfect embedding is a demonstration of a non-increasing (or monotonic) utility function since the respondent's valuation is insensitive to the magnitude of the good, and it violates the fundamental axiom of economic theory that more of a good should be valued higher, provided that it encompasses positive values. *Regular embedding*, or

part-whole bias, on the other hand, 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, 1992; p. 58). The WTP of an environmental commodity is thus determined by how many other (public) goods are included in the scenario and valued simultaneously, which pose problems for the standard economic assumptions that values are context independent.

Despite the demonstration of embedding in a variety of studies covering a wide range of resources (*e.g.*, Strand and Taraldset, 1991; Kahneman and Knetsch, 1992; Desvousges *et al.*, 1993; Diamond *et al.*, 1993; Kahneman and Ritov, 1994), there remains a wide disagreement whether the effect constitutes a major problem for the CVM. The major reason is that studies that have demonstrated such effects are, generally, judged by CV practitioners to be of poor quality in terms of questionnaire design and survey administration (*e.g.*, Hanemann, 1994; Carson *et al.*, 1996a). Most importantly, CV advocates commonly emphasise that these attempts do not at all, or only to a limited extent, follow the NOAA panel's guidelines for conducting CV studies.[29]

2.8.1. Perfect Embedding

Two diametrically opposed explanations for perfect embedding have been proposed in the CV literature; (i) poor quality in survey design and administration that either fail to establish a plausible scenario, or tend to mask differences in scope (*e.g.*, Smith, 1992; Carson *et al.*, 1996a), or (ii) the methodology violates economic theory (*e.g.*, Kahneman and Knetsch, 1992; Diamond and Hausman, 1994). Advocates of the CVM quite naturally subscribe to the former of these explanations, and Hoevenagel (1996) states that "...perfect embedding correlates with the use of poorly defined goods and with the use of goods which are only slightly different from each other" (p. 60). Hanemann (1994) resumes the argument by claiming that there are only two studies that have found a statistically significant effect of scope, and highlights at the same time the deficiency in study design of both these experiments. For example, he points out that these have used an OE valuation format, rather than a CE format, and further that the interviews

[29] The details of this criticism will be explored in chapter four.

have had the character of brief shopping-mall intercepts. Hutchinson *et al.* (1995) present a summary of other common objections against demonstrations of perfect embedding, such as insufficient piloting, lack of statistical power used to detect differences in value, and misleading or inappropriate context(s) for valuation.

These observations thus suggest that perfect embedding may be possible to overcome with improved questionnaire designs and interview techniques, or with more sophisticated statistical instruments, with the implicit conclusion that the opponents of the CVM have not completed their task with accuracy. For familiar environmental amenities, which to a large extent constitute use values, there ought not to be any severe problems of perfect embedding, and these should be possible to avoid or at least be minimised by careful survey implementation. On the contrary, for complex unfamiliar amenities mainly encompassing non-use values, the prospects are not as promising. Embedding is most likely to occur when respondents are poorly informed about the amenity, particularly if the hypothetical market and its provision are not presented as realistic. Some support for these assumptions is found in a number of independent studies (*e.g.*, Hoevenagel, 1996; Smith and Osborne, 1996; Carson, 1997).

However, the conclusion that WTP would be responsive to scope as long as people are accurately and completely informed about the valuation issue, becomes somewhat problematic when the following is considered. The majority of studies rejecting the embedding hypothesis have relied on within-subject, rather than between-subject tests (*e.g.*, Propper, 1990; Boyle *et al.*, 1994). Since respondents ought to be strongly influenced by their previously stated value, no clear answer as to whether people have the ability to articulate unbiased estimates is provided. Furthermore, although the criticism of poorly elaborated surveys no doubt is warranted, CV researchers putting forward such arguments tend to present the goods in a way that pictures the magnitudes as 'implausibly' different between scenarios.

Fisher (1996) argues that monotonic preferences may in fact be reconciled with principles of economic theory, at least when assumptions are modified to allow for a non-increasing utility function. Standard consumer theory assumes a concave utility function as presented in Figure 2.1. It shows that value increases as a function of the

quantity consumed, but the marginal value of an additional unit decreases as more of the good is consumed due to diminishing marginal returns. Hence, the marginal value of an increase from 1 to 2 units is larger than from 4 to 5 units. If we in addition assume that there is some kind of satiation point at which no more of the good is wanted, we would expect a very limited or no increase in utility beyond this point, which is illustrated by Figure 2.2. Fisher (1996) speculates that if many environmental amenities result in such utility functions (for instance, the number of birds saved may not have any value beyond a minimum level required for species survival), then any consumption above this level would add nothing to utility. Therefore, if the scope is varied from point Q^a to point Q^b between scenarios, the same value would be assigned to each of these states.

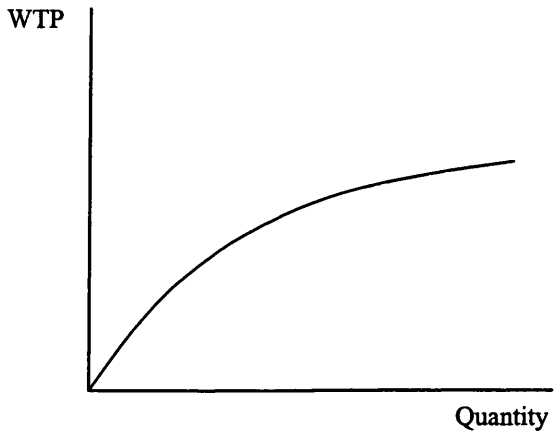

Figure 2.1. Concave utility function

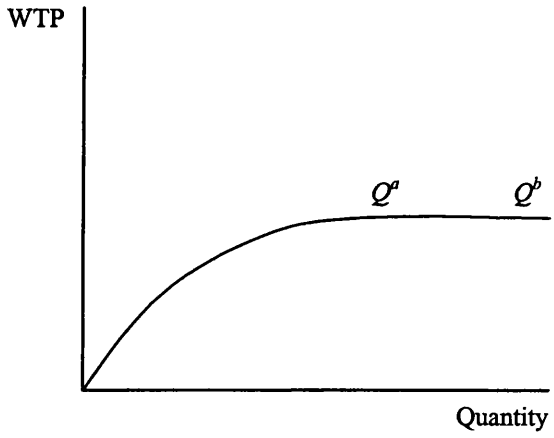

Figure 2.2. Satiation point

A major problem of this hypothesis is that not all environmental amenities are characterised by such distinct satiation points (*e.g.*, visibility conditions at national parks, or beautiful landscapes). A fundamentally different interpretation not accommodated by conventional economic theory is suggested by Kahneman and Knetsch (1992), who conclude that WTP reflects the moral satisfaction derived from making donations to environmental goods, rather than being an indication of economic value. Their reasoning is an extension of Andreoni's (1990) hypothesis of the 'warm glow' that arises from the mere act of giving to a 'good cause', which presumably is enhanced through interaction with other people, as in the interview context. The hypothesis is also supported by a verbal-protocol analysis conducted by Schkade and Payne (1994), in which it was observed that WTP was constructed from a variety of

considerations, including an obligation to pay a fair share of the cost of the proposed solution, and a signal of their concern for a good (environmental) cause.[30]

2.8.2. Regular Embedding

Regular embedding has been explained by the fact that respondents unconsciously include environmental, as well as other types of public (and sometimes private) goods, in their valuation of a more confined amenity (Mitchell and Carson, 1989). For instance, if a survey is designed to estimate the WTP for a reduction of hydrocarbonides, respondents may think of the total reduction of air pollutants and anchor their amount to this latter 'imagined' scenario. The bias may also occur because the respondents simply forget about other (public) goods that possibly need funding, and when reminded of these, their budget constraints force them to reduce their spending on the targeted commodity.

In a study of the WTP for a reduction of air pollutants by Strand and Taraldset (1991), one subset of the population was asked about their WTP for measures against air pollution, whereas in the other subset respondents were also presented a list of other environmental problems to be considered. They were subsequently asked to rank six different environmental problems that they found most important to take measures against. The respondents in the former subset were willing to pay significantly more for the reduction of air pollutants. This reflects respondents' inability to consider other environmental problems that they value and that may need funding, but when they were informed of other possible public and environmental issues, WTP was reduced. Other studies suggest that simply reminding the respondents of other environmental problems, either related or unrelated to the specific good being valued, is not sufficient to alter people's valuation (*e.g.*, Halvorsen, 1993). A simultaneous valuation of a set of amenities is necessary in order to have an impact on respondents' valuations, at least when these are complex and unfamiliar to the respondents. Thus, something beyond a mere description of budgetary substitutes seems necessary if properties of demand are to be properly reflected in contingent values.

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[30] The theoretical bases of these hypotheses are developed in chapter three and in the empirical section.

A plausible explanation of regular (and perfect) embedding is the mental account hypothesis proposed by Thaler (1990), asserting that people have mental accounts for various classes of goods, and that monetary budgets for each of these are not transferable between sub-groups of goods, neither possible to separate into specific events. Consequently, money will not be 'moved around' in a rational way. For example, rather than considering how much money people would like to spend on the cinema, restaurants or concerts, they tend to bulk these types of expenditures into a broader category, perhaps called 'entertainment', from which they are reluctant to transfer money to other but different consumption alternatives. As a result, people tend to focus on their total valuation of a larger set of goods, in this case possibly environmental amenities in general, instead of the particular object to be valued.

2.9. Sequence Effects

Akin to part-whole bias is the so called *sequence effects*, which involves the influence exerted on the estimated value by the order in which the good is valued in a sequence of goods. The typical empirical finding is that the value falls, often dramatically, the later the amenity is valued in a sequence (Diamond *et al.*, 1993; Carson *et al.*, 1996a). CV proponents are again keen to assert that these effects are due to defective survey instruments. It has been argued that in many instances the goods valued in a sequence have been described to the respondents as quite similar, thereby making them perfect substitutes for each other. We would therefore expect that the value falls substantially the later the targeted amenity is valued. The effect has also been called 'positional' bias in the literature, since the order in which different goods are presented may also suggest their order of importance (Mitchell and Carson, 1989). Similar types of 'primacy-effects' have been demonstrated in various contexts of social research, which entail higher endorsements of items presented early in a list of alternatives, whereas other alternatives, particularly presented in the middle, are assigned less importance (Schwarz *et al.*, 1991).

Randall and Hoehn (1996) show theoretically why adding together independently valued goods should be higher, compared to when these goods are valued simultaneously in a package. This effect occurs also for marketed private goods and the

anomaly may be explained by income and substitution effects (Randall and Hoehn, 1996). However, the effects ought not to be as strong as that which has been demonstrated in CV studies.[31] An alternative explanation is that people do not consider their total income in their valuation. Similar to Thaler's (1990) mental-account hypothesis, WTP is conditioned by the disposable or 'marginal' income that has to be allocated over a number of classes and sub-classes of good, one of which may be reserved for environmental amenities. In the event that this 'environmental account' is consumed as the first commodity is valued, and assuming that this is a close substitute of the commodity valued subsequently, we would expect large substitution effects.[32]

Irrespective of the search for plausible explanations of sequence effects, a major problem still remains; what constitutes an appropriate context in which environmental goods should be valued? When different goods are valued independently, their benefits will be grossly overestimated, compared to when the same goods are valued in a package, and since it is not feasible to value all possible public goods simultaneously (environmental as well as others), the problem remains unresolved. Hoevenagel (1996) has offered a criterion regarding in which context the benefits of an environmental amenity should be derived, suggesting that the number of substitutes presented in the survey depends on the time span over which the particular project is realised. Over a shorter period it is not necessary to inform the respondents of any substitutes, but the longer the period of time, the more appropriate would it be to adjust for budget alternatives by introducing substitutes in the scenario. However, I do not believe that this provides any viable solution to the problem, since it is difficult to approximate the length of the period over which the actual project extends. It is very problematic, if not

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[31] However, as mentioned previously, there is a pronounced difference between private and public goods in the derivation of substitution and income elasticities.

[32] According to Diamond and Hausman (1994), the assumption of a large substitution effect between various environmental amenities is inappropriate since preferences should be defined over the natural resources remaining, not over the amount of resources available. Consequently, WTP should be larger the smaller the quantity remaining, and thus the WTP for preserving two amenities should be higher than the sum of WTP for each amenity valued alone. However, this prediction assumes that the amenity valued is the only one threatened. When both are threatened but only one is considered in the question, we should expect diminishing values over a sequence of goods as postulated.

impossible, to envision all potential future environmental and public (or private) goods that need funding, even in the shorter term. Thus, it is very difficult to find a single context of valuation that is 'theoretically' correct.

2.10. Population and Sample Selection Bias

Of concern when determining welfare effects is to specify what is the relevant population. *Population choice bias* arises when the defined population does not adequately correspond to the population to whom the benefits and costs of the amenity will accrue. This issue is particularly important when the environmental resource is geographically dispersed, or when it involves large non-use values. As argued before, in these situations the researcher or policy maker must decide who's value should be accounted for. For example, is it appropriate to take into account 'all' citizens, since anyone may derive a benefit from the resource being valued, or should focus be placed on agents that use the resource in some way or the other?

The next problem facing the CV researcher is to actually identify the population that fulfil the chosen criteria. Furthermore, the level of measurement must be decided. A choice ought to be made between individuals or households as the agents. Theoretically, the household's WTP should be the sum of individual WTP among members of this household. However, in a CV study, values will be underestimated if the individual representing the household fails to realise and include the economic value on behalf of other household members. Obviously, the level of measurement should be decided according to what respondents automatically think of when stating WTP. For example, if they tend to consider the benefits accrued to the household and how much the family on the whole can afford to pay, despite being informed that they should consider their individual value, WTP should preferably be measured at the household level.

Other problems to avoid are *sample selection bias* and to minimise *item non-response bias*. The former entails similar problems as in other areas of social research and may be avoided by using a proper method of probability sampling. Yet, in CVM and other Stated Preference Methods (SPMs), there is a specific problem of self-selection bias, arising for instance when only people who have an interest in the resource (or of

environmental issues in general) respond to the survey. It is further not unlikely that these respondents represent a particular viewpoint, and thereby the results will not necessarily be representative of the targeted population. In cases when the overall response rate is low it is therefore recommended to carefully follow-up those who did not respond to the survey in the first place and examine whether these people seem to differ from the respondents regarding factors and characteristics that influence WTP.

Item non-response bias occurs when people fail to answer various key questions, and there is a problem of deciding how to exactly treat those who do not answer these questions; does it imply that they have misunderstood or simply forgot to answer the question, or does it reflect a protest against the proposal? Similar problems arise in the case of zero-responses of WTP; should these be treated as 'true' zero WTP, or is it more adequate to view them as protest bids against the methodological procedure, or other aspects of the scenario? Generally in survey research, item non-responses above 10% are rare, but in CV contexts, non-response rates as high as 20-30%, or higher, are not uncommon (Mitchell and Carson, 1989). The frequency of zero responses has also been demonstrated to be rather high in CV studies. The most straightforward solution to this problem is to explicitly ask for the reasons behind stated WTP, and on the basis of this separate respondents who do not place any value on the resource from those who do but find the valuation scenario inappropriate, implausible or unconvincing.

2.11. Conclusions

In this chapter a number of theoretical problems and potential biases and anomalies of CV responses have been presented, some of which are common for measurement in other areas of social research (*e.g.* anchoring, sequence (or order) effects), and others that are specific for the CVM (*e.g.* embedding effects, payment-vehicle bias, the inclusion of non-use values). The validity of a measure reflecting a theoretical notion or construct, whether it is an attitude or an economic value, depends on how well it represents real behaviour or traits among the group of people being investigated. In the case of economic values for environmental resources, measured either as WTP or WTA, four types of validity deserve closer attention; *usefulness*, *content validity*, *criterion validity*, and *construct validity*.

Any measure, whatever it is reflecting, must be judged according to how *useful* it is. Very often in social science this condition is not paid sufficient attention to. The CVM is warranted by the alleged effectiveness of including public issues in cost-benefit analysis in order to prevent an excess provision or use of these. Nevertheless, although on the whole useful, some CV studies have aimed at assigning monetary values to issues that reasonably may not be possible, nor meaningful, to incorporate within welfare economic analysis, either because they are too complex, or due to the lack of feasible institutional arrangements in order to capture estimated values. However, I will in this thesis focus on cases when an institutional arrangement may be established, or at least appears plausible. Continuing with construct validity, this may be separated into two categories (Mitchell and Carson, 1989). *Theoretical validity* reflects how well estimates of WTP or WTA can be predicted by various characteristics among the respondents (such as gender, income, age, etc.), whereas *convergent validity* is judged on the basis of to what extent CV estimates correspond to the results of alternative methodological approaches of valuing the resource.

The former criterion is in CV studies regularly assessed by capturing socio-economic characteristics of respondents, and the results from most CV studies show that stated economic values are fairly well predicted by these.[33] However, this only indicates that different people value the same amenity differently, and provides no information regarding how the same individual responds to various levels of this, nor how much value is assigned to different amenities. On the basis of these limitations, embedding emerges as a relevant anomaly to study in order to assess the validity of CV results. With respect to convergent validity, Carson *et al.* (1996a) conclude that, on the basis of a meta-analysis comparing CV results with those derived from Observed Indirect (OI) approaches of benefit estimation, such as the travel cost method or hedonic price-based measures, the CVM does reasonably well. The ratio between CV responses and revealed preferences is estimated to fall within the range of 0.78 and 0.92, indicating that CV

[33] The usual result is that income, level of education and geographical proximity are positively correlated with WTP, whereas age is negatively correlated with WTP (Carson *et al.*, 1996a). The arguments are that richer people can afford to pay more, and more highly educated and younger people are better informed of the value and importance of environmental preservation.

studies slightly underestimate economic value. However, there are relatively few studies that have applied more than one approach to benefit estimation to the same good, and the goods included in the meta-analysis are rather familiar and locally well-defined, for which non-use values are absent or very limited. Thus, no implications regarding the validity of CV responses in general can be drawn from these results.

The major problem with the notions of validity discussed above is that they are internal in the sense that they all make comparisons within a hypothetical domain, or rely on indirect measures of economic value. A stronger test of validity is obviously to compare hypothetical statements with real payments, or ultimately, the extent to which derived WTP and/or WTA represent economic values as purported by cost-benefit analysis. *Criterion validity* is rarely if ever assessed in the context of CVM since no markets exist for the amenity. Yet, a handful of studies have been conducted that compare hypothetical WTP with consequential payments in experiments, and as mentioned previously, these generally suggest that hypothetical WTP seems to be a poor predictor of real behaviour (*e.g.*, Seip and Strand, 1992; Neill *et al.*, 1994), although no conclusive evidence is provided regarding this aspect.

On the whole, the performance of the CVM regarding the above aspects of validity seems to be inferior to most types of assessment in social research. More importantly though, as far as *content validity* (or face validity) is concerned, this criterion has been largely or completely overlooked in the CV literature. Exceptions that put emphasis on the link between assessed economic values and the underlying theoretical construct are usually written by researchers who are not directly involved in empirical research (*e.g.*, Anderson, 1993; Barry, 1995; Keat, 1997), and therefore very few empirical test have been carried out. Accordingly, it will form an important part of this thesis and the validity concept will play a central role in the theoretical chapter that follows. I will put the methodology within a broader framework and discuss whether lay people understand or consent to the idea of assigning economic values to natural resources, or how they otherwise interpret and evaluate CV questions. In order to enlighten this discussion, theoretical perspectives traditionally viewed as being outside the CV literature will be utilised.

The empirical studies and experiments will build on this theorising and put emphasis on issues and anomalies that have implications for the validity of the underlying value construct, that is, if people at all have any ('true') economic values for environmental resources commonly being valued in CV studies. In particular, among the problems reviewed in this chapter, embedding effects, the correspondence between hypothetical statements and actual behaviour, and to a certain extent compliance bias and the inclusion of non-use values, will be specifically investigated. Additionally, focus will be placed on issues that have not received much attention in the previous literature. It is envisaged that these effects and their variance (or invariance) with methodological approaches of benefit estimation will provide useful information about the possibilities and limitations of assigning monetary values to natural resources, whereas the other types of biases presented here are more of isolated methodological problems not necessarily linked to content validity. Although the results may not always clearly distinguish between content validity and *measurement validity*, the latter that assumes that there is an underlying value that the methodology fails to adequately capture, both which are interesting in their own respect, qualitative analyses will be performed in order to ascertain the origin of observed anomalies in CV studies and other approaches to environmental benefit estimation.

3. Theoretical Framework

Having summarised the literature on potential problems with the Contingent Valuation Methodology (CVM) in the previous chapter, I will now discuss the theoretical underpinnings of hypothetical value statements. The purpose is not necessarily to provide exact explanations for empirical anomalies, but aims to present a broader framework wherein results of Contingent Valuation (CV) studies may be interpreted. The major objective is thus to illuminate theoretical notions and perspectives that may help to improve our *understanding* of economic values in these contexts. In the introductory chapter of this thesis I argued that the literature on the CVM has somewhat lost its relevance due to its focus on isolated anomalies and methodological procedures, whereas little effort has been made in order to explore the basic nature of CV responses. The touchstone for assessing validity has been how well data fit with established economic models, whereas the *processes* of valuation have been largely ignored.

Two theoretical areas will be explored in this chapter, each of which have the potential to enhance our understanding of *how* and *why* people value public goods in hypothetical market scenarios. Firstly, I will present findings from research directly related to preference and value formation, reviewing some important hypotheses that challenge the idea of economic rationality, and setting out a discussion that explores the implications for environmental benefit estimation. Secondly, I will address the broader issues of attitude formation and structure, such as the attitude-behaviour link, construal processes of preference formation, the functional (or expressive) value of attitudes, mental models and interpretations of CV scenarios, and the social processes of public opinion. This section adopts a social-psychological perspective on the assessment of economic values that aims to facilitate a more constructive analysis of CV results.

3.1. Economic Rationality and Preference Formation

A fundamental axiom of standard economic theory is that individuals will act *rationally* upon changes in their environment. Choices are interpreted as reflections of *individual* preferences only, and as such they define whether the individual is acting rationally or

not, and preferences are finally assumed to be *independent* of contextual factors. Thus, economic preferences are seen as mechanistic reactions to the existence of and changes in environmental conditions, no matter in which context, culture or society, they occur. The problems and anomalies discussed in the previous chapter quite clearly demonstrate that this model of economic behaviour is merely normative, with limited capacities to explain how and on what basis people actually make choices. This is by no means a controversial statement. Numerous artefacts of conventional economic theory, such as preference intransitivity, Ellsberg paradoxes, endowment effects, framing and response-mode effects, are well known through their occurrence in a vast number of experiments, employed in a variety of contexts (*e.g.*, Tversky, 1969; Fischhoff *et al.*, 1988; Tversky and Kahneman, 1988; Kahneman *et al.*, 1990; Kleindorfer *et al.*, 1993).

Past research in the psychology of human decision-making and judgement-making abilities further suggests that such inconsistencies are not temporary effects, but rather behavioural regularities (*e.g.*, Simon, 1986; Harris *et al.*, 1989; Gregory *et al.*, 1993; Conlisk, 1996). This has resulted in alternative theories and hypotheses that recognise the limited access to information and computational capacities among humans, such as 'satisficing' (Simon, 1955), simplification of decision rules (Kahneman *et al.*, 1982), and (narrow) choice bracketing (Read *et al.*, 1999). Apart from explanations of various deviations from normative models, the mere definition of rationality is assumed to be dependent on societal and cultural underpinnings (Etzioni, 1986), which presents additional problems in deciding what in fact should be interpreted as irrational behaviour. In the following I will review some descriptive models of economic behaviour that are relevant for the CVM, such as *heuristics of economic decision-making* and *prospect theory*.

3.1.1. Heuristics of Economic Decision Making

In their widely cited book, Kahneman *et al.* (1982) summarise a series of papers about the judgement and decision-making under various forms of uncertainty. The starting point of this research is that many decisions in such contexts are based on a variety of beliefs reflecting the likelihood of uncertain events. However, rather than searching their mind for the objective likelihood that something will occur, this is expressed by

individuals in statements such as "'I think that...', 'chances are...', 'it is likely that...', and so forth" (Kahneman *et al.*, 1982; p. 3). Thus, the *perceived likelihood* is dynamic and vaguely represented, rather than being a precise estimate. The most important finding is nevertheless that the occurrence of events are considered as more or less likely, even on occasions when exact probabilities are explicitly provided. This necessitates a distinction between objective and *subjective* probability, the latter which may deviate significantly from the former, and is expressed as an approximate range that may or may not enclose the underlying 'true' probability.

The research by Kahneman *et al.* (1982) centres on three 'rules of thumb' that are employed under conditions of uncertainty; *representativeness*, *availibility*, and *anchoring*. 'Representativeness' implies that an event is evaluated on the basis of to what degree it is representative of another event, or class of events. The subjective probability that something will occur thus depends on how similar this is to another event for which the characteristics or outcomes are known. Key words in this evaluation process are 'resembles', 'similar to', and 'reminds of'. The 'availability-heuristic' reflects the idea that the evaluation of the probability of an event depends on the ease to which other but similar events can be brought to mind. For example, the subjective probability of winning on the lottery depends on our own and friend's experiences of winning. Finally and as discussed previously, anchoring hypothesises that people start from an initial guess that is subsequently adjusted in order to generate a final answer.[34]

On many occasions, the shortcut that these decision-rules offer seems to be quite useful in order to arrive at satisfactory decisions. However, I will argue that the viability of such techniques becomes more fragile as the situation becomes less familiar and more complex. Environmental resources most commonly are unfamiliar (since we normally cannot expect the respondents to have any previous experience of using them) and complex (since they carry with them an array of different attributes that are either

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[34] The hypotheses by Kahneman *et al.* (1982) have been complemented and modified by more resent research. Gigerenzer (1996) and Todd and Gigerenzer (1999) argue that the focus on three main heuristics is insufficient since there are many more types of heuristics that are likely to be employed in human decision-making. The 'original' heuristics are too vaguely defined and should rather be seen as broad categorisations of more specific decision rules.

unknown or not easily distinguished from each other). Moreover, private goods entail one important aspect that makes them differ from environmental amenities; we are used to making decisions about them on a daily basis, implying that our heuristics are applied in an appropriate context in which our previous experience comes to help. Hence, the valuation of marketed goods is made within a relevant framework that does not yet exist for the majority of environmental resources.

The strategies discussed above generally suggest that people do not think abstractly about (complex) social issues. The 'availability-heuristic' is similar to Abelson's (1976) theory of script processing in attitude formation, which postulates that an attitude is determined by particular episodes or symbols that can be recalled. This challenges the recommendations set out by the NOAA panel (Arrow *et al.*, 1993), which urge CV researchers to completely and rigorously inform respondents about the amenity and its terms of provision. This perspective on judgement-making abilities is well illustrated in major microeconomic textbooks, which devote significant space to explore asymmetric and imperfect information among economic agents since assuming that these are the main reasons for market dis-equilibrium. However, the provision of additional information may be insufficient in order to alter respondents' behaviour and avoid involved anomalies of decision-making. Abelson (1976) argues that;

> Specifically, the impact of abstract base-rate information about the consensual frequency of an event has virtually no effect on judgments about the motives or future behavior of an actor, in comparison to "distinctiveness" information about other episodes involving the actor. (p. 41)

As argued in chapter two, the quality of information and arguments presented in a CV scenario, although having a strong impact under conditions of high personal relevance, has only a moderate influence under conditions of low personal relevance (Ajzen *et al.*, 1996). This finding is also in accordance with the elaboration likelihood model of persuasion developed by Petty and Cacioppo (1986), which predicts that involvement is positively correlated to the susceptibility of qualitative information. It is worthwhile to contemplate what implications this has regarding people's judgements of environmental issues. For example, embedding effects may partly be explained by this phenomenon, since the scope, urgency and severity of a (global) environmental problem generally is

not reflected in stated Willingness To Pay (WTA), despite attempts to make these aspects explicit to the respondents. To conclude, since probabilities for quite well-defined issues are (at best) approximately interpreted, we may question to what extent people can comprehend and report precise opinions about unfamiliar events. This aspect will be addressed in the empirical sections that follow.

3.1.2. Prospect Theory

Prospect theory, unlike Expected Utility Theory (EUT) originally proposed by von Neumann and Morgenstern (1944), predicts that choices will depend not only on actual outcomes, but how the problem is *framed* (Kahneman and Tversky, 1979). If given a sum of £100, in addition to what they already own, and then presented with the alternatives A (50% chance of winning £100), and B (sure win of £50) in a choice set, the majority choose B. However, when given a sum of £200 and presented the alternatives C (50% of losing £100), and D (sure loss of £50), the majority choose C. According to EUT, the expected utility of all options are equal (0.5 * 100 = 50), and therefore the individual should be indifferent between these alternatives. If nevertheless one specific alternative is considered as better, we would according to principles of invariance expect that particular choice to be repeated in the next choice set.

The major conclusion proposed by the authors is that people in their decision strategies do not primarily focus upon final outcomes, but on incremental stages and isolated parts of the choice set (Kahneman and Tversky, 1979). They are likely to adopt sub-optimal strategies by ignoring shared components and concentrating on distinguishing features. These outcomes are similar to those that result from 'narrow choice bracketing' (or incomplete weighting of alternatives) proposed by Read *et al.* (1999).[35] In the above

[35] When people bracket their choices broadly, they consider all choice alternatives simultaneously, and when the bracketing is narrow, each choice alternative is considered in isolation. Whereas 'broad choice bracketing' allows the decision maker to take account of all possible consequences of a choice, in 'narrow choice bracketing' only a limited number of consequences are considered. Often these consequences are immediate and local to the specific event, implying that more global and long-term consequences are restrained or ignored (Read *et al.*, 1999).

example the distinguishing feature is whether the problem is presented as a gain or loss, and it is evident that we attach more weight to the latter than the former (Kahneman *et al.*, 1990). In addition to the framing of alternatives as gains or losses, individuals tend to assign higher weights to low probabilities for losses and risks, compared to probabilities associated with gains, and are assumed to prefer certainty over uncertainty (Kahneman and Tversky, 1979). Figure 3.1. illustrates the value function according to prospect theory.

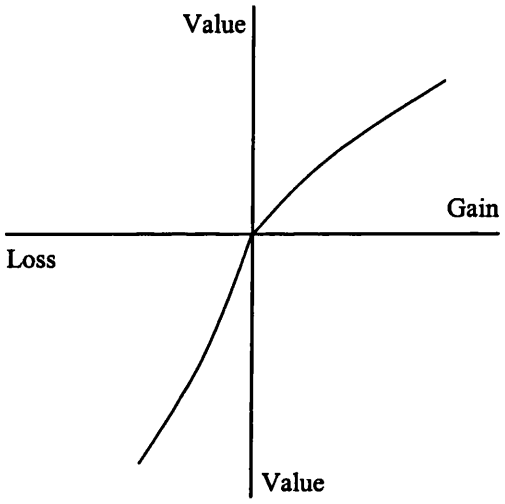

Figure 3.1. Prospect theory and the framing of values.

Contrary to EUT, which anticipates a symmetrical function, value increases or decreases proportionally more when this is framed as a loss rather than a gain. The functional relationship is not only relevant for people's understanding of probabilities, or how they process information depending on how the task is framed. It may also reflect their *acceptance* of the procedure. If this is not taken on board, many people will reply with protest bids that do not necessarily imply a 'worthless' amenity. *Identification* and perception of *property rights* are key concepts here. Firstly, losses evoke different emotional and behavioural responses than gains. Losses are a threat to the individual that she is programmed to react more decisively to (Schroeder and Dwyer, 1988), and in the same way that children have a stronger attachment to teddy bears in their arms than those on store shelves, one's possessions partly define one's

identity (Heberlein, 1988). These effects are therefore commonly referred to as 'endowment effects'.

If CV responses are measuring the intensity of such emotional arousal, which according to some studies they are (*e.g.*, Kahneman and Knetsch, 1992), logically, losses would be assigned significantly greater weight than gains, simply because giving up something 'costs more'. We would therefore expect people to provide larger monetary values for the prevention of environmental deterioration, compared to equivalent improvements.[36] The CV scenario also provides information regarding the origin of the problem, which involves political judgements regarding who caused this and, therefore, is responsible. Hence, the CV researcher is deliberately or unwittingly assigning rights that the respondents possibly have not thought about before, or which may be against what they consider appropriate. Furthermore, Walker *et al.* (1999) found that the disparity between WTP and WTA was far greater for damage caused by human intervention than naturally caused damage. Implicit in the former framing is that someone is responsible for the damage, and the respondents are likely to make a moral statement when demanding compensation. On the other hand, when the environmental change is naturally caused it does not carry the same moral implications, and measures against it may not seem warranted.

3.1.3. Implications for Environmental Benefit Estimation

On the basis of the various anomalies that have been demonstrated in CV research, Diamond and Hausman (1994) conclude that "...with a pattern of results that is inconsistent with the usual economic assumptions, two interpretations are always possible; the survey was defective, or the CV method does not measure with accuracy" (p. 53), the latter which imposes major restrictions on the applicability of the methodology. However, a third interpretation appears possible, namely that core

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[36] This thereby offers an explanation for the large differences found between WTP and WTA estimates for the same environmental amenity. Whereas for the former the good is presented as a gain (*i.e.*, 'my WTP to achieve this environmental *improvement* is...'), for the latter it is generally framed as a loss (*i.e.*, 'my WTA compensation for this environmental *deterioration* is...').

assumptions of economic theory are misplaced or irrelevant, since people do not seem to possess well-behaved preferences for marketed goods.[37] This may at first sight bear relevance for environmental valuation, because if we find that rational economic reasoning applies to other examples of economic decision-making, this indicates that the CV methodology is flawed. On the other hand, if it is demonstrated that people are also acting irrationally in the decision process regarding ordinary marketed goods, then the argument against CVM becomes problematic since otherwise any sort of economic preference has to be disqualified.

However, although irrational behaviour is not restricted to CV contexts, the deviations from anything called rational are much more pronounced within the latter. Moreover, regardless of how irrational or inconsistent market decisions are, they still represent real behaviour. Revealed preferences fundamentally differ from stated preferences in the sense that they are based on observation of choices people actually make. They carry with them economic consequences, and economic theory is about measuring such consequences. No matter if these choices make sense or not, and irrespective of to what extent these represent something we can call 'true' value, they are still consequential in determining economic growth and wealth distribution. As Keat (1997) puts it, "market transactions take place without reference to the reasons for which consumers prefer what they 'happen' to prefer: the market is, as it were ... 'blind to reasons'" (p. 36). A different problem arises when value is hypothetically stated and does not meet the criteria of welfare estimation, that is, when it does not properly reflect the states of affairs and physical consequences it is supposed to measure.

Stated preferences nonetheless carry some desirable properties. They avoid some of the problematic assumptions that underlie revealed preferences, such as what is true in the past will remain true in the future, and that existing social and economic circumstances will prevail. The elicitation of stated preferences may further be valuable for the development of economic theory;

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[37] It has been indicated, for instance, that embedding effects are standard economic phenomena, even though the effects are more pronounced for public than for private goods (Randall and Hoehn, 1996).

> In fact, the critical scrutiny directed at the contingent valuation method has led some economists to think more deeply about cognitive processes, rationality, and the nature of preferences for *all* goods, public or private. We may, in other words, come out of this debate with an improved theory of preference and choice (Portney (1994); p. 15; emphasis in original)

Unfortunately, few CV researchers seem to be taking these possibilities on board. A common strategy among CV advocates has predominantly, if not exclusively, been to propose improved methodological procedures that would overcome involved problems. This agenda, as argued previously, evolve to the experimentation and development of new elicitation techniques, methods for 'trimming' data, sophisticated models of explanation, or simply adding auxiliary hypotheses, whereas little effort has been made to understand the very basis of people's perception of natural resources and their comprehension of economic value in these contexts. As argued by Fischhoff (1991), this 'fallacy' originates from the dominating paradigm in economics, which alludes to people's ability to articulate and express values on the most diverse topics as long as questions are unambiguously described and adequately interpreted by respondents. However, the complexity of value formation and expression are likely to go far beyond the scope of economic models, which suggests that alternative theoretical perspectives and notions are relevant for studying these phenomena.

3.2. Attitudes and Social Psychological Perspectives

The discussion so far reveals that the analysis of CV results within the standard economic framework is insufficient to explain how people perceive and value the environment. An implication is that CV responses represent more, and perhaps something different, than economic value as understood in market transactions. Therefore, rather than see WTP purely in the context of a purchase model, it should be considered as a special type of attitude that involves more than physical states of the world, and which acknowledges the ambiguities involved (Ritov and Kahneman, 1997; Kahneman *et al.*, 1999). Attitudes have in the literature been defined as "...a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly and Chaiken, 1993; p. 1). As such they are not

directly observable, but manifest themselves as indicative statements. A CV response may be considered as an attitude in the sense that it is an *evaluation* of an object, the natural environment, and it is expressed in monetary terms, which may be regarded as a particular attitude scale. By treating CV responses as attitudes we confront some basic issues that run through the literature, and in this section I will discuss some important theoretical developments in these fields. Specifically, I attempt to address the following aspects; the *predictive power* of attitudes, their *meaningfulness*, *structure*, and *(social) construction*.

3.2.1. The Attitude-Behaviour Link

Throughout the last century, attitudes' impact on behaviour has received prominent attention by sociologists and psychologists alike. Probably the most significant theoretical development in this field is the Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein (1980). The theory distinguishes three important factors that guide behaviour; *attitudes*, *social norms*, and *behavioural intentions*. Attitudes represent beliefs about the consequences of a behaviour, or about the object itself, whereas social norms are perceptions of how significant others would act, or what they would think about a particular behaviour. Both these factors determine the individual's intention to pursue a behaviour, which is the proximal cause of eventually engaging in this (Eagly and Chaiken, 1993). Thus, whereas attitudes only indirectly predict behaviour, the direct influence is exerted by behavioural intentions. Although being widely criticised over the years, mainly since it offers an incomplete description of the causes of behaviour (Eagly and Chaiken, 1993),[38] the TRA still represents a powerful framework for studying the link between attitudes and behaviour, in this particular case to what extent hypothetical value statements correspond to real economic commitments toward natural resources and other public goods.

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[38] For instance, Fredricks and Dossett (1983) compared it with the Bentler-Speckart model and found direct paths from prior behaviour to intention in a circular fashion, something which is overlooked by the Ajzen-Fishbein model. Furthermore, Fazio (1990) distinguishes between spontaneous and deliberative cognitive processing that ultimately depends on the type of behaviour. Generally, the TRA has been criticised for its simplification that causation flows in a single direction (Liska, 1984).

Attitudes' predictive power of subsequent behaviour strongly depends on the context within which attitudes are expressed. In order to serve as valid means of prediction, attitudes ought to be assessed within a context that imitates the one within which behaviour actually takes place. Moreover, the time-span between attitude assessment and behavioural action needs to be limited (Ajzen and Fishbein, 1980), because otherwise influencing external and internal conditions are likely to change. These key features are clearly not fulfilled in the majority of CV studies; monetary valuation of environmental resources does not comply with the procedures upon which public action is normally taken, and the time-span before policy measures are eventually introduced, if ever, is considerable. If people cannot comprehend a link between the CV study and policy implementation, their answers to this may not carry with them any intentions. They are, as LaPiere (1934) has argued, symbolic responses to imagined events.

Furthermore, Krosnick (1986) demonstrates that the attitudes people consider to be important are more stable over time, whereas unimportant attitudes show evidence of considerable change over a relative short time frame. This implicitly suggests that important attitudes are more strongly correlated with behaviour. For example, attitudes that are important tend to be relatively intense and reported at extreme points along attitude scales, whereas unimportant attitudes are expressed more neutrally at the midpoint (Krosnick, 1986; Bishop, 1990). The meaning of a neutral attitude is less obvious, and it does not tell us too much about subsequent behaviour since this may be pursued in either direction. The question is whether CV responses should be seen as reflections of important or unimportant attitudes. Despite the fact that environmental issues commonly are important, they are not necessarily perceived as personally relevant to the individual, which reasonably influences the strength, and therefore importance of an attitude. Eagly and Chaiken (1993) argue that unimportant or 'un-involving' attitudes are structurally isolated and less resistant to change. Furthermore, importance is determined by past experience of the attitude object, something that generally does not exist with respect to (complex) environmental issues.

Abelson (1986) advocates public commitment as an important factor in determining the strength of a belief, and accordingly in predicting behaviour. He states that "an individual who with apparent sincerity espouses a particular belief to a public audience

must seem to that audience really to have that belief" (p. 232). Aware of this reflected appraisal, the individual will regard this belief as a possession, and Abelson further argues that she will behave toward it as such. Another factor having implications for whether an attitude is 'strong' or not is the extent to which it has been elaborated, or traced in its origin. A belief that has been elaborated at great length is likely to be more accessible and strongly held than beliefs that are constructed on the spur of the moment, and therefore more strongly correlated with behaviour (Kokkinaki and Lunt, 1997). Again, 'opinions' uttered in a CV interview or survey are hardly well elaborated, nor do they have an evident origin since the respondents presumably have not been confronted with a similar inquiry before, and we may therefore question if and to what extent CV responses are predictive of future actions, conceptualised as actual subsequent payments in real-world contexts or experiments. This will hence be investigated in this thesis.

3.2.2. Value Construction and 'Non-Attitudes'

According to theoretical assumptions in economics, preferences are exogenous. The utility that the individual derives from a certain good or service determines preferences, which in turn define market prices. A radical interpretation put forward by Hollis and Nell (1975) is that the influence does not only flow in this direction; prices and costs simultaneously define value, giving arise to *endogenous* preferences. The value of an outcome is thus not independent of the resources and efforts required in order to attain this goal. An informative example is put forward by Schwarz (1997), who argues that our reaction to a $800 bill for a car repair would be dramatically different if only a loose wire has to be fixed, compared to a complete replacement of the engine, although the outcome is the same. Values are both determined by end results as well as the means of achieving these, and furthermore, they depend on judgements of what would be a reasonable or fair price (*e.g.*, Lewis, 1990). Extending this argument, we may claim that money in many contexts is merely a means of realising certain goals, rather than being a measurable continuous concept genuinely reflecting value or worth.

Apart from implying problematic circularities for economic theory, the influence of prices and costs has important consequences for environmental valuation. The efforts needed to achieve a particular environmental improvement are likely to signal the

implicit price of this, which subsequently determines WTP. For instance, Baron and Maxwell (1996) demonstrate that the cost of a public good, either when explicitly stated or indirectly suggested according to how this would be provided, influence WTP. The anticipated flow from values to prices is presumably more apparent the more experienced we are with the good, and value may establish itself more correctly when we are familiar with the benefits and characteristics of this (Whitehead *et al.*, 1995).[39] On the other hand, in the valuation of novel amenities, we are more dependent on prices and costs as a benchmark for what would be a reasonable response of WTP. Since we cannot predict to what extent we will use these goods in the future, neither are we aware of their relative importance to us, which ultimately determines underlying values. Thus, apart from realising the future consequences of environmental changes, people must also predict their preferences for these, which is an inherently difficult task.

Some may argue that the mere statement of value is sufficient for valid preferences, but I am reluctant to agree with this statement, because value is a *necessary* but not a *sufficient* condition for the existence of preferences. Value in its purest form, as in 'I value the right to express ones view', exists across a vast number of contexts and finds innumerable ways of expression, but the crucial task is to capture these in a single format. Even though accepting a 'weak' definition of preferences, we ought to ask ourselves; do such preferences make sense, and is it sensible to estimate welfare effects and draw policy recommendations on the basis of these? I am inclined to argue, therefore, that economists wishing to capture economic value in such contexts are trying to bridge a gap between fundamental values and economic preferences before the relationship between these entities are sufficiently and widely understood in society.

As a consequence of the complexity involved, and the fact that people are not used to thinking about environmental resources in monetary terms, some researchers have concluded that people construct their preferences at the time of being interviewed, rather than retrieve a previously established value from memory (Gregory *et al.*, 1993;

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[39] However, bearing in mind that even on equity markets, which often are assumed to be the most perfect of markets, investors are quite clearly influenced by price movements in their buying and selling behaviour, and they do not solely base their decisions on exogenous factors (Shiller, 1990).

Schkade and Payne, 1994). Schuman (1996) argues that for novel public goods, it is hard to see how respondents could bring with them or on the spot construct a definite preference entirely on their own and without any cues at hand. Taking these aspects into consideration, the prospects of deriving valid and reliable values for such intangible commodities as climate change or a threatened species in a remote part of the world appear dubious. If people continuously make decision errors in experiments on ordinary private goods, traded on established markets, what makes us believe that they would act rationally in their valuation of public goods? And if people do not base their valuations on relevant 'exogenous' factors (as postulated by economic theory) for goods that they are largely familiar with, how likely is it that they will do so for 'goods' that are located in a non-market domain? Tversky *et al.* (1988) hence express;

> The lability of preferences implied by the demonstrations of framing and elicitation effects raises difficult questions concerning the assessment of preferences and values. In the classical analysis, the relation of preference is inferred from observed responses (e.g. choice, matching) and is assumed to reflect the decision maker's underlying utility or value. But if different elicitation procedures produce different orderings of options, how can preferences and values be defined? And in what sense do they exist? To be sure, people make choices, set prices, rate options and even explain their decision to others. Preferences, therefore, exist as observed data. However, if these data do not satisfy the elementary requirements of invariance, it is unclear how to define a relation of preference that can serve as a basis for the measurement of value (p. 383)

Thus, rather than interpreting CV responses as stable and accessible constructs that fulfil the necessary properties in order to serve as viable predictors of behaviour, these may on many occasions represent 'non-attitudes' (Converse, 1970), which are either constructed according to whatever considerations are on the respondent's mind when being asked, or expressed irrespective of any knowledge or belief about the attitude object. It has further been shown that the frequency of non-attitudes is particularly high for (political) issues that are not immediate to people (Converse, 1974), and a fundamental question to ask is therefore if any economic values exist for environmental amenities. It is interesting to note that, whereas the finding that respondents do not seem to act strategically in CV studies is assumed to provide support for the idea that people will truthfully reveal their preferences when asked, an overlooked possibility is that this may in fact be due to the lack of any meaningful values for the amenity being valued,

which imply that no incentives exist to overstate or understate WTP. Non-attitudes are further surprisingly consistent over time and linked to other relevant issues (Schuman and Presser, 1981), which give rise to additional problems of distinguishing these from 'true' attitudes (or values). This thesis addresses this aspect and the following sections discuss the various inferences respondents make about the valuation task, and therefore, what CV responses possibly represent, if not corresponding to economic value as assumed by the researcher.

3.2.3. The Functional Value of Attitudes

A fundamental requirement of a CV study, along with all approaches to Cost Benefit Analysis (CBA), is that responses are based on *instrumental*, or outcome-related, considerations (Blamey, 1998). What we want to do in a CBA is to compare one state of the world with another and in that way calculate their relative importance. It rests on the assumption that people are always motivated by values that correspond to an external reality. The problem is that attitudes in many contexts are *symbolic* expressions that comprise much more than their intrinsic content and that are quite unresponsive to rational arguments (*e.g.*, Morgan *et al.*, 1983; Herek, 1986). The attitude object is in this case "... a means to an end – it provides a vehicle for securing social support, for increasing self esteem, or for reducing anxiety" (Herek, 1986; p. 105). The attitude may include more than actual states of the world, or may not at all be related to actual outcomes, since, by definition, the benefits arise primarily from its expression.

The basic argument here is that CV responses comprise other factors than those which are the target of the CBA. They reflect a desire to gain approval from respected persons (Kelman, 1958; Herek, 1986), for instance the interviewers, but a more sophisticated interpretation recognises CV responses as partly determined by important moral norms, core values, institutional characteristics, etc (*e.g.*, Kahneman and Knetsch, 1992). The evaluative tendencies that represent values, or attitudes, manifest themselves in three different ways; *cognitive*, *affective*, and *conative* (*e.g.*, Ajzen and Peterson, 1988). The first is founded upon beliefs regarding the nature and characteristics of an attitude object, the second expresses feelings toward this, and the third represents behavioural inclinations, intentions, and commitments (Eagly and Chaiken, 1993). These response

categories do not necessarily converge, nor harmonize, since they reflect different theoretical components. Thus, a conflict may arise between what we believe, what we feel, and our intentions. An illustrative example would be people's attitudes toward maintained and open landscapes; they may indeed find these beautiful, and therefore tend to like the sight of them (affective part), but they may not believe that these amenities are threatened or serve any particularly important environmental function (cognitive part), and finally, they may not have any intentions to visit any of them (conative part).

Similarly to the above interpretation, Katz (1960) suggests that attitudes serve four distinct personality functions. Firstly, they have a *utilitarian* function that acknowledges the behaviourist *and* economic principle that humans are motivated to gain rewards and avoid punishment. They furthermore serve a *knowledge* function that aims at achieving a meaningful, organised and stable view of the world. An *ego-defensive* function has the purpose of protecting the individual's self concept and avoiding anxiety, and finally, a *value expressive* function mediates the need for self expression and self realisation. The latter function is realised in two ways; whereas Katz (1960) focuses on the need to develop and defend deeper personal ideals, which will reassert the individual's self-image, Herek (1986) refers to a social function that involves both identification with and conformity to key persons or groups of people. Again, these constructs may be in conflict with each other, implying that attitudes are expressed differently depending on what particular dimension(s) receive focus. For example, instrumental goals do not always correspond with normative needs, and discomfort is likely to arise if instrumental desires conflict with deeper held ideals, or when personal opinions fail to meet social expectations (Blamey, 1998).

The assumption that attitudes serve such diverse functions pose problems for utilitarianism, which serves as the guiding moral principle in neo-classical economic theory. Utilitarianism rests on the elementary requirements that "...the goodness of a state of affairs be a function only of the utility information regarding that state .. [and] that every choice, ..., be ultimately determined by the goodness of the consequent states of affairs" (Sen, 1987; p. 39). Consequently, it only recognises outcome-related considerations. Some researchers reason that any value, whatever its source, should be

accounted for in welfare analysis (*e.g.*, Kopp, 1992). Yet, if these values are not exclusive to the good under valuation, nor are they necessarily dependent on its realisation, and therefore the same welfare estimate may be achieved due to the existence or preservation of other related (or unrelated) amenities. For instance, values seemingly attached to the resource may in fact be based on factors that relate to a much broader class of issues, and therefore the same value would be assigned to each commodity within this class. Given that this value cannot be accounted for more than once, since by definition it is explicitly associated with one specific resource, it would be conceptually inappropriate to include such values in welfare analysis other than at a level that incorporates and aims at estimating the total value of all issues within a broader category. More elaborated discussions regarding this issue are provided by Fisher (1996) and Milgrom (1993).[40]

The attitude concept in psychology thus differs fundamentally from the value concept in economics in so far as the underlying dispositions of an attitude are understood as being difficult to represent along one dimension, whereas economic value is assumed to inherently capture all aspects involved and resolve any conflicts between these. Heberlein (1988) argues that this focus originates from the use of very abstract concepts in sociology and psychology, such as status, power and intelligence, which are intrinsically difficult to measure. Moreover, concepts traditionally studied are not only multidimensional, but often also *conceptually loose*, characteristics which have given arise to sophisticated models such as Keeney and Raiffa's (1976) theory of multiple objectives in value trade-offs, Schwartz and Bilsky's (1987) multi-attribute theory, or Rosenberg and Hovland's (1960) hierarchical model that recognises cognition, affect and conation as first order factors and attitude as a second order factor evaluated at a higher level of abstraction (Ajzen and Peterson, 1988). Attitudes may hence be seen as the mere 'observable' output of a higher dimensional order, guiding what is right or wrong, important or unimportant, relevant or irrelevant, etc. (Schwartz and Bilsky,

[40] It is important at this point to distinguish symbolic attitudes from existence values; whereas the latter by definition are determined by physical outcomes or states, whoever benefits from these, the former are independent of outcomes. In the case of existence values, the controversy lies in *whose* welfare should be accounted for, rather than *what* should qualify as welfare.

1987). Given that natural resources are symbolised by multiple use (they involve dimensions reflecting life-support, aesthetic, scientific, religious, moral, economic, and symbolic functions), and accrue benefits that may be either consumptive or non-consumptive, the value of these are therefore not easily reducible into a single monetary measure, particularly in the absence of any established framework guiding individuals in their valuation attempts. Blamey *et al.* (1999) capture this point in the following;

> Respondents seeking to express support for (or opposition to) an environmental proposal, while at the same time indicating they object to the some aspects of the scenario, or that they cannot afford payment, are [through WTP] restricted to giving a simple indication of their uncertainty, without specific reference to its cause. (p. 128-129)

There is thus a likelihood that many people reason in the following manner: 'I support the idea of X, but on the other hand I do not consent to the procedure of Y', or 'I think it is very important with such measures, still I am doubtful about whether this approach is appropriate', and finally 'I realise that this is an important problem, however I simply do not believe the proposed program will be effective in solving this'. To my knowledge there has only been one serious attempt at developing a CV format that accommodates multiple value dimensions, and which aims at minimising the ambivalence arising from the inherent requirement to make trade-offs between competing motives and objectives. In Blamey *et al.* (1999), people responded to four different aspect of an environmental project; *direct support*, *worth*, *affordability*, and *appropriateness*. The authors argue that their approach provides more refined economic values by giving room for conflicting beliefs related to outcome and expressive considerations. On the whole, the functional approach for the study of attitudes is central in this thesis and will constitute a valuable theoretical framework in the interpretation of the results of subsequent empirical studies.

3.2.4. Mental Models and Interpretation of Valuation Scenarios

The perspectives of the researcher, and the consequent effect on how an issue is presented, have important consequences for how various states of the world are interpreted by interviewees. A number of studies and experiments suggest that the

probabilities of various outcomes are not appreciated unless there is a plausible story embedded to it, and that the valence of outcomes and probabilities depends on these stories (Dawes, 1999). Underlying this notion of *moral anchors* is the psychological principle that much of human thinking and action is not quantitative, but rest on storytelling to make the narrative coherent (Pennington and Hastie, 1993). For example, the explanations of a particular event or behaviour alter people's perceptions of this, and therefore their choices. Cultural theory similarly assumes that people are *active* rather than passive receivers of information (*e.g.*, Douglas and Wildavsky, 1982), and embedded in risk evaluations are *institutional structures* that comprise much more than objective measures of likelihood. Contemporary psychometric theories, traditionally emphasising framing and cognitive misperception of probabilities, also acknowledge the subjective and value-laden nature of risk assessment (*e.g.*, Slovic, 1997).

Particularly interesting are those instances when aspects not explicitly mentioned in the valuation scenario play an important role, aspects that often are remote or seemingly unrelated to the issue being evaluated. For example, Macnaghten and Jacobs (1997) in studying the acceptance and uptake of sustainable economic development, recognise the political context wherein the meaning of this concept is examined. The salience of sustainability, they argue, is not judged according to its environmental implications per se, but on the basis of people's trust (or mistrust) in governments, the availability of individual agency, etc. This highlights "the [good] relationships between government and citizens ... required for its successful promotion" (Macnaghten and Jacobs, 1997; p. 22). Gaskell *et al.* (1997) similarly found that the public's assessment of risks related to biotechnology depends on people's trust in regulating authorities, the usefulness of the technology, and its moral acceptability.

Embedding effects may be explained within a similar framework. CV researchers commonly assume that respondents will pay attention to all factors included in a valuation scenario (*e.g.*, Mitchell and Carson, 1989). The problem is that they are asked to value something that they generally have no experience of. Instead they have to imagine implied states and changes, because the words uttered in the scenario cannot present a complete picture of what is under valuation. In other words, they have to form a *mental representations* of the good in order to make the question real enough to

answer, which may differ from the one intended by the researcher (Fischhoff, 1997; Schwarz, 1997; Fischhoff *et al.*, 1999). The respondents are hence likely to make inferences about the inclusiveness of the good that differ from the scenario description either because the amenity is seen as being naturally or logically related to other resources (*e.g.*, migratory water fowls may by respondents be associated with undamaged wetlands), or simply because they do not accept or find the specification of scope plausible (*e.g.*, Schuman, 1996; Schwarz, 1997). Eagly and Kulesa (1997) similarly emphasise the intra-attitudinal structure of environmental opinions, which encompass prior beliefs about environmental causes and effects that guide respondents in their valuation.

Apart from the difficulty of separating relevant from irrelevant considerations among respondents, a philosophically grounded criticism of the CVM is that a monetary valuation of environmental resources is inappropriate in so far as responses encompass aspects that are not comparable with other goods (*i.e.*, incommensurable events), and furthermore, although choices are being made between goods, this may not imply that these are valued in a higher or lower order (Raz, 1986; Anderson, 1993). Vatn and Bromley (1994) further argue that the separation into use, option and existence values reflects a *commodification* of environmental goods that does not find consent among lay people. There is an eagerness to estimate precise values, which further demands perfectly demarcated objects to which property rights can be assigned, or at least demanded. However, what is overseen in this categorisation is the fundamental value of the eco-system. An illustrative example is the 'commoditisation' and acquirement of land by immigrants to the U.S. in 17th century, a concept that stood in sharp contrast with the Native Americans who claimed that man belongs to land, not vice verse. The urge to 'commoditise' the environment, I believe, may be founded in the paradigm and way of thinking within the economic discipline. Vatn and Bromley (1994) state that;

> Denying the commodification of the environment forces one to try to comprehend environmental goods and service in a more holistic way – although economists tend to reject holism because it undermines the presumption of the analytical sufficiency of a world usefully defined as consisting of atomistic agents acting on atomistic objects (p. 137).

It is thus relevant to ask how many citizens that would support the reliance on economic values in political decision-making processes about natural resources. If the underlying principles of economic impact analysis are not widely agreed upon by the public, CV responses are less meaningful. A major problem here is that, since both the attitude object (the natural resource) and the valuation task are novel, the presentation in itself is likely to facilitate perspectives on the appropriateness and the feasibility of the proposal (Messick, 1999). If the adequacy of an economic valuation is generated and imposed by the CV researcher, due to the absence of alternative perspectives, and because the respondents do not find any reasons to question this, people may as a result answer valuation questions affirmatively, despite any genuine consent (Schwarz, 1994). As indicated earlier, the fear of appearing uninformed or socially irresponsible may induce respondents to conjure up opinions on issues they had not given any prior thought to (Schuman and Presser, 1981; Schwarz, 1994), and it should therefore be an interest to examine this aspect in CV contexts.

3.2.5. Communicative Processes of Attitude and Value Formation

Public opinion may be viewed as a special category of attitudes; it ought to reflect public issues, it therefore has social implications, and it needs to be expressed in order to serve a purpose. A CV response should therefore be seen, not only as a notion of attitude (Kahneman and Ritov, 1994), but also as a statement of public opinion. Himmelweit (1990) acknowledges the 'need of expression' by referring to Moscovici's (1984) theory of social representations, and depicts public opinion as shared by many individuals and as the product of the interaction between people. It is thus implied that socialising experiences, providing by family, friends, relatives, work-place, peers, marriage, etc., have important influence on public opinion (Himmelweit, 1990; Morgan and Schwalbe, 1990). Yet, this interpretation is not unique to 'sociological' perspectives of the 'attitude' construct. Although perhaps being more static by partly ignoring the dynamic aspects of people's reaction and interaction with each other, similar views are put forward by generalised theories of *social impact* (*e.g.*, Kelman, 1958), *social influence* (*e.g.*, Latané, 1981), and *social comparision*, (*e.g.*, Fazio, 1979; Kruglanski and Mayseless, 1987), and theories specifically related to the construction and

validation of public opinion (*e.g.*, Nowak *et al.*, 1990).[41] For example, Nowak *et al.* (1990) argue that;

> In part, these [types of] preferences reflect common reactions to events and images shared through the mass media and diverse concerns arising out of economic and social circumstances. In part, however, they reflect a process of group interaction as people discuss their beliefs and impressions with relatives, friends, coworkers, and others. (p. 363)

An attitude is therefore not a static product that is well suited to be studied in isolation, since this is likely to prevent us from understanding the involved processes in its formation. The importance of social interaction in the creation and establishment of public opinion is that it constitutes as well as affects the schemata people use in order to interpret and subsequently develop an opinion toward an issue. They are necessary, I will argue, in order for people to *understand*, not only the issue per se, but also how to *evaluate* this. It provides a shared frame of reference that helps to reduce uncertainty and stabilise a judgement on a complex issue (Deutsch and Gerard, 1955; Nowak *et al.*, 1990), thereby making it more consistent over time (Delli Carpini and Keeter, 1996). The influence of social processes takes various different forms; they clarify supportive and non-supportive reasons for a particular attitude position (Zimbardo and Leippe, 1991), the discussions between people are likely to make them more involved and therefore more aware of their standpoints (Bligh, 2000), social processes reinforce subjective opinions toward issues that the individual is already familiar with (Fazio, 1979), and people tend to strive for conformity within social groups (Herek, 1986).

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[41] Although recognising the social origin of attitudes, explanations resting on traditional conceptualisations of attitudes, such as social cognition, differ from social representation mainly in that the latter also acknowledge that these are widely shared and constitute a part of social reality itself (Jaspars and Fraser, 1984). 'Psychological' perspectives are also to a larger extent based on laboratory experiments, rather than 'real-world' research procedures. A major critique against social cognition is that it lacks a research agenda that aims to take full account of intervening factors such as social interaction, motivation and social context. Nevertheless, in this context I am not concerned with the way social networks and communities cultivate our general perception of the world, but rather how people develop and express opinions and attitudes toward specific issues and events.

Douglas and Wildavsky (1982) summarise these factors by arguing that when lay people assign (economic) values to natural resources, their social environments define what they see and what they do not see. It must therefore be seen as inadequate to expect that respondents to a CV survey can respond with well-considered answers, since they have not been given the opportunity to consult friends, relatives or the media in order to develop an opinion in the matter. Hansen (1991) and Mazur and Lee (1993) report how media coverage and news stories ascribing the importance of various issues ultimately determine environmental concern, which emphasises this factor as a crucial component of social opinion. Moreover, in the process of judging appropriateness, expectations arise regarding how other people would act, which justifies one's own decision or choice. As a result, respondents to CV studies are often keen on knowing how other people would act and how much they would pay for the amenity (*e.g.*, Schkade and Payne, 1994).[42]

The role of social processes is associated with the previous argument that people may not perceive or understand the valuation task as intended since it does not comply with or stand in sharp contrast with institutionalised procedures of public policy-making. The attempts at standardising the interaction between researcher and respondent in order to examine certain events tend to overlook the need to put inquires into a context within which ordinary people can make sense of them, and in which the interaction becomes meaningful. As Schwarz (1994), Clark and Schober (1992) and other researchers have noted, conversations in research settings differ from everyday conversations by being highly constrained and sometimes they are completely inadequate, either in the sense that they modify real-world events, or that they are invented by the researcher. Thereby they lack a *common ground* between speaker and listener that define backgrounds, underlying meanings and intentions among communicative agents.

One approach toward clarifying meanings and intentions of the research task, and giving room for the expression of disagreement among respondents, is to encourage

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[42] We may thus at this point re-connect to the earlier discussion related to the attitude-behaviour link, and assert that people are searching for important social norms, or values, that act as guidance in the establishment of attitudes and behavioural intentions.

communicative processes before economic values are elicited. Since constructing preferences seems to be a much more socially profound process than organising oneself in an interview, a collective discussion ought to precede the valuation task, on the basis of which people could develop and define the values they then would adhere to. No matter if these correspond to the principles underlying economic value assessment, if people have been given the opportunity to discuss and reflect on the purposes of the study, they are likely to be less vulnerable to expectations imposed by the researcher. The present research therefore aims to examine the influence of such contextual factors.

Apart from such influencing factors on public opinion, Sen (1987) hypothesises that people are often experiencing a conflict between self-oriented motives and moral commitments, and that people therefore have difficulties in making decisions over issues and events that involve more than their own welfare. Vatn and Bromley (1994) and Vatn (1999) have on the basis of such arguments emphasised the value of communicative processes in CV contexts, whereby they conclude that different contexts of valuation result in the realisation of different interests and motives. Thus, in an individual context, private welfare is likely to be more prominent, whereas a collective discussion preceding the valuation question is likely to make altruistic welfare more salient. We may further hypothesise that communicative processes will enlighten what should be valued, why, by whom, etc. Thus, individual and social contexts of valuation are likely to result in a different interpretation and evaluation of the valuation task. CV studies are unmistakably conducted as individual interviews, but it appears reasonable to firstly discuss in what particular contexts economic values should be assessed considering the objectives and implications of the environmental proposal.

3.3. Conclusions

No other branch of social science has so frequently imported scientific tools from mathematics than economics. The value attached to mathematical formalisation has two foundations; firstly, it provides a precise and universal language for expressing ideas, and secondly it allows for quantitative predictions. Yet, complete mathematical representations of economic behaviour are simplifications rather than complete accounts of reality since they have to leave out a number of important influencing factors. As

argued by Liabson and Zeckhauser (1998), parsimony has proved to be an extraordinarily good principle of organisation in the natural sciences, but it is doubtful whether it can provide a sufficient explanation of economic behaviour, which is inherently dynamic and complex. Empirical tests have generally revealed that mathematical modelling does not do too well in predicting behaviour (Laibson and Zeckhauser, 1998), but more importantly, this level of analysis conceals deeper ideals, motives and objectives behind actions.

Before the positivistic revolution in economics, occurring in the early years of the 20th century, economists were much concerned with definitions of wealth, measures of happiness, distribution of economic fortune, etc., which may ultimately provide answers to what is right or wrong in society. However, as a result of the works of Marshall, Pigou, Pareto and others during the first half of the last century, the focus of economics shifted from normative to positive. It was even explicitly stated that economics is solely about efficiency, (*i.e.*, *how* things should be carried out), and ought not bother so much about effectiveness. (*i.e.*, *what* kind of things that should be carried out). Indeed, an adequate conclusion according to economic analysis may stand in sharp contrast to what is desirable or wanted, but it is not the task of economists to engage in the latter inquires (Mulberg, 1995). It is hence suggested that economics cannot really offer guidelines to political action. Marshall, for example, realised the limits of mathematical formalisation, and was concerned that models should be reflected in practical life. Despite his critique of theoretical developments and regardless of his aim to provide guidance in the practical conduit of life, he is most famous for the elaborated theory of (Marshallian) consumer surplus, which constitutes one of the most significant cornerstones of neo-classical economic theory. The 'failure' of breaking grounds with tradition is brilliantly illustrated by the following advice to one of his students:

1. use mathematics as a shorthand language, rather than as an engine of enquiry;
2. keep them till you are done;
3. translate into English;
4. then illustrate by examples that are important in real life;
5. burn the mathematics;
6. if you cannot succeed in (4), burn (3). This last I did often.

(*source*; Mulberg, 1995)

This thesis is an attempt to surpass the middle stages of this analytical procedure. This chapter illustrated that standard economic theory is insufficient to understand how people perceive and value the environment, and it is indicated that hypothetical value statements represent something more or different than economic preferences. In this respect, Sen (1987) distinguishes between the 'well-being aspect' and the 'agency aspect' of a person; whereas the former focuses on personal achievements and opportunities, the latter additionally encompasses other objectives, motives and values, sometimes extended well beyond the pursuit of one's own well-being. Sen (1977) and others (*e.g.*, Vatn and Bromley, 1994; Nyborg, 2000), accordingly, recognise two different categories of preferences; *ethical* and *economic*. These exclusively belong to either a political context or a market context, and there are limits to importing an economic approach into spheres wherein people do or do not believe things for ethical reasons. The distinction between such foundations of value, the former which is expressing our most dearly held concerns and the latter being devices for satisfying (basic) desires, is not only problematic for utilitarian principles of welfare estimation. In addition, a conflict often arises between the various aspects of well-being that further complicates the analysis.

The theoretical notions and insights emphasised here suggest that the economic framework ought also to incorporate perspectives and insights from other disciplines. Rather than purely see WTP in the context of a purchase model, it should be considered as a special type of attitude that involves more than physical states of the world, and which sometimes are constructed during the course of the interview rather than reflecting a pre-defined value available in people's minds. Even when being anchored to developed views about the issue, various motivations of preferences may not coincide with each other, which result in difficulties of refining these into a summary judgement. Moreover, the context in which these attitudes are captured is likely to play a significant role, which implies that the individual perspective should be extended to accommodate the social processes behind public opinion on environmental issues. Finally, in these processes the mental models people have of the environment must be realised and incorporated in a model that does not merely focus on how respondents react to the information specifically provided by the researcher in a valuation scenario.

4. Test of Perfect and Regular Embedding

In the previous chapters I have reviewed the Contingent Valuation Method (CVM), and provided a theoretical framework with the aim to shed light on the origin of various problems of the methodology that have been demonstrated and discussed in previous research. The main argument put forward is that the Contingent Valuation (CV) debate has been characterised by an unwillingness to consult perspectives and theoretical notions traditionally viewed as outside the field of economics. This thesis adopts a broader perspective on people's responses of economic value in hypothetical market scenarios, and the empirical section that follows examines various conceptually important anomalies of the methodology and how these may be explained or understood on the basis of insights in social psychology.

This first empirical chapter examines the internal consistency of Willingness To Pay (WTP) assessed for four environmental amenities. Particularly, the occurrence of *embedding* is investigated by performing *between-subject tests* of insensitivity to scope (perfect embedding) and part-whole effects (regular embedding). Thus, the study focuses on anomalies that, if verified, question whether stated preferences are founded in economic value, or if these have a basis in other motives not directly associated with the amenity being valued, and which are irrelevant for the valuation task. Additionally, it relies on a design similar to a typical CV study and employs stronger tests of embedding than have normally been used in previous studies rejecting the embedding hypothesis. Four different measures or intensifiers of scope (*i.e.*, absolute magnitudes, percentages, number of events, and verbal cues) are applied in order to evaluate their prospective influence on scope sensitivity. In addition to examining embedding in CV contexts, I also compare the consistency of the WTP estimate with Categorical Rating (CR) as an alternative measure of environmental priorities. Kahneman and Ritov (1994) found that opinions measured on a conventional rating scale of attitude strength showed more responsiveness to scope than estimates of WTP, and that the psychometric properties of the latter seem to be inferior to those of traditional scales of attitudes. In order to gain a better insight into the basis of and motivations for people's responses, in-depth interviews are conducted in parallel with the main study.

4.1. Internal Consistency of Stated Willingness to Pay

In chapter two it was asserted that CV results are vulnerable to embedding. What this means is that WTP estimates are insensitive to the magnitude of the good or service being valued (*e.g.*, Desvousges *et al.*, 1993; Diamond *et al.*, 1993; Kahneman and Ritov, 1994), and further that they are highly sensitive to whether the good is evaluated on its own or inferred from a larger package of goods (*e.g.*, Strand and Taraldset, 1991; Kahneman and Knetsch, 1992). Summarising the origins of the effects discussed previously, Kahneman and Knetsch (1992) propose that WTP reflects the moral satisfaction derived from making donations to environmental resources, rather than being an indication of economic value. Their reasoning is an extension of Andreoni's (1989) hypothesis of the 'warm glow' that arises from the act of giving to a 'good cause', and thus implies that economic values in these contexts represent symbolic expressions that are not necessarily based on specific characteristics of the resource being valued.

Despite the demonstration of embedding in a variety of empirical studies, this has failed to clarify if and to what extent respondents base their value assessments on instrumental considerations, the major reason being that studies that have highlighted problems with the CVM are, generally, judged by CV practitioners to be of poor quality in terms of questionnaire design and survey administration (*e.g.*, Hanemann, 1994; Carson *et al.*, 1996a). This study therefore aims at applying a procedure more similar to a typical CV study. It is envisaged that the results will provide better indication of whether embedding occurs primarily due to flawed methodological approaches, or if WTP estimates violate economic theory, even when 'properly' assessed on the basis of a complete and rigorous description of the environmental resource.

4.1.1. Empirical Demonstration of Embedding

Smith and Osborne (1996) conducted a meta-analysis of five separate CV studies of improved (or declined) visibility at national parks. Their conclusion was that the method is responsive to the magnitude of the environmental amenity since a positive

and statistically significant relationship between WTP and improvement in visibility range was found.[43] However, I am inclined to argue that a meta-analysis is insufficient to adequately judge whether CV estimates are responsive to scope. Apart from being conducted by different research teams, the five studies differ in a variety of aspects that are likely to influence the outcome, such as the type of interview, elicitation format, where the interview took place, in what way the visibility condition was described, etc. Although the authors seem to realise this shortcoming and accordingly try to control for the prospective influence of such features, it is still doubtful whether the five studies are comparable in this manner.[44] Conducting a CV study, whether or not it is administered as a mail survey or as face-to-face interviews, involves a number of factors that are not always possible to identify, let alone control for. The mere fact that the studies were conducted by different research teams is likely to influence the results. A more rigorous analysis requires that the interviews are made by the same person(s), using an identical questionnaire with only the scope altered, and directed toward two populations rather similar in terms of some key characteristics.

On the basis of a survey comprising 30 CV studies that each separately investigated the occurrence of embedding, Carson (1997) similarly to Smith and Osborne (1996) concludes that only a handful support the embedding hypothesis, whereas the majority clearly reject it. However, their criteria chosen for assessing the occurrence of embedding deserve attention. Most of the studies referred to have performed within-subject tests, rather than between-subject tests (Propper, 1990; Boyle *et al.*, 1994). As mentioned before in this thesis, a major problem with the former is that the respondents

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[43] The authors make this conclusion on the basis of the NOAA panel's recommendation that the requirement for a CV study to pass a scope tests is that the WTP estimates are not 'implausibly unresponsive' to the magnitude of the good being investigated. It is not clear-cut what the term 'implausibly unresponsive' implies, but this is arguably a weaker criterion than that proposed by Diamond *et al.* (1993), who argues that WTP ought to increase more than proportionally to scope. However, this latter assumption is not generally applicable since it is conditioned on the idea that preserving a small part of the resource is not (environmentally) worthwhile, whereas a larger part is.

[44] For instance, whereas one study was administered as a mail-survey with telephone follow-ups, the others were conducted as face-to-face interviews. Moreover, both the elicitation format and ways of presenting magnitudes varied across studies; in some cases the amenity was presented as the number of days each year with 'clear skies', in other as a permanent and stable improvement in visibility range.

are likely to be influenced by previously stated values when subsequently asked about several levels of the good, and most likely try to act in an internally consistent way by providing higher bids for larger magnitudes of the good (Festinger, 1957). Although this drawback is mentioned in the paper, the author is more convinced by the advantages of a within-subject test, such as its lower costs and that the main interest of a Cost-Benefit Analysis (CBA) is the curves defined over levels of the good, not a single point estimate (Carson, 1997).

Furthermore, one study included in the survey examined the respondents' ex-ante perception of scope and how this determined WTP, whereby responsiveness to scope was found (Whitehead, 1992). In this case the pre-established perception of scope is likely to determine WTP, and the study provides no clear answer as to how people respond to the information provided in the CV scenario. Finally, at least one of the studies presents some mixed results that may as well be interpreted as supportive of the embedding hypothesis. For instance, in a study about forest protection, Loomis *et al.* (1993) found evidence of scope sensitivity between two levels of the good (70,000 and 6,000 ha), but when other levels were presented (122,000 and 70,000 ha), people did not respond to this difference.

Turning to studies that have performed between-subject tests of embedding, Desvousges *et al.* (1993) assessed the WTP for preventing 2,000, 20,000 and 200,000 migratory waterfowl deaths, and found mean responses of 80, 78 and 88 dollars respectively, with no statistically significant difference between the amounts. The discrepancies are much smaller than expected, and the most troublesome outcome is that the value of 20,000 fowls is actually smaller than the value of 2,000 fowls. Other examples are provided by Fischhoff *et al.* (1993), who assessed the WTP for preserving 110 and 10,000 hectares of wetland in New Jersey, Beattie *et al.* (1998) who estimated the WTP for improved road safety, and Kahneman and Ritov (1994) who valued a vast number of different environmental and public issues. In the latter study, for most issues the scope was specified by qualifiers such as 'large', 'major', severe', etc., which were hypothesised to illustrate the importance and urgency of each problem. Finally, regular embedding, or part-whole bias, has been demonstrated by Strand and Taraldset (1991), and Kahneman and Knetsch (1992), who valued issues

such as air pollution, national parks, toxic waste disposal, and endangered wild animals. Regular embedding implies that the valuation depends on how many other issues are included in the valuation scenario, and the general finding of these studies is that assessed WTP is significantly higher when the amenity is valued on its own, compared to when the value for this is inferred from a larger package of goods.

A major critique of the Desvousges-study is that, although the number of birds differed largely between scenarios, in order to give a more comprehensive picture of the issue, respondents were told that the total number of migratory water fowls residing in the area covered were 8.5 million. Seen in this light, the birds saved constitutes less than 0.1%, less than 1% and about 2% of the total number of birds. It is hence indicated in the scenario that a very small part of the bird population will be prevented, and due to diminishing marginal returns, perhaps especially prominent for amenities that involve large non-use values, and which are valued according to whether the levels provided are sufficient to prevent their extinction, a reasonable explanation of why the WTP is roughly the same in all three scenarios emerges. Another problem with the study is that the interviews were made as brief shopping-mall intercepts, with the risk of jeopardising the credibility of the study in the eyes of the respondents (for a more extensive picture of similar criticism, see Hausman, 1993).

Similar criticism is made against other studies demonstrating scope effects, which suggests that other measures of scope may be more capable of making the WTP estimate responsive. Interesting in this respect is Kahneman and Ritov's (1994) study since it uses adjectives instead of quantitative measures in order to vary the magnitudes of the amenity. However, this study is based on a rather different questionnaire design than a typical CV study, which, I anticipate, would lead CV proponents to respond sceptically. For instance, instead of providing a rigorous and complete description of the good, respondents were shown brief statements (or headlines) in single sentences referring to various types of environmental problems, some of which were even presented as fictitious. Respondents were then asked to provide WTP estimates for proposed interventions associated with each of these, also presented in single sentences. Furthermore, rather than being given time to think carefully before answering, people were requested to respond 'as quickly as they could' and according

to whatever the questions meant to them. Finally, the study comprised WTP questions for as many as 37 environmental issues and it is questionable that informative and well-founded judgements can be made on all of these, particularly considering that the interview was completed in less than 15 minutes.

It appears from the discussion above that, no matter how the reasoning is turned and twisted, we will unmistakably find 'valid' objections to what at first seem to be rather clear evidence in favour of one hypothesis or the other. As a consequence and as discussed in earlier chapters, two diametrically opposed explanations for the occurrence of embedding have been proposed in the CV literature; (1) poor quality in survey design and administration which either fails to establish a realistic scenario, or tends to mask differences in scope (Hanemann, 1994; Hoevenagel, 1996; Carson *et al.*, 1996a), or (2) WTP estimates derived from CV surveys violate economic theory (Kahneman and Knetsch, 1992; Diamond and Hausman, 1994; Kahneman *et al.*, 1999). Proponents of the CVM quite naturally subscribe to the former of these explanations. Most importantly, studies supporting the embedding hypothesis are criticised for not following the NOAA panel's guidelines for conducting reliable CV studies (Arrow *et al.*, 1993). Thus, it is suggested that embedding may be overcome with improved questionnaire design, interview techniques and administration modes, or that underlying true differences in assessments can be detected with more sophisticated statistical analyses, with the implicit conclusion that the CV critics have not completed their task with accuracy.

In this study I therefore attempt to apply a more extensive and rigorous CV design than in the studies reviewed above. For example, the nature of each environmental issue and the likely consequences of a deterioration is clearly described in the valuation scenario. The objective here is to present a credible approach to solving these problems, which takes account of how the good or service is to be provided, who is responsible for this, and in what way interventions should be administered and maintained. Additionally, before presenting the WTP scenario, respondents are informed about the rationale of assigning monetary values to environmental amenities, thereby enabling them to place the enquiry in an appropriate context.

However, I do not attempt to strictly follow the guidelines established by the NOAA panel (Arrow *et al.*, 1993). Although the general interpretation among CV practitioners seems to be that each study ought to do exactly this, this is not the implication of the panel's recommendations, and the authors explicitly state that a CV study "does not have to meet each of these guidelines" (Arrow *et al.*, 1993; p. 4608). As suggested in the literature on 'good' CV practice, neither are all these recommendations indisputable, something which will be discussed in the text where appropriate. The main point is that between-subject tests of embedding are performed, by applying a procedure and a design similar to a typical CV study. The rationale of this research is thus to evaluate whether the occurrence of embedding can be explained by 'improper' (or different) methodological designs, or if the procedures commonly used by CV practitioners are likely to give rise to similar results.

4.2. Design of Field Study

Data were collected between November 1997 and May 1998. The main study was conducted using two different administration modes. In order to yield a sufficient sample for subsequent quantitative analyses, 1076 questionnaires were distributed to 6 student halls throughout London and randomly selected households in Sweden by mail. The sample thus includes people from a range of backgrounds, although students are somewhat over-represented. In addition to these mail-surveys, 152 students were randomly approached at the dining hall of the London School of Economics (LSE) and asked to participate in an interview about environmental priorities. Respondents in this group completed the survey directly under supervision of the interviewer. Hence, the interviewer was in this case accessible to answer various questions that arose and make clear the purpose of the study as well as the intention of specific questions.[45] The survey format and interview design, along with the choice and description of environmental issues, are primarily based on a pre-test conducted in two sessions prior to the main study, comprising 42 interviews.

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[45] By conducting both mail surveys and face-to-face interviews, the latter which are generally considered more reliable, we are able to investigate whether the format has any influence on the results. No differences were recorded between the two administration modes.

4.2.1. Interview Procedure and Questionnaire Design

After a general introduction to the interview that explained the intention of the study and principles of Cost Benefit Analysis (CBA), respondents were asked to read through the whole list of issues and think carefully about their household income and future expenses before answering any questions. Subsequently, information about the nature of the environmental amenities and the effects resulting from a deterioration of these was presented. In order to enhance the impression of a realistic scenario, a feasible intervention to solve each problem was in addition provided.[46] Except for one sub-sample, for which the payment vehicle was put forward as a yearly tax payment, WTP was framed as an *annual voluntary contribution*. The WTP was further elicited using an Open-Ended (OE) format. The validity of this format is considered inferior to a Dichotomous Choice (DC) format by the NOAA panel (Arrow *et al.*, 1993), mainly due to the fact that the incentive compatible setting of the DC format is likely to reduce strategic behaviour since it creates a situation where it is in the person's interest to reveal his or her true preferences. However, on the basis of various empirical tests, a number of researchers are questioning the restriction to DC formats (Loomis, 1990; Schulze *et al.*, 1996).[47] The CR scores were assessed on a 7-point scale, ranging from 0 ('does not concern me at all'), to 7 ('one of the issues that concerns me most').[48]

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[46] Hence, some important differences prevail compared to the Kahneman and Ritov (1994) study in which respondents were requested to respond as quickly as they could to issues that, in some cases, were explicitly presented as fictitious.

[47] A study by Lunander (1998) shows that overbidding occurs to a greater extent when using a DC format, at least when the simple majority rule is modified into a provision and payment rule. This result is problematic for the NOAA panel's recommendation of a conservative design that "the option that tends to underestimate willingness to pay is preferred" (Arrow *et al.*, 1993; p. 4608). Furthermore, estimates derived from DC questions are statistically inefficient and require at least a threefold increase in sample size in order to attain the same statistical precision as OE formats (Schulze *et al.*, 1996). Finally, the possible gain in incentive compatibility must be weighted against the anchoring effects evoked by pre-established values of WTP.

[48] Categorical Rating (CR) is a technique commonly used in psychological research for assessing the strength of attitudes or opinions, and implies that the respondents rate their concern for the specific issue in question on a discrete scale from, for instance 0 ('not at all important to me') to 5 ('one of the issues that is most important to me'). Attitudes are normally assessed on a 5-graded or a 7-graded scale.

In order to test for perfect and regular embedding the respondents were in the main study randomly divided into eight sub-groups. In three of these, WTP estimates were derived for four environmental amenities presented in the following order; *rain forests in South America*, *endangered wild animals*, *air-pollution in central London*, and *global warming*. One of these three samples was used as benchmark or reference point, whereas in the other two the scope was varied simultaneously for two issues at the time (see table 4.1. below for an explanation of this design). Thereby a tool is provided that enables us to test for scope insensitivity. The valuation scenarios are presented below. Alterations of scope are illustrated in brackets, and each respondent is presented with either of two quantities (or qualities) for each of these four amenities.

> Preservation of the rain forest in ***Bolivia (South America).*** Rain forests contain the largest number of habitats and are therefore a source of much irreplaceable material for medicine, industry and agriculture. The main causes of deforestation are timber exploitation and conversion of forests into grazing land and agriculture. International initiatives have been taken to establish national reserves throughout the country, implying a sustainable use of the rain forest. The results will be that the current deforestation rate of ***50,000 ha (2 million ha***) annually is prevented.
>
> Saving of the endangered ***African elephant (five most endangered animals, including the African elephant).*** This animal is threatened by extinction due to illegal (ivory) hunting and the exploitation of important habitats and breeding grounds. The foundation of an international wildlife fund, the establishment of game parks and stricter hunting laws will entail its survival.
>
> **An *improvement (a major improvement)*** of the air-quality in the London area, by imposing stricter emission controls and subsidising more environmentally friendly fuels. High concentration of substances such as carbon monoxide, nitrogen oxides, sulphur dioxide, lead and black smoke, reduce plant growth, cause visible damage to sensible crops and add to acid deposition (acid rain). Moreover, they are toxic for humans, and high concentrations or acute exposure might cause breathing problems.
>
> A reduction of ***20% (60%)*** of the gases that cause **global warming.** The emission of greenhouse gases give arise to global warming, and to stop this we need to be more efficient in the way we use energy for heating, transport and industry. The effects of global warming is somewhat uncertain, but it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be possible. There are also considerable risks of rising sea-

level and the frequency of droughts, tropical storms and other unexpected changes to the climate.

The same procedure as above, also using three sample groups, was applied to see whether measures of categorical ratings are more or less responsive to scope than WTP. In the remaining two sample groups, respondents were only presented with and asked to value one environmental issue, specified either as a *20%* or a *60%* reduction of the gases that give rise to global warming. The WTP estimates derived from these two sample groups were compared with the WTP of global warming evaluated as part of four different environmental issues, thereby providing a test for part-whole bias. Table 4.1. gives a description of the sample groups.

Table 4.1. Division of sample groups

Sample group	Environmental issue(s)	Dependent variable
# 1	Rain forests, endangered animals, air pollution, global warming	WTP
# 2	**Rain forests, endangered animals**, air pollution, global warming	WTP
# 3	Rain forests, endangered animals, **air pollution, global warming**	WTP
# 4	Rain forests, endangered animals, air pollution, global warming	CR
# 5	**Rain forests, endangered animals**, air pollution, global warming	CR
# 6	Rain forests, endangered animals, **air pollution, global warming**	CR
# 7	Global warming; 20% reduction	WTP
# 8	**Global warming; 60% reduction**	WTP

Note: Bold text indicates that issues are presented as major in scope, whereas normal text indicates minor scope

By using four different scales of measurement or intensifiers of scope (*i.e.*, absolute magnitudes, percentages, verbal cues, and number of events) to specify the extent or severity of each problem, it is possible to test whether the unit-type influences people's perception of how extensive or important the environmental problem is. Although the nature of the amenities differ from each other in two important respects (*i.e.*, they may be more or less familiar, and they may differ in the degree of personal relevance to

people), I do not anticipate that these dimensions have any significant impact on the occurrence of scope insensitivity since all amenities should be considered as rather unfamiliar and not personally relevant or immediate to people. Therefore I hypothesise that any difference in terms of responsiveness to scope will mainly be due to how magnitudes and importance are specified.

After the main task of assessing WTP, or alternatively CR scores, respondents were asked some follow-up questions that captured their main motivations for WTP and CR responses, how difficult they found the task, and how confident they were with their answers. Since there may be many differences in socio-economic characteristics between the student sample and the Swedish sample (*e.g.*, age, income, culture, etc.), a dummy variable was introduced in order to assess these differences.

4.2.2. In-Depth Interviews

In addition to the main study described above, 12 in-depth face-to-face interviews were conducted. These were elaborated using a procedure similar to a retrospective protocol, through which respondents are asked how they come up with their answers immediately after a decision has been made (Ericsson and Simon, 1984). Respondents were presented with the same CV scenario as in the main survey and subsequently asked for their WTP. The remaining part of the interview was set aside to ask follow-up questions in order to gain insight into how people respond to the CV question, such as what they were thinking before making their decision, motivations of WTP, how difficult they found the task, how confident they were with their answers, etc. Some of these questions were identical to the ones presented to the respondents in the main sample, however for the latter group they were framed as closed-ended rather than open-ended questions. The findings of these in-depth interviews are presented in a separate section below, and are not included in the statistical analysis that follows.[49]

[49] The main part of the questionnaire may be found as an appendix to this thesis.

4.3. Results

Among the 1228 subjects targeted in the main study, 438 replied to the mail survey or chose to participate in a face-to-face interview. Eleven of these respondents were sorted out in the evaluation process due to incomplete responses, meaning that the results in all are based on 427 observations. These observations consist of 278 mail surveys (response rate = 27%), and 149 face-to-face interviews. Out of the 427 complete responses, 337 respondents answered WTP questions associated with either one or simultaneously four environmental issues, whereas 90 respondents reported their attitudes toward the same four issues on the basis of the CR format.

4.3.1. Descriptive Statistics

Altogether 313 respondents, or 92.9%, replied with a WTP > 0 for at least one of the issues, and for each environmental issue taken separately, non-zero responses varied between 77.9 and 90.6%. On average, people were willing to pay roughly 3.5% of their yearly income for the four issues in total. Inspection of Figure 4.1. reveals the nature of the distribution of total WTP for all four issues. Roughly it follows a normal distribution with a heavy right tail. The same basic pattern in distribution of WTP is found for each specific issue. Responses above £400 are extremely unevenly distributed, ranging from £400 to £12,000, indicating that these respondents possibly have misunderstood the purpose of the survey. The sample is therefore truncated at this point, leaving us with a total of 317 observations of WTP.[50] Among these, 148 respondents provided WTP estimates for four issues, whereas the remaining 169 valued *global warming* only.[51] The mean WTP for each issue, with median in brackets,

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[50] An alternative approach would be to censor the sample by setting outliers bid equal to £400. This procedure was also tested, but yielded no alterations to the main results. Moreover, since respondents providing extreme WTP estimates (*i.e.*, above £400) may have partly or completely misunderstood the purpose of the survey, or alternatively are acting very strategically, there are no foundations for standardising these responses. I therefore consider truncation as most appropriate in this case.

[51] Since the sample groups overlap each other (*e.g.*, a number of respondents assign WTP for all four issues), the observations reported in the tables do not necessarily add up to the total number of observations.

is presented in Table 4.2. Respondents were after truncation on average and in total for four issues willing to pay 1.4% of their yearly income. All subsequent analyses are based on truncated data unless otherwise stated.

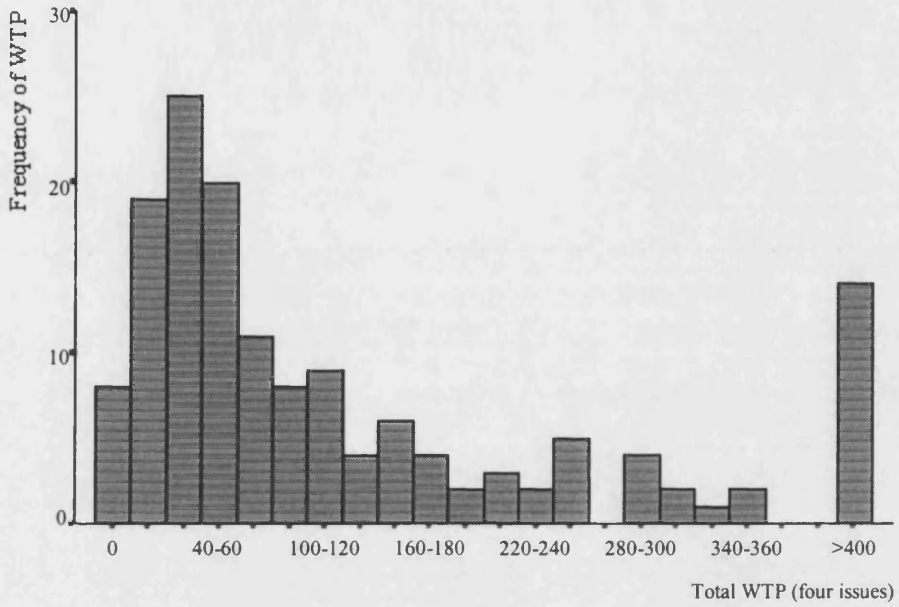

Figure 4.1. Frequency distribution of total WTP

Note: Frequencies are divided into classes of £ 20 (*i.e.* first pile reflects the frequency of £ 0, second pile the interval of £ 0.1 - 20, third pile £ 20.1 – 40, etc.)

Table 4.2. Mean and median WTP

	Rain Forests	Animals	Air Pollution	Global Warming[a]	Global Warming[b]
Grand	£ 52.24 (20)	£ 30.59 (10)	£ 54.70 (10)	£ 161.43 (30)	£ 60.60 (22.5)
Truncated	£ 37.82 (20)	£ 24.04 (10)	£ 30.90 (10)	£ 53.00 (30)	£ 45.41 (20)

Note: *a* represents the overall mean and median values of *global warming*
b represents mean and median values for *global warming* when evaluated as part of four issues

The WTP estimates seem to lack the statistical properties to serve as robust measures of economic value. As demonstrated above, mean WTP changes substantially when outliers are excluded, and an important question is, to what extent should data obtained from CV studies be censored or truncated in order to constitute a valid basis of the

welfare effects involved? The percentage of income people on average are willing to spend on these amenities also cast a shadow of doubt. At first glance 1.4% may seem to be a rather reasonable figure, and generally in CV contexts it is considered as such, but taking into account all possible expenses people are and may be facing in the future, associated with public as well as private goods, their income will soon be consumed if this amount of money is maintained over time and for other equally important issues.

4.3.2. Parametric and Non-Parametric Analysis

Table 4.3. presents mean WTP estimates for all four environmental issues along with ANOVA and Kruskall-Wallis test statistics. Although a significant difference between the issues is found in terms of mean values according to both parametric and non-parametric analyses, these are, nonetheless, rather close to each other.[52] Following this, we may intuitively argue that the monetary figures provided are not necessarily related to the specific attributes and characteristics of the amenity. In our case, the WTP estimates fall within the range of £24 to £45, and since the environmental issues in many aspects differ from each other in their nature and importance, we may suspect that these values are not solely based on instrumental considerations. I consider it rather implausible, for example, that a ratio of roughly 1:2 represents an adequate range for the economic value assigned to these amenities. When comparing WTP with categorical ratings, the latter estimates equally fail to distinguish clearly the issues from each other in terms of their relative importance. However, except from the *global warming* issue, both measures seem to rank the environmental issues in the same order. Thus, the relative importance of the four issues may be supported by the convergence of these alternative measures of environmental priorities.

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[52] A criticism that has been raised against the CVM is that the technique most commonly produces estimates within a very restricted range, regardless of what is under valuation (Kahneman and Ritov, 1994).

Table 4.3. Differences between WTP for each environmental issue

Environmental Issue	Global Warming[a]	Rain Forests	Animals	Air Pollution
Mean WTP	45.41	37.82	24.04	30.90
Overall Mean WTP		36.11		
One-Way ANOVA		$F = 5.28^{***}$		
Kruskall-Wallis test		$\chi^2 = 29.56^{***}$		
Mean CR score	4.46	3.94	3.39	4.48
Overall Mean CR		4.07		
One-Way ANOVA		$F = 13.41^{***}$		
Kruskall-Wallis test		$\chi^2 = 36.62^{***}$		

Note: - *** denotes significance at the 0.01 level
- [a] sub-samples which are only presented the global warming issue are excluded

The validity of the CV study is further assessed through 4 OLS regression equations presented in Table 4.4. On the basis of a Box-Cox regression, a semi-log functional form was chosen in which the dependent variable is kept linear.[53] According to additional econometric tests performed, no major problems of heteroscedasticity or underspecification of the chosen models were found. The WTP for each issue is explained by roughly the same individual characteristics; predominantly income and gender, with women bidding higher, but also age and non-human interest as the main motive of WTP, serve as mainstays in the analysis, with the expected sign. Thus, people who do not only consider their own self-interest but intrinsic values, such as non-human welfare, as well, are likely to provide higher bids. Most importantly, it is indicated that people who are confronted with only one environmental issue (*i.e.*, global warming), are willing to pay significantly more for this issue than are respondents who simultaneously provide WTP for three other environmental goods.

[53] A Box-Cox regression tests for the functional form of the econometric model and provides information about how specific variables should be scaled. For example, due to the underlying relationship between independent and dependent variables, a linear, log-linear, or exponential function may be used. Various econometric models were tested but yielded no significant differences between the results.

The overall results are independent of whether a tax or a voluntary contribution is used as the payment vehicle, and finally, no significant difference is found between the LSE and the Swedish sample according to a dummy variable capturing this influence.

Table 4.4. Determinants of WTP

Variable	Global Warming	Rain Forests	Animals	Air Pollution
Intercept	5.31	-63.40	-89.63	-146.6*
	(0.09)[a]	(-0.77)	(-1.36)	(-1.70)
lnAge	-20.99*	-13.56	-4.50	-3.81
	(-1.63)	(-0.58)	(-0.24)	(-0.16)
lnIncome	12.06**	17.14**	13.50**	23.56***
	(2.00)	(2.16)	(2.09)	(2.86)
Gender[1][b]	-21.45***	-22.33**	4.06	-26.45***
	(-3.17)	(-2.44)	(0.55)	(-2.75)
Easy Task[1][b]	-7.09	-13.31	3.82	-8.78
	(-0.94)	(-1.34)	(0.47)	(-0.84)
Confident[1][b]	-0.10	8.17	-0.50	-6.11
	(-0.02)	(0.82)	(-0.06)	(-0.59)
Non-Human Interest[1][b]	5.45	16.71*	14.50*	-6.89
	(0.74)	(1.74)	(1.86)	(-0.68)
Tax Payment[1][b]	16.71			
	(1.30)			
WTP Reduced[1][b]	9.05			
	(1.00)			
One Issue[1][b]	46.81***			
	(5.29)			
Swedish Sample [1][b]	17.16			
	(1.32)			
Scope[1][b]	-5.32	-8.04	-2.44	5.78
	(-0.71)	(-0.83)	(-0.31)	(0.57)
R-square	0.14	0.10	0.07	0.11
F-ratio	4.64***	2.22**	1.49	2.29**
Durbin-Watson	1.84	2.18	2.02	2.02
Box-Cox statistics:				
λ (corresponding to X_i)	0.70	0.21	0.08	-0.14
	(1.08)	(0.14)	(0.08)	(-0.17)
θ (corresponding to Y)	0.96***	0.95***	0.93***	0.94***
	(15.15)	(11.72)	(18.90)	(10.79)
$n * R^2 \sim \chi^2_{df}$[c]	4.40	4.34	4.18	6.69
n	317	145	148	144

Note: - *, **, and *** denotes significance at the $p = 0.1$, 0.05, and 0.01 levels
- [a] t ratios in parenthesis
- [b] classification of dummy variables:
gender: 1 if male
easy task: 1 if WTP estimation considered as an easy task
confident: 1 if confident with stated WTP
non-human interest: 1 if non-human interest is an important motive for WTP
tax payment: 1 if payment vehicle is a yearly tax rather than a voluntary contribution
WTP reduced: 1 if willing to reduce WTP in the follow-up question
one issue: 1 if WTP is asked only for one issue (global warming)
Swedish sample: 1 if the respondents is drawn from the Swedish sample population
scope: 1 if the scenario comprise a larger scope of the environmental good
- [c] *White's general heteroscedasticity test on the basis of the auxiliary regression:*
$e^2_i = \alpha_1 + \alpha_2 lnage_i + \alpha_3 lnincome_i + \alpha_4 (lnage)^2_i + \alpha_5 (lnincome)^2_i + \alpha_6 (lnage_i * lnincome_i) + v_i$

The consistency of WTP with respect to part-whole effects and scope insensitivity, and responsiveness to scope of CR scores, are more closely analysed by performing both one-way ANOVA and Mann-Whitney U tests, presented in Table 4.5. and 4.6. In Table 4.5., a part-whole effect for global warming is clearly demonstrated; whereas the mean WTP is £ 45.41 when the issue is evaluated as part of four issues, this figure increases to £ 79.30 when the issue is valued on its own. The difference in the means is statistically significant at the 0.01 level according to the relevant test statistic. Hence, we may assert that a part of WTP is based on other motives and considerations than those postulated by conventional economic theory. However, WTP does not seem to merely reflect the moral satisfaction or symbolic value derived from contributing to the environment as hypothesised by Kahneman and Knetsch (1992). If this were the case, we would expect that the total WTP would be roughly the same irrespective of how many other issues are included in the scenario (since symbolic value refers to the environment in general), but as illustrated in the table, total WTP for four issues is significantly higher (£115.21) than the value placed on the global warming issue when evaluated on its own (£79.30).

Thus, it is reasonable to conclude that the stated WTP is founded in a combination of symbolic expressions and other considerations, possibly economic value. Alternatively, if merely reflecting symbolic values, these are not unrelated to the specific environmental amenity, but depend on *what* and *how many* issues are under valuation (*i.e.*, various amenities signal different symbolic values, which may vary in significance). Another plausible explanation for the effect is some people's failure to realise their budget constraints; of a total of 214 respondents, 22% stated that they were willing to slightly or substantially reduce their monetary bid after explicitly calculating their stated total WTP in a follow-up question. This implies that, when valuing several issues, respondents are reminded of other potential issues that may require funding, which would possibly result in more conservative estimates due to limited monetary budgets.

Table 4.5. Examination of part-whole effects

Valuation Scenario	Mean WTP Global Warming	Mean Total WTP
One issue evaluated:	79.30	79.30
As part of four issues	45.41	115.21[b]
Between Groups Significance	$Z = -4.34$[a] (0.00)	$Z = 2.14$[a] (0.03)

Note: - *p*-values in brackets
- [a] Mann-Whitney U test
- [b] mean total WTP for four issues

In table 4.6., the responsiveness to scope for both WTP and categorical ratings is analysed. The most important result is that perfect embedding is demonstrated for all four environmental issues. Furthermore, insensitivity to scope is independent of the way in which the magnitudes are specified; no difference is found with respect to type of intensifier or scale of measurement. The effect occurs no matter if absolute magnitudes, percentages, number of events or verbal cues are applied in order to specify the scope. These results are also verified by the regression analysis presented in Table 4.4., in which the dummy variables indicating the difference between minor and major scope are statistically insignificant across all issues. For some amenities, respondents valuing a larger scope of the issue actually provided lower bids, although the 'misdirection' of WTP is trivial and insignificant apart from for one issue (*endangered animals*). Thus, the hypothesis that respondents are insensitive to scope is supported by these results. Finally, the alternative rating of importance, measured through categorical rating, does not result in greater responsiveness to scope than does economic value. However, since categorical rating is a relative measure that possibly lacks the properties of interval-ratio data, it may conceal the actual influence of scope.

Table 4.6. Examination of insensitivity to scope

Environmental Issue	Mean WTP		Mean CR score	
	Minor Scope	Major Scope	Minor Scope	Major Scope
Global Warming[c]	46.39	43.23	4.62	4.10
Between Groups Significance	$F = 0.16^a$ (0.69)		$F = 2.64^a$ (0.11)	
Rain Forests[d]	40.34	33.03	3.89	4.03
Between Groups Significance	$F = 0.57^a$ (0.45)		$F = 0.23^a$ (0.63)	
Endangered Animals[e]	25.24	21.62	3.28	3.58
Between Groups Significance	$Z = -2.26^b$ (0.02)		$F = 0.90^a$ (0.34)	
Air Pollution[f]	28.54	35.35	4.61	4.21
Between Groups Significance	$F = 0.45^a$ (0.50)		$F = 2.04^a$ (0.16)	

Note: - *p*-values in brackets
- [a] one-way ANOVA
- [b] Mann-Whitney U test
- [c] a *20%* vs a *60% reduction* of the gases that give rise to Global Warming
- [d] preservation of *50,000 ha in Bolivia* vs *2 million ha in South America*
- [e] saving of the *African elephant* vs saving *five of the most endangered mammals*, including the African elephant
- [f] an *improvement* vs a *major improvement* of the air quality

In order to test Fisher's (1996) hypothesis that people may not perceive any increase in value above a certain level of the good provided, some respondents were presented a follow-up question after they have assessed their WTP that read either of the following; 'after assessing the value of a 20% reduction in greenhouse gases, would you say that your value for a 60% reduction would be the same or higher, and how much would this be?'. A considerable proportion of respondents who were presented this question (9 out of 22) stated a substantially higher value after the change of scope, and on the aggregate there is a significant difference between WTP for 20% and 60% respectively. Thus, the respondents in this study do not indicate a flat utility function between the various levels of scope presented in the scenario, which implies that scope effects may not be explained by zero-marginal value above some minimum viable level. A more general conclusion is that it seems difficult to fully accommodate embedding by (modified) assumptions of economic theory.

4.3.3. Qualitative Analysis

When asked about their motives and considerations for stated WTP in association with the CV scenario, it is clear that considerations other than those assumed by standard economic theory play an important role in determining economic value (*e.g.*, Schkade and Payne, 1994). The most frequent responses, in the following order, were;

contemplation of who may be responsible for (solving) the problem (*i.e.*, what is my own responsibility, and thus how much ought I to pay?)
what is needed for an adequate solution(s) (what are the costs for it/them?)
the importance and/or severity of the problem
whether or not other people will pay and how much ('a fair share')
what I can afford to pay
to what extent I am personally involved or do have an interest in the problem
how much should society reasonably spend on the environment (collective 'green' accounts)
how much do I give to other charities (mental accounts for charities) *or normally spend X dollars on*
consideration of future generations

Thus, motivations exist that are unrelated to instrumental consequences and specific features of the resource. It may not appear particularly strange that such motives are important for people, yet they are, as argued, problematic for the estimation of welfare effects in subsequent CBA since they are not necessarily confined to the specific resource being valued. Given this, an explanation is provided for why perfect and regular embedding tend to occur in CV contexts.

Apart from these motives of WTP, some respondents also said that they were thinking of the environment in general rather than specifically of the particular commodity under valuation. They further claimed that the environment is a complex issue not separable into specific events, or meant that as such they must be put in an appropriate context whereby projects and costs are rigorously described and subsequently decided upon. These statements thus indicate that a variety of 'unconventional' but subjectively important considerations play a major role in determining WTP, or attitudes, for which reason we may suspect that part-whole and scope insensitivity are not as 'odd' anomalies as they at first seem according to conventional analysis. It is also important

to capture these reflections and reasons for WTP in CV studies, preferably in a qualitative format, since people who were asked the same questions in a closed-ended format, to a much larger extent, provided more 'rational' and socially acceptable answers, such as making reference to the importance of the problem, the extent of it, the interest of future generations, etc.

As a follow-up section to this part of the questionnaire, people were also specifically asked if they reflected on the scope of the problem (31% said yes), if they paid attention to other public issues, environmental or others, that eventually require financial support (21%), if they would agree to support other issues with a similar amount (29%), and if they considered it appropriate to base policy-decisions on monetary valuation (41%). An important implication for the future application of CV studies is that 8 of the 12 respondents that were interviewed by the use of retrospective protocols said that extended information about specific project-costs and interventions may be of help in providing monetary values for these public goods.[54]

4.4. Conclusions

In recent years the CVM has encountered widespread criticism due to the variety of biases that potentially pose a threat to the validity of the method (*e.g.*, Kahneman and Knetsch, 1992; Diamond and Hausman, 1994; Kahneman *et al.*, 1999). Possibly one of the most discussed problems nowadays are the embedding effects that have been demonstrated in a number of studies (*e.g.*, Desvousges *et al.*, 1993; Diamond *et al.*, 1993), and the main issue at stake is; do these effects arise due to flawed questionnaire designs and carelessly conducted CV surveys, or are such anomalies behavioural regularities that may not be easily overcome by improved methodologies? This study examined the internal consistency of CV responses by investigating the occurrence of embedding, and in order to make results comparable with those of other studies, a design similar to a typical CV study was applied. Between-subject tests of part-whole bias and insensitivity to scope were moreover performed, thereby providing a stronger

[54] Since only 12 in-depth interviews were completed (*i.e.*, retrospective protocols) which thoroughly looked into the inquires above, these latter results should be interpreted carefully.

test than those employed in the majority of studies rejecting the embedding hypothesis, which mainly have relied on within-subject tests.

Willingness to pay was assessed for four environmental amenities; *rain forests*, *endangered wild animals*, *air pollution*, and *global warming*. The scope of these amenities was specified using four different scales of measurement; absolute magnitudes, percentages, number of events, and verbal cues. Hence, the procedure facilitates a test of whether the type of good and how magnitudes are specified have any influence on scope sensitivity. In addition to examining the occurrence of embedding in CV formats, I also compared the consistency of WTP with Categorical Rating (CR) as an alternative measure of environmental priorities. In order to gain better insight into how people respond to the CV questions, in-depth interviews were conducted in parallel with the main study.

The main findings were that neither an instrument of economic value nor a concept of attitude, as utilised here, seem capable of making the respondents responsive to scope. No significant difference was found between minor and major scope for WTP or CR for any of the issues. The weak relation between expressed economic value and the extent, urgency or character of the amenity is also supported by small variations in mean WTP across the four issues. The presumption that a measure of economic value should be psychometrically inferior to a more traditional notion of attitude, as proposed by Kahneman and Ritov (1994), is however challenged as neither instrument shows responsiveness to scope. The fact that a considerable portion of the respondents were willing to pay more if the scope was increased when directly asked subsequent to the valuation questions, indicates that within-subject tests are unlikely to properly reveal if and to what extent people are responsive to scope. Thus, apart from showing that embedding occurs even when a design similar to a typical CV study that adheres to the most important of the NOAA panel's recommendations (Arrow *et al.*, 1993), it also suggests that procedures employed by many CV practitioners in order to test for these and similar biases may be inappropriate.

Furthermore, a considerable part-whole effect was demonstrated for the global warming issue. This inconsistency is, however, unlikely to be explained completely by

the moral satisfaction hypothesis (Kahneman and Knetsch, 1992), since the total WTP for all four goods is significantly larger than the WTP for global warming when evaluated on its own. Thus, rather than merely reflecting value-expressive or symbolic objectives, which should result in the same WTP regardless of how many amenities are included in the scenario, WTP is presumably determined by a combination of such motives and other considerations. This is also in accordance with the theorising by Katz (1960) and Herek (1986), who hypothesise that attitudes serve multiple functions, rather than having one single purpose. As discussed in previous chapters, the results are further consistent with Thaler's (1990) hypothesis that people have 'mental accounts' for a variety of issues that are not easily separable into specific events. Rather than focusing on the particular issue being valued, most respondents seem to base their WTP on a more inclusive category of environmental resources.

Another plausible explanation for the effects is some people's failure to consider their budget constraints; of a total of 214 respondents, 22% stated that they were willing to reduce their monetary bid after thoroughly contemplating their stated total WTP in a follow-up question. When valuing several issues, respondents are reminded of other potential issues that may require funding, which would result in more conservative estimates. This indirectly confirms the hypothesis that people tend to only reflect on a narrow or limited set of consequences of a particular choice, rather than its global consequences (Read *et al.*, 1999). This 'cognitive inertia' implies that people take each issue as it comes; they tend to see it in isolation and as a single problem that needs to be solved, without thinking about other possible or necessary consumption alternatives. I believe this captures one of the key problems of CVM. Most CV studies are concerned with a 'one-off' event, which prevents respondents from considering other public goods and services that are important and may require funding. In order to make a more valid value assessment of a particular issue, it is reasonable to assume that people must have something to compare it with. Since it is more or less impossible to provide information about all alternative use of the monetary budget in the valuation scenario, and further, since there is no unequivocal way of determining to what aspects this information should be limited, the issue is difficult, if not impossible, to overcome.

As a concluding remark, opponents of the CV method commonly assert that CV respondents do not have a clear and real value for the item being valued. Instead of relying on a well defined scheme interpreted in their minds, people seem to construct their preferences and make a decision rule whenever they need it (Schkade and Payne, 1994; Fischhoff *et al.*, 1999). As a result, people's responses in a CV context are likely to be arbitrary and unlikely to properly reflect instrumental considerations as required by CBA. Such misgivings seem well founded in the context of these results. Overall, these indicate that assessed economic value is quite insensitive to factors that ought to be important according to standard economic theory, such as the scope or importance of a particular issue, but instead are influenced by factors that should not be relevant and are problematic for subsequent welfare analysis. Given that the present study relies on a design similar to a typical CV study, whereby the amenities and suggested policy interventions are clearly described in the valuation scenario, these anomalies are further unlikely to be solely attributable to flawed methodologies as commonly asserted by CV practitioners (*e.g.*, Carson *et al.*, 1996a). This raises the question of to what extent they are behavioural regularities, at least in the context of more complex and global environmental resources.

It is easy to see why economic impact analysis of environmental improvements and deterioration is attractive as no other unit than monetary value is capable of providing a direct and relevant comparison with other competing projects, public as well as private. However and as argued previously, I am not inclined to think that a single measure such as WTP has the ability to accommodate the diversity of values encompassed by natural resources. It is important to understand that people's ability to express articulated values on the most diverse topics is very limited. Rather than focusing on outcomes of specific questions, the valuation process itself ought to be highlighted. Therefore, as a logical step onwards from this study, the next chapter performs a qualitative analysis of what lies behind or underneath seemingly irrational and inconsistent responses in CV contexts.

5. How People Make Sense of Contingent Valuation Questions

In the Contingent Valuation (CV) literature, various explanations have been provided as to why people behave inconsistently and irrationally, and how various empirical anomalies may be amended. Yet, these explanations have mostly been rather 'reductionistic' in their character, whereas the broader issues of how people understand, interpret, and make sense of CV questions have been largely ignored. For example, embedding effects have been attributed to substitution effects (Hanemann, 1994), or diminishing marginal returns (Fisher, 1996), whereas modified notions of income effects have been proposed as a cause for unreasonably large discrepancies between Willingness To Pay (WTP) and Willingness To Accept (WTA) estimates (Hanemann, 1991). Other problems, such as overstatements of WTP, have more generally been explained by improper survey design or inappropriate elicitation formats (Mitchell and Carson, 1989; Hanemann, 1994; Carson *et al.*, 1996a). On the whole, rather than looking beyond mainstream economic frameworks in order to understand the anomalies commonly observed in CV studies, assiduous attempts are made to integrate these within existing economic theories and knowledge.

Fischhoff (1991) captures this point by distinguishing between what he calls the *philosophy of articulated values* on the one hand, and the *philosophy of basic values* on the other; whereas the former assumes that people can provide articulated and perfectly meaningful answers to basically all issues, provided a complete description of the task, the latter hypothesises that people lack well-defined values for all but the most familiar of issues, of which they have an extensive experience. It is clear from this distinction that the core assumptions in economics stem from a strong tradition in the former of these paradigms. As a consequence, the CV research has mainly been focused on explaining and predicting specific effects and phenomena, which has resulted in a reluctance to accept findings that demonstrate deeper problems with the method. It is interesting to note that CV practitioners, who otherwise stress the importance of following the NOAA panel's recommendations of 'good' CV practice (Arrow *et al.*, 1993), have not been particularly attentive to the panel's advice that each CV study

should check for the respondents' understanding of the valuation task through some follow-up questions to this.

At the start of this thesis I argued that we ought to ask ourselves *how* and *why* people value environmental issues before we make inquires into *how much* they value these in monetary terms. This chapter explicitly takes notice of these questions by investigating how people spontaneously understand and interpret CV questions for environmental amenities, in this particular case global warming. It develops the qualitative analysis performed in the previous chapter, which indicated that people are motivated by factors that should be irrelevant for the valuation task, whereas factors that ought to be relevant seem to play a minor role. I will hence focus on content (or face) validity, whereby the *process* rather than the product of respondents' thinking is brought into light.[55] A qualitative analysis is applied in order to fulfil this aim, and although actual WTP amounts are assessed for the environmental resource under consideration, these will be of minor importance. Instead, focus is placed on the respondents' thoughts and the discussion that revolves around these figures, which are envisaged to reveal whether these correspond to an underlying value construct, or if they represent expressions of 'non-attitudes' with little bearing on economic value (Converse, 1970).

5.1. Thought Processes and Interpretation of WTP Questions

There are surprisingly few studies that have performed qualitative analyses of people's answers in CV contexts, investigating how people respond to a typical WTP question. The most reported of these, and which has also caused an animated debate regarding the validity of stated preferences, is Schkade and Payne's (1994) study of the preservation of migratory water fowls in central United States. On the basis of a verbal protocol

[55] The mainstream research in the field have been excessively concerned with construct validity and reliability of WTP estimates. The usual process has been to investigate how WTP bids vary with factors that a-priori are expected to have influence on these (theoretical validity), and later examine to what extent results are repeated across different studies (convergent validity). Generally, it is believed that assessed economic values and their internal relationship is a sufficient criterion of validating the methodology.

analysis (Ericsson and Simon, 1984),[56] the main findings from the study are that the monetary figures provided are motivated by a variety of considerations, most of which ought not to be relevant according to mainstream theoretical assumptions. Rather than considering the scope or importance of the problem, and how this may be weighted against other demands on their wealth, people are keen to reflect upon how much they otherwise spend on charitable contributions (mental accounts), they want to pay a fair share of the cost of the solution, and they tend to signal a concern for a much larger set of environmental amenities. Most problematic though is the fact that 20% of the respondents reported guessing or were just making up an answer. These results, therefore, not only suggest that standard economic theory is insufficient to explain CV results, but also confirm the hypothesis that responses seem to be arbitrarily constructed during the course of the interview.

Vadnjal and O'Connor (1994), although not using a think-aloud technique, arrived at a somewhat similar conclusion when examining how people interpreted CV questions about the urban development of a marine park in Auckland, New Zealand. However, instead of looking specifically into thought processes and cognitive strategies used by respondents, their study was focused on what people in, a broader sense, thought about a monetary valuation of this issue. Respondents were also encouraged to express their general views about the appropriateness of destroying the natural resource in favour of urban development. Results of the study suggest that people are concerned about what ought to be right or wrong in society, which is symbolised by very large WTP estimates, and as such they are un-associated with economic decision-making as traditionally defined. Generally, respondents argued that the environment is beyond choice and therefore not well represented by economic value. Nevertheless, if necessary, people are willing to pay significant, in some cases indefinite, amounts, but these do not represent compensation for any actual loss of the resource. Instead they are based on an underlying principle of what ought to be ethically right, no matter what the costs. In this sense, expressed WTP amounts are more likely to be gestures in a political process

[56] The aim of this technique is to investigate how people respond to a particular inquiry or question by capturing the cognitive processes people utilise when generating answers. Hence, people are probed to reveal for the researcher everything that comes to mind when working on a particular problem.

toward which people respond as 'morally responsible' citizens, not as self-oriented consumers. Some empirical support is thus provided for theoretical arguments developed by Sen (1987) and others (*e.g.*, Boyce *et al.*, 1992; Vatn and Bromley, 1994).

Building on these findings, I will in this study investigate, not only to what extent people 'relevantly' respond to CV questions, but also in what context they tend to spontaneously place such an inquiry. This will indicate if and to what extent the public *identify* with the procedure of valuing unfamiliar and complex environmental resources in monetary terms through hypothetical markets. Thus, apart from the strategies people employ in order to provide an answer and what they otherwise think about the procedure, I will also examine how people *make sense* of a typical CV study, what meanings they attach to their answers, and how they, 'un-probed', interpret the questions being posed. The approach tries not to 'force' people to comply with the particular inquiry, but aims at giving respondents as much freedom and time as possible to respond in a way that is most natural to them. One may interpret this as starting from the other end, that of the respondents; rather than dismissing some responses, or part of responses, because they do not relate to or fit into the frame of the question, these are exactly the responses I am interested in. Instead of excluding utterances when people seemingly have completely or partly misunderstood the purpose of the WTP question, I consider those answers meaningful for my research. I will subsequently guide these respondents into an appropriate path of thought, but it is the whole story, including its contradictions, that is important, not just those parts corresponding to the interpretation by the researcher.[57]

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[57] All CV studies so far, to my knowledge, even those that have been critical of the methodology and conducted from a qualitative standpoint, have reported thought processes that more or less fit into the frame of the scenario, whereas very little has been said about what possibly precede these. To give an example, if as researchers we are asking a particular question and people spontaneously respond in a way that is irrelevant or when people simply do not understand the question, we firstly guide them by elaborating our explanation, and then focus on the answer that (hopefully) corresponds to the intention of the task. However, by ignoring this preceding process of thought, I believe valuable information for the future development of the CV methodology will be lost.

5.2. Conversational Norms

Schwarz (1994) argues that at the heart of all processes of conversation exist certain assumptions that constitute a *common ground* between speakers and listeners. This common ground is crucial in order to establish an understanding between the communicative agents, and thereby a meaningful conversation. For example, a discussion about whether to vote against or for the introduction of the European Monetary Union (EMU) is unlikely to be meaningful unless there is an established context of democratic principles that both parties realise, in this particular case the referendum. It does not imply that they have to agree upon these principles, but they have to be familiar with them and the basic rationale underlying such political processes. Reflecting a more fundamental dimension, everyone taking part in this discussion ought to be familiar with the monetary and financial system (*e.g.*, the role of banks, employer-employee relations, market transactions, etc). To attempt a discussion about EMU with someone who is not familiar with the Western concept of money-use is doomed to be quite meaningless in this respect.

In most real-world contexts, such 'common grounds' of conversation are mostly obvious to the communicators, and therefore rarely questioned. In the communication over a wide variety of issues, there exists some background to statements that are made, and these can normally be put in a context whereby links to associated issues are simultaneously being established.[58] However, in research settings these kinds of backgrounds are not always established. As Schwarz (1994) and some others have noted, conversations in research settings differ from everyday conversations by being highly constrained (*e.g.*, Clark and Schober, 1992), and sometimes they are completely inadequate, either in the sense that they deviate from how similar enquires are posed and interpreted in real-world situations, or because they are invented by the researcher. Attempts at standardising the interaction between researcher and respondent in order to

[58] As an everyday example, a discussion about the weather between non-meteorologists as the Swedish summer holiday is approaching, does not simply involve temperatures, winds and rainfall. In addition, it carries with it imaginations and anticipations of vacation plans, possible frustration or joy resulting from particular forecasts, drinking and eating habits, the consequences of living in the Northern part of the world, and, although presumably more obscured, implications of the protestant work ethic.

isolate and examine certain events tend to overlook the need to put this into a context within which ordinary people can make sense of the same, thereby preventing the interaction from becoming meaningful. Schwarz (1994) notes that:

> Most importantly, the standardisation of instructions, or of the questions asked, precludes the tailoring of utterances to meet different common grounds. Moreover, when research participants ask for clarification, they may often not receive additional information. Rather, the previously given instructions may be repeated or a well-trained interviewer may respond, "Whatever it means to you", when asked to clarify a question's meaning...As a result, a mutual negotiation of intended meaning is largely precluded in many research situations (p. 127).

To summarise, the foundations of conversation that define its meaning are missing in many research settings. Yet, a more serious problem is probably that, in their attempts to make the inquiry 'real' enough to answer, respondents will assume that there must be a meaning somewhere, and therefore they are unlikely to protest against the task, no matter how odd it seems to be, and regardless of whether or not they are familiar with the event being researched. They have no reason to question the intention of the researcher, because "communicated information comes with a guarantee of relevance" (Sperber and Wilson, 1986; p. vii), and rather than asking for clarification, since this may reveal their ignorance, they are likely to engage in a constant search for cues about what the questions really mean, and make educated guesses about what the researcher is possibly aiming for (Nadeau and Niemi, 1995).[59]

5.2.1. Making Sense of Valuation Scenarios

On the basis of the above discussion, we may argue that the hypothetical market of an otherwise non-marketed good does not encompass a common ground that both researchers and subjects anticipate, let alone agree upon. The former has after some, usually thorough, contemplation assumed that one may construct a market for this, and

[59] Most problematic are cases when respondents have no knowledge about the issue whatsoever, and it has been demonstrated that as many as 30% of survey respondents provide answers to fictitious issues that are invented by the researcher, (Converse, 1970; Schuman and Presser, 1981).

as soon as this is done, it is 'just' a matter of asking people the right questions and consistent and well-behaved preferences will be obtained. However, whereas the researcher may have spent years in conceptualising and developing an understanding of this, no doubt facilitated by academic tradition and training, the respondents are only given the time of the interview to comprehend this construct. Admittedly, this is realised by the CV practitioner, who will devote significant efforts to elaborating the scenario and explaining carefully its underlying purpose. This is therefore the key consideration among CV researchers.

However, it is doubtful whether the basic foundations of the valuation task can be (properly) realised during the course of the interview, despite thorough explanation. In the same way that the translation of a book or a film into a foreign language is unlikely to convey (all) hidden meanings and intentions of conversations and scenes, a similar problem is arguably present in a CV study, in which the interviewee lacks the prior knowledge and experiences that are necessary in order to put this in an adequate context. The clarification of the valuation task can surely provoke an answer from the respondents, but the questions we must ask are: Does the procedure correspond with the respondents' assumptions or mental representations of how these and similar issues are normally decided upon? Do they put this in an appropriate context? If not, how 'genuine' will responses of economic value be, and what do these essentially represent? A major problem for subsequent welfare estimation arises if the comprehension of the task by the respondent deviates from what the question is intended to measure. I will argue that this problem is widely overlooked in the CV literature. Although in many cases a misunderstanding is revealed in the beginning of and during the interview, this nuisance is eagerly corrected for by further explanations, without any serious attempts at analysing the respondents' spontaneous interpretation of the valuation task.

Apart from the likely difficulties of comprehending the purpose and rationale of a CV study, since this suggests a way of making environmental priorities that is unheard of by the respondents, and that further does not correspond with established procedures of public policy-making, there are other aspects surrounding the valuation task that guides the respondents in their task. For instance, they may reflect upon who is sponsoring the study, who is responsible for the implementation of environmental measures, their

eventual trust or mistrust in involved parties, etc (Fischhoff, 1997; Macnaghten and Jacobs, 1997). Schwarz (1997) offers an alternative explanation of embedding effects that proceeds from this reasoning; rather than attributing this anomaly to the respondents' failure to realise the extent of, or specific characteristics of the good, their mental representation of this may differ from that of the researcher. Overall they are likely to consider the resource as an inseparable part of a larger part of an environmental issue (Thaler, 1990), and therefore, their valuation captures a number of effects that are unknown to the researcher.

5.2.2. Social Context and Environmental Valuation

A related issue to the discussion above is the social context in which the valuation question is being asked. A few papers discuss this aspect (*e.g.*, Harris *et al.*, 1989; Vatn and Bromley, 1994), but it is commonly ignored in the CV literature. Except from at the piloting stage, a CV study is typically conducted as individual interviews. A potential problem with this approach is that, since individual preferences are likely to be context relative, we do not know which context is pertinent to a particular choice. As Vatn and Bromley (1994) argue, if decisions about natural resources can be categorised as pure consumer choices, then individual WTP would be appropriate. If, on the other hand, these choices have more to do with moral norms and social commitments, then monetary bids from isolated individuals have little to offer.

A collective discussion may, as argued, be crucial in order to establish a shared understanding and a coherent basis for forthcoming choices. If given the opportunity to discuss the matter with other people, whereby important social processes of value formation are facilitated, respondents may become more confident regarding what should be valued and why, which in the long run should have implications for the character and consistency of WTP. In CV studies, people are asked to respond to a procedure that has not yet been *institutionalised*, and unless citizens are given an opportunity to contemplate and discuss the foundations of a monetary valuation of the environment, we may not expect them to have a well-developed idea how much specific resources are worth to them.

5.3. Research Hypotheses

On the basis of the previous discussion, a number of hypotheses for this study emerged. Some of these relate to how people spontaneously interpret and make sense of the valuation scenario, whereas the remainder look into how people respond to the WTP questions when they are guided into the thoughts relevant for the inquiry.

H_1: People will not necessarily interpret the CV question as intended.

Since assigning economic values to environmental issues is a novel task, there is a risk that they will misunderstand or interpret the task differently from what is intended; instead of thinking about and responding on the basis of how much the environmental improvement is worth to them, or what they otherwise are willing to pay for this, they may discuss other environmental and/or public issues not comprised by the question.

H_2: People will not perceive the valuation scenario as consequential.

According to Blamey (1998), statements of WTP in CV studies are not perceived as consequential by the respondents. If they do not believe that suggested environmental measures will be implemented in the foreseeable future and on the basis of aggregated WTP, and if they do not view it as credible that they eventually have to pay stated amounts, these are less likely to be associated with the characteristics of the resource and less bound by real budget-constraints. Although the link between economic value and policy interventions is anticipated, the consequences of statements will be negligible since the individual is only one of very many voters.

H_3: Economic value is (completely or partly) based on factors that ought not to be relevant according to standard economic theory.

Corresponding to the findings of chapter 4 and of previous research, factors such as the moral implication of the policy intervention, costs of solving the problem, the respondents own responsibility, and thereby duty of paying, are important determinants of WTP (*e.g.*, Kahneman and Knetsch, 1992; Schkade and Payne, 1994).

H_4: People refer to the environment in general when stating WTP, rather than on the particular issue to be valued.

Part-whole effects (*i.e.*, regular embedding) imply that WTP will be overstated since it is based on a larger and more inclusive amenity than what is the object of subsequent Cost-Benefit Analysis (CBA) (*e.g.*, Kahneman and Knetsch, 1992).

H_5: Answers derived in a social context (including more than two persons) are different from those assessed through individual interviews.

A discussion between individuals in a focus group may facilitate a different perspective on the issue, possibly resulting in a different 'conceptualisation' or understanding of the valuation task. Assuming such differences, estimates of WTP will be sensitive to whether these are assessed in an individual or in a social context.

5.4. Design of Interviews and Focus-Group Discussions

Two different groups of people were recruited for this study. Approximately half the sample consists of graduate and undergraduate students at the London School of Economics (LSE), and the remaining half consists of people with various different backgrounds and socio-economic characteristics. These respondents were randomly targeted in two different ways; subjects in the former group were informed about the study through e-mail, whereas the remaining respondents were notified by leaflets put in their mailboxes. Although both students and non-students participated in the study, I do not attempt to achieve a perfectly representative sample since the aim is to isolate interviewer effects and investigate the influence of contextual factors, rather than empirically estimate actual welfare effects.

The study used focus groups and individual in-depth interviews in order to investigate if people understand and how they identify with an economic valuation of a global environmental issue, in this particular case global warming. Altogether 2 focus-groups, each including 4 respondents, and 21 individual face-to-face interviews were conducted, the former lasting roughly 90 minutes, whereas the latter took on average 40 minutes to

complete. The focus groups started by some initial statements made by the interviewer that relate to the environmental issue being valued and the purpose of the valuation task. Further on, the valuation scenario was presented and some open-ended key questions were asked, including the WTP question, but mainly the group was left on its own to discuss the research inquiry. Thus, the objective was to let the respondents interpret and assign meaning to the valuation scenario by themselves.

In individual interviews, respondents were asked to 'think-aloud' while answering the valuation question. In this particular case a concurrent protocol was applied, in which respondents report everything that comes to mind at the moment of their decision-making (Ericsson and Simon, 1984). Hence, similar to the focus-group setting, the technique offers a way to learn how people spontaneously respond to the valuation question, if they interpret and understand this as intended, and whether they consent to the idea of a monetary valuation of the environmental resource being valued. The procedure also discloses how they arrive at the particular figure stated, such as the motivations, considerations, and strategies of WTP. In addition to the WTP question, respondents were asked to think-aloud while answering some follow-up questions, such as what they thought about the procedure, if they considered this appropriate, and how ambivalent or uncertain they were about their stated amount. Thus, some more general opinions revolving around the issue among respondents who adequately interpreted the valuation question are also captured. The instructions preceding the verbal protocols are presented below.

> Before coming to the next question, I want to inform you that one important purpose of this research is to find out what people are thinking when answering questions about environmental values. Therefore I am asking you to think-aloud while you are working on the question given below. By thinking aloud I am simply interested in everything that you are thinking, from the moment you have read or heard the question until you give me an answer you are satisfied with. In this process it is important that you do not plan what to say, nor do you have to explain what you are saying unless probed to do so. Just speak out loud what comes to mind. If you are silent for some time I will remind you to continue talking.[60]

[60] As a clarification of what this implies, the respondents were presented a fairly easy mathematical task and asked to describe the process of solving this.

In contrast with the usual quantitative approach in the Contingent Valuation Method (CVM), a qualitative approach such as the one employed here provides a means of examining what lies behind people's answers to survey questions and what meaning they attach to various research issues. Particularly when responses are not well-founded, this information is indeed valuable, and it is also expressed in the respondents' own language.

The particular 'good' being valued was *global warming*, for which respondents firstly were given a thorough explanation regarding its causes and environmental effects. They were further carefully told about the scientific uncertainties involved and the debate between various interest groups and scientists. As in other CV studies, the aim was to present a realistic scenario of how to solve the problem and how it should (or could) be paid for. The scenario built on the Kyoto treaty, but with an extended policy that prevented 'all' known problems of global warming. Hence, the scenario originates from a 'strong' version of sustainability. The valuation scenario read;

> Global warming results from the emission of greenhouse gases, primarily carbon dioxides, which are bi-products of manufacturing, heating and transportation. The effects of global warming is somewhat uncertain, and there prevail some disagreement among involved researchers what and exactly how large the effects would be. However, it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be efficient nor possible in the future. Whereas some places will get warmer, other will become colder, leading to changes in the liveability at different places. Due to alterations in global and regional temperatures, there are considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate. Conservation biologists are further concerned with the effects on biodiversity, from extinction of single populations of highly habitat-specific endangered plants to the extirpation of entire species and communities. On a more broader level, these changes might cause yet unknown but possibly serious effects on the global eco-system.
>
> In order to stop this we need to be more efficient in the way we use energy for heating, transport and industry. As a first step toward solving the problem, a treaty was signed by 38 countries in Kyoto Japan, agreeing to reduce emissions of greenhouse gases 7 percent below 1990 levels by the year 2012. Yet, there are a significant number of people, including environmental groups, climate scientists and governmental officials, who argue that these efforts are not sufficient and who therefore urge for much tougher restrictions. However, by

> imposing higher charges on the emission of greenhouse gases, along with making more use of biological fuels, various fuels and other forms of energy will become more expensive. Apart from the direct effect on taxes, such measures will eventually have an impact on the prices of various consumer products.
>
> Suppose now that a policy is implemented that will ensure that the emission of greenhouse gases are reduced to the extent that the above problems are prevented. There has been some approximation of how much such a policy will cost for the average citizen in terms of higher prices and taxes, and the core question is if people are prepared to pay this. I would therefore like to know how much such initiatives are worth to you.

In addition, the rationale for capturing economic value for environmental resources and their subsequent input in policy analysis was briefly explained before the valuation scenario. The respondents were informed that the WTP involved a yearly payment, either in the form of higher prices for products and services giving rise to global warming, or higher taxes. Finally, in focus groups, respondents answered the WTP question individually after the procedure was discussed between participants and interviewer. They were explicitly told that WTP ought to reflect what they as individuals thought it was worth, not what the group in the aggregate would be willing or could afford to pay. Therefore, although being captured as an individual response, this was, presumably, guided by other people's opinion and preferences. The WTP question was elicited in a standard Open-Ended (OE) format;

> How much would the proposed intervention have to cost you before you would vote no to this? To put it differently, what is your annual maximum willingness to pay for this environmental improvement in terms of higher prices and taxes?
>
> The maximum amount I am willing to pay is £ ..... annually

After the interviews and focus-group discussions had been completed, all recorded responses were firstly transcribed and thereafter coded. In this specific case, the coding scheme originated from previous research regarding how people typically respond to CV questions (*e.g.*, Schkade and Payne, 1994). However, initial categorisations were modified and new codes emerged during the process according to what was found to be common considerations among respondents. Hence, a combination of a pre-established

scheme and an inductive approach was employed. In the end, the following six categories, reflecting various key considerations, were chosen; (1) references to the specific resource under valuation, (2) reference to more general issues (environmental resources, public goods in general, charitable contributions, etc.), (3) references to political issues and issues of fairness, (4) references to economic constraints and factors, (5) references to other than economic solutions, and (6) other references (more specific categorisations are presented in table 5.1.). Since these categorisations were intended to capture motivations of WTP in general, rather than for each respondent individually, each subject may have more than one category assigned to him or her. After the categorisations were allocated to respondents, transcripts were once more examined, and utterances and citations illustrating ways of thinking or tackling the elicitation question were isolated.[61,62]

5.5. Results

This section is divided into five parts. The first focuses on how people spontaneously respond to the CV scenario, that is, if they identify with this, or how they otherwise make sense of the inquiry. The second and third sections report what people in more explicit terms thought about the procedure when this was clarified by the researcher. The fourth part focuses on responses that, at least to some extent, correspond to the intention of the question and aims at identifying the strategies used by the respondents in order to arrive at a certain estimate of WTP. The final part discusses the uncertainty respondents experienced when faced with the valuation scenario.

The findings of this research are furthermore presented in two different ways. Partly responses will be categorised into various key themes on the basis of the coding scheme presented in the previous section in order to illustrate the frequency of various considerations, reflecting shared meanings and perceptions among respondents, partly

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[61] Ideally, someone 'impartial' to and without any direct interest of the research issue may have been consulted for the transcription and coding of responses, but due to budget constraints this was not feasible.

[62] The questionnaire may be found as an appendix to the thesis.

people's remarks and comments will be reported exactly as these are expressed by themselves. Responses are mainly un-edited, but in order to make sense of fragmentary comments and establish a coherent text, on some occasions these are supplemented. Words and phrases taken directly from the transcriptions are reported in italicised text, whereas supplemented comments are presented in brackets.

5.5.1. Interpretation of and Identification with the Valuation Scenario

A quarter of the people interviewed did not interpret the valuation question as intended. Instead of thinking in terms of individual economic value, which ought to have a basis in what the individuals themselves think the improvement is worth to them, many respondents convey a discussion about other issues. These are commonly of political significance, but the crucial point is that they are not comprised by, nor directly related to the question being asked. They may revolve around issues of environmental preservation, but they have little if anything in common with economic value as defined by the CV researcher. For instance, a number of respondents discussed more general issues of taxation, stating whether or not they thought that this is an appropriate basis of environmental policy-making, others were concerned with what ought to be done to solve the problem, and some respondents were keen to mention the broader conflicts between environmental preservation and economic development. One respondent illustrates this point;

> *"How would I work through that is, I mean I have a belief in a progressive taxation system, so I would always be willing to accept a reasonable amount of the burden, irrespective to questions like that. What is most important is that the burden* [fall differently] *on particular groups of the economy, so I would not have a flat tax. So, based on that, how much would it be allocating..."* (respondent #5)

What is striking for these respondents is that they are referring to other people and the society as a whole. Instead of focusing on their own opinion, preferences, behaviour and WTP, they are concerned with what other people would do, or fail to do, discussing whether there is a problem of citizen consciousness, whether or not other people would reject the idea of making these and other environmental problems the object of taxation,

if other people are willing to pay anything, or otherwise change their behaviour, etc. Consider the following examples;

> *"Well it depends, I mean you got things like education, health, transport, hmm, these issues, and you got* [to] *prioritise where environmental issues are to be placed. Having said that, ...if the environment is not friendly, if you don't think about the environment, then we will all be dead. It all depends, as I said, on how you prioritise things. I would definitely put environmental issues, say in the top five, but personally speaking with an overgrowing population, health is going to be* [a] *major issue. ...*[Therefore] *it is only a small amount of money that we can do* [for environmental issues]. *One of the issues maybe, in terms of taxation is charging more for petrol and things like that, but then people are not going to be happy with that because you take the freedom of the car away from people, you know. And if you put prices up, you got to have a better transport system, ...and another way would be* [to establish] *car-tolls, ...or stop people from using the car in cities. But you know it is very very difficult, ...it is a small amount of resources, and we got to prioritise, and unfortunately I don't think that environmental issues are among the top priorities for most people, environment issues are not there."* (respondent #9)

> *"I'm thinking the US versus like the most Scandinavian, or most European countries, where there is really high taxes, and you get lots of benefits from it, whereas in the States it is very individual, you know, you want to get the benefits that you pay for yourself, and something like environmental things, that type of* [global] *benefits, individual people are not willing to pay for. Like universal health care, they tried to start that up in the US, you don't get free healthcare* [there] *you see, ...and it failed. So I think for me as an individual I am much more environmentally concerned and environmental stuff are of a very big priority for me, so I would probably be more willing to pay than the average American."* (respondent #10)

These examples illustrate how some respondents spontaneously interpret the purpose of the interview. A lack of correspondence with the intention of the question is clearly demonstrated. However, what is more alarming is that a misinterpretation of the purpose and rationale of the task continues after a thorough explanation regarding this has been provided. Overall, people are uncomfortable with answering the WTP question due to their uncertainty over what the procedure really implies, although the scenario in itself (*i.e.*, the causes, consequences and suggested measures of preventing global warming) is (perfectly) clear to them. When presented follow-up questions on how they feel about the valuation task and whether they found this appropriate, these respondents tend to return to their original interpretation and divert from the notion of economic value.

5.5.2. Appropriateness of Economic Value

Although some people will respond regardless of what they think about the procedure, others express openly their concern for the appropriateness of putting 'price-tags' on the environment. Nearly half of the sample (12 respondents) clearly does not believe in this way of making environmental priorities, arguing that the environment is 'not a monetary issue'. This opinion arises because they consider it to be un-related to private economic decision-making. Common arguments are that lay people do not have sufficient knowledge to make appropriate judgements and consequently 'experts should decide', that the procedure represents an 'ultra-liberal standpoint' overseeing core values, or that these kinds of environmental resources are global issues that rather should be solved through joint-efforts across nations. One respondent is particularly clear about this aspect;

> *"It depends, depends on so much, if, I mean... What are you talking about, are you talking about paying to, hmm, whom, the government? It doesn't fit into my frame of mind actually, I mean, the question is virtually meaningless (laughter) for my way of thinking, it's in a sense that, hmm, the whole notion of paying on a market for these environmental objectives, is, huh, ought to be unsuccessful, because it doesn't fit into the way I think, because the way I think, if I would like to give to these matters, I would not like it to be through this market* [procedure]..." (respondent #20)

Nevertheless, the findings are somewhat mixed. Whereas a few respondents are undecided about what is right or wrong in this respect, some believe that CVM is a viable approach to making environmental priorities. They argue that it is a 'sensible' and feasible approach, that policy makers should take account of public opinion, and that economic benefits and costs matter. Yet, although public opinion is considered to be an important input to policy analysis, many are concerned whether it is possible to reduce such into a monetary figure that would adequately reflect what should be prevented and what should not, and that would capture important aspects of responsibility and availability of paying. Similarly, although there are limits to how much people can afford to pay and that costs thus have to be taken into consideration, this is a separate concept from economic preferences.

Most importantly though is the fact that some respondents, despite their scepticism or lack of consent toward the CVM, still provide an answer to the valuation question. The responses from this group of respondents do not seem to be particularly unreasonable and they do not differ significantly from the average response. Thus, seemingly well-behaved responses to this CV study do not necessarily reveal people's 'true' opinions or to what extent they are committed to their statements. Clearly this phenomenon poses a major problem for CV studies, which in the analysis commonly put emphasis on internal validity and overlooks to what extent responses are founded in an underlying value construct.

Interestingly, a difference regarding this aspect was found between focus groups and individual interviews. Whereas in the latter a possible disagreement toward the procedure was not disclosed until some follow-up questions were asked, respondents in the former mode seem more keen to initially protest against the procedure and to openly state their scepticism. Possibly this is due to the support they receive from other participants in the focus group, in which the exerted influence of the researcher according to what would be an 'acceptable' and expected answer may be significantly reduced. This outcome is supported by earlier findings by (Milgram, 1974), on the basis of which we may conclude that citizens are socialised to obey and trust authorities, but when someone sees someone else refusing to 'follow orders', protests from other people escalate.

5.5.3. Credibility of the Hypothetical Market

A follow-up question was asked regarding how credible or realistic people thought the valuation scenario was. The purpose of this question was to illuminate to what extent CV results are consistent with the fundamental assumptions of traditional CBA. In order to be, as Blamey (1998) argues, it is required that responses are outcome related. There are two forces that may violate this assumption. Firstly and central to this thesis, economic values are indicated to also have a value-expressive function in these contexts, whereby the mere expression of an opinion is not only important but represents a significant part (*e.g.*, Kahneman and Knetsch, 1992). Secondly, the implications of a wrong decision by the individual will have very small, if any,

consequences as long as she does not consider her response to be influential on the project-outcome, possibly since she thinks of herself as one in a million 'voters'.

In this study it is revealed that, for instance when asked if they believed if and to what extent their statement would be treated as a binding agreement, as many as 19 respondents (66%) consider the setting more or less hypothetical in the sense that no such basis of policy making is likely to be introduced in the near future, and that they thus do not have to eventually pay the amount stated. Moreover, a few subjects express the thought that the hypothetical market is indeed very hypothetical, admitting that their stated WTP might not represent a 'true' value, nor that it is consistent through time;

> *"So, maybe on a yearly basis I could afford to pay £50-60. However, my income will increase...but £50-60 definitely I would devote. Having said that, at the same time, honestly, it's very theoretical and I say that in theory, but in practice when I really have to reach for the money and pay, I wouldn't be as happy. So take that with a little bit of a reservation."* (respondent #13)

Obviously, one may argue that a lack of credibility arises because the particular valuation scenario presented here is perceived as unrealistic. However, since there is no major conceptual difference between the design of this study and others that have assessed the value of equally complex amenities, I do not see any strong reason why the results of this study should be significantly different in this respect.

5.5.4. Strategies and Considerations of Willingness to Pay

According to previous research, when people provide a WTP response, they tend to pay attention to factors not in accordance with economic theory and that should be irrelevant for economic value (*e.g.*, Schkade and Payne, 1994; Vadnjal and O'Connor, 1994). The considerations and motivations of WTP are presented in Table 5.1. As explained in section 5.3., each respondent is given multiple codes when he or she is drawing on several different categories of these in order to establish an answer. The number of considerations assigned to each respondent is thus not restricted. As it turned out, 200

codes were assigned across 29 respondents, and each respondent was assigned between 2 and 13 different considerations.

Table 5.1. Considerations and Motivations of WTP

Considerations, Motivations and Strategies of WTP	Number of Respondents	Mean WTP in each Category
Reference to the particular resource under valuation:		
Scope of problem (subjectively or objectively perceived)	7	514
Personal value of amenity (*i.e.*, what it is worth to me)	3	1500
Costs of solving the problem	2	1400
Uncertain of what the improvement will imply	3	1183
Reference to economic situation and economic factors		
What I can afford to pay	12	489
What is reasonable	3	517
How much do I otherwise spend in taxes	8	384
States percentage (of income or taxes) rather than absolute value	15	711
Reference to other spending	3	340
How much not to have a significant impact on other spending	4	1200
Reference to necessary but not "leisure" expenditures	3	1067
Difficulties of perceiving and calculating future income	4	587
Reference to more general issues		
Environmental or public issues in general	10	425
Reference to (other) charitable contributions	3	690
Reference to political issues and issues of fairness		
Do other people pay and how much?	11	581
Who is responsible, and therefore, who should pay?	19	656
Reference to payment vehicle or mode of administration	7	493
Attitudes or feelings toward taxation in general	4	837
Appropriateness of individual economic value	13	455
Trust in responsible authorities and parties	13	702
Discussion of institutional problems and possibilities	8	724
Other issues of fairness	2	550
Reference to other solutions		
Will change behaviour rather than paying for the problem	4	148
Automatically considers fees related to specific use (*e.g.*, car tolls)	8	588
Other references		
Very difficult or impossible to answer	10	575
Guessed or made up an answer	3	800
Uncertain of own answer (seeks confirmation of what is correct)	3	750
Need more information	3	150
How much is needed ("I will pay what it takes")	8	969
Partly or completely misunderstand the question	4	275
Overall	6.9[a]	639 250[b]

[a] average number of considerations per person
[b] median

As hypothesised, the table illustrates that those factors that ought to form a basis of WTP are rather infrequently considered. For instance, the scope of the problem and personal worth of the amenity is only mentioned by 7 and 3 respondents respectively. Instead, people make reference to the environment or public issues in general (10 respondents) when calculating how much money to allocate. This is further highlighted by the fact that as many as 16 respondents claimed to have been thinking about the environment in general, and not global warming specifically, when explicitly asked after the 'think-aloud' procedure. Thus, these findings are similar to those obtained in chapter 4 and provide support for the embedding hypothesis (Kahneman and Knetsch, 1992). At the same time it should be stressed that a number of people do base their WTP responses on factors assumed to be relevant according to economic theory. For instance, 12 respondents considered how much they could afford to pay. Similarly, some respondents were unwilling to provide an answer simply because they did not have sufficient knowledge about what the improvement would imply, or otherwise felt that they needed more information in order to answer the question properly. For example;

> *"If I was to contribute from my yearly income I want to know the specific facts about the situation, you know, how desperate the situation is, how much is actually needed, ahh, but then I expect that if I was told that the situation dictates this amount of money, I would most likely go ahead and pay it."* (respondent #8)

> *"How much more? I don't know you see, I am not an expert...I don't know how many billions are needed."* (respondent #9)

Apart from motivations directly relevant to WTP, many respondents wanted to know who is responsible for the problem, and therefore, who should reasonably pay for this. In relation to this, people also seem keen on knowing if other citizens are paying and how much. Consider the following examples;

> *"First of all it depends, we say, this is definitely going to work, right?, which makes it really important to me and I would happily pay the same amount as everyone else. But what comes to mind at the same time is actually that maybe the payment should be gradually increased with your income, and, ahh, maybe that companies should pay more than private persons, right?"* (respondent #1)

> *"I don't think a can put a figure to it, I can just put a percentage of my income, hmm, looking at a very low income, ...but one has to look at it in two ways, firstly who, everyone should pay but in different gradings, i.e., people who are obviously less capable of paying, due to lower income or large families, and I'm not going to be able to pay the same* [amount] *as people who are industrialists. The second thing that should be taken into account is the fact that industrialists, or people who are related to the industry, which is actually producing part of the problem, should probably be taxed, in quotation marks, more." ... "You need a figure? Ahhh, what, a £1,000, £1,500 every year? I mean I earn about, hmm, £16,000-17,000, so around 10% of that, knowing that everyone else is doing the same thing, because why should it be that people who believe in it and, it's very difficult to explain but, if you're paying you feel it has to be part of a joint effort with everyone else, it can't just be selectively done"* (respondent #12)

> *"Hmm, so I'm not sure if I completely understand it, I wouldn't have to..., I wouldn't want to pay if I did not think that everybody was going to pay...if it was something that effects everybody, a global thing, I would be very very, I would just be sacred if I was paying £100, or something, and very few other people were going to pay and it wasn't going to be enough to cover it. But you're saying it is enough?"* (respondent #14)

Hence, the issue is not considered in isolation but rather as a collective effort whereby it is important that everyone is 'doing their share'. In this sense, people perceive the good as (purely) public in its character, which should be provided not necessarily on the basis of what isolated individual citizens are willing to pay, but what has been collectively agreed upon, possibly through more common democratic procedures of decision-making.

Another common strategy was to use a benchmark that formed the basis for how much money to allocate. Approximately half the respondents reflected on how much they spend in taxes for other public issues. The majority of these respondents also tended to state a percentage of their monthly or yearly income, rather than an absolute amount. This 'taxation benchmark' may also been seen as supportive of the previous argument that global environmental amenities, which rightly are seen as public issues, should not be provided on the basis of individual value. A further strategy was to make reference to various types of private spending, and to make sure that the amount stated would not have any significant impact on necessary or regular spending. Similar results are reported by Beattie *et al.* (1998) in a study of road safety, in which it was shown that

respondents tend to state a WTP amount that would not have any impact on their regular expenditures and savings.[63] Finally, some respondents considered how much they spend on other charities and based their amount accordingly. Some support for the mental account hypothesis pioneered by Thaler (1990) is provided here. The following transcripts illustrate this;

> *"Hmm, something that is a meaningful amount yet does not detract from my own ability to save money, to do the things and buy the things I want to do. So kind of a painless amount I suppose."* (respondent #10)

> *"If it's a yearly payment it will be different, because I already subscribe to other charities and I've already a little budget for donations to other causes, and I could not strain that too much."* (respondent #13)

Related to this is the view held by many respondents that environmental problems are either serious and therefore worthwhile to prevent, or they are not. Given this, people are willing to 'pay what it takes', while being reluctant to assess any specific value for the amenity on a continuous scale. Two respondents responded in the following way;

> *"...because if global warming threatens to destroy the whole planet, then you're going to say ok, I'll pay everything, hmm, but how to assess how much it is worth to you, if it is not going to threaten your life... You see it is not something you're used to put a value on, you're used to* [have] *value on something and then you get that thing"* (respondent #14)

> *"I wouldn't be a great supporter of that kind of approach....It's, hmm, by doing* [this] *you're mowing away from what, ...hmm, we would then do as much as people say we should do, we would spend as much money as people say we should spend, and this means that you, hmm, you can have almost like a collective conspiracy, ...and I don't know about the effects of global warming, unless from the media, which is controlled anyway. I would never be able to tell that global warming was happening; raise the temperature by one or two degrees over a couple of years,* [and] *I'm not going to know the difference, ...and secondly with that kind of*

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[63] Several respondents consider necessary spending (*i.e.*, rent, food, travels, etc.), but somehow fail to take into account leisure expenditures. It is thus indicated that whereas the former category constitute an accepted reason for not paying more to a good cause, this is not the case for the latter. This also illustrates that the impact of such extra and 'unnecessary' expenditures are underrated in people's budget-making.

> *thing, you're dealing with such fundamental issues, so ultimately I would pay anything to save, hmm, life, you know, even sacrificing my* [own] *life for the world... With* [respect to] *global warming we are not going to get back to the 1992 level, or whatever, the question is; should we get it 1 degree above that, two degrees above that, three degrees above it,* [and] *would I* [like to] *pay £20 to get it three degrees above, £100 to get it two degrees above, £1,000 to get it back to where it was?"* (respondent #15)

5.5.5. Uncertainty of Value Assessment

The misinterpretation of and difficulties with understanding the valuation task are obviously giving rise to an uncertainty regarding how to answer the questions. As indicated throughout this analysis, even when they have comprehended the task appropriately, since they have not been given the opportunity to think about whether it makes sense or not, whereby underlying purposes may become more transparent, people are unsure what would properly reflect their personal value of the amenity. The results indicate that respondents tend to look for information regarding how other people would perceive the task, what they are likely to do, whether they believe 'everyone' ought to take responsibility for the issue, etc. A number of respondents also seek confirmation from the interviewer, making utterances such as 'is this enough?', 'is this good enough?', or 'would that be alright?'. In their search for an 'adequate' value, they are hoping to receive some sort of support from the researcher. Interestingly, in the beginning of the interview some people were reluctant about their participation in the study due to their alleged ignorance of the subject matter, but assumed that the interviewer must be an expert in making similar decisions and assessing WTP. Hence, rather than perceiving the task as an opinion poll, to which any answer should be valid, they start from the position that there is a 'true' value that the researcher knows about.

Some claimed that the question was very difficult or almost impossible to answer (10 respondents), and although only representing a small portion of respondents, 3 guessed or simply made up an answer. Again this is in part reflecting the difficulty of assessing a WTP amount, but equally it illustrates people's reluctance, or even inability, to protest against the procedure, no matter how ignorant they are regarding this, and no matter whether or not they consent to the very idea of assigning monetary values to

environmental issues such as global warming. The degree of uncertainty is best reflected by the following subject;

> *"It's very difficult to, huh, to give you, you know, if you want some sort of a bold hard figure, how much is it worth to you, I mean, you know, in a touching feely sense it's worth a lot to me if it succeeds 'cause it's gonna help my children and my grandchildren, and, huh, so forth, but asking me to put a figure on it, how much per year am I willing to pay is extremely difficult, I mean, hmm, I'm willing to pay as much as my council rate I suppose, I don't know, hmm, so what's that, hmm, 500 bucks, a 1,000 bucks Australian a year, I don't know, but then I might be willing to pay more..."* (respondet #28)

5.6. Conclusions

Findings from previous research related to how people respond to CV questions (Schkade and Payne, 1994; Vadnjal and O'Connor, 1994) are largely replicated in this study. The strategies used in order to assign an economic value to the environmental amenity are mostly not in accordance with the assumptions of standard economic theory. Factors that ought to be relevant seem to be subdued in favour of irrelevant factors. WTP is largely insensitive to the scope of the good, people make reference to environmental or public issues in general rather than focusing on the specific good described in the scenario, they are concerned to what extent they themselves, or other parties, are responsible for the problem, and they tend to automatically consider fees and regulations associated with a use of the specific resource in question, not economic value as defined in the CV literature. How much people can afford to pay is on the other hand an important determinant of WTP, but this is generally not stated in an absolute amount, but rather as a percentage of income. It is further conditioned by how much is spent on 'other' taxes, and if related to overall spending, this benchmark is more or less confined to necessary or regular spending, whereas other 'unnecessary' (or leisure) expenditures do not figure in budget constraints. These findings provide a qualitative framework for understanding the anomalies demonstrated in the previous chapter.

More fundamentally, many respondents were concerned about the appropriateness of basing policy decision related to the amenity on individual economic value, at least as assessed in a study like this. Moreover, rather than thinking about their WTP, some

people were inclined to discuss other, largely unrelated issues, such as general views of taxation, trust in responsible authorities and parties, or conducted other sorts of discussions related to institutional problems and difficulties. Others were concerned if and how much other citizens would pay instead of focusing on their own preferences. Hence it is indicated that an economic valuation of the environment does not come as straightforward as some CV researchers may be inclined to think, and it should not be taken for granted that respondents interpret the valuation task exactly as intended. There seems to be a lack of understanding between the researcher and interviewee in this sense; whereas the hypothetical market may make perfect sense for the former, it is not necessarily perceived in the same way by lay people, who may not comprehend underlying meanings, purposes and rationale of the inquiry, regardless of the provision of a thorough explanation.

What is particularly troublesome is that this lack of understanding is not always expressed, unless probed in relation to the elicitation question. People have a tendency to answer the question anyway, whatever meaning they attach to it, no matter if they adapt to the basic idea of a monetary valuation, and regardless of their consent to hypothetical markets as a basis of environmental priorities. These findings are in accordance with Schwarz' (1994) assumptions that those conversational norms that define the very meaning of a communicative process are absent in CV contexts. Put differently, there has to be a shared mental representation of procedures and purposes, and as long as the hypothetical market underlying CVM is not perceived equally by the researcher and respondents, answers provided may not represent genuine opinions.

Within a traditional quantitative framework, such responses may also be difficult to distinguish from those reported by people who have a well-developed opinion toward the issue. Previous research demonstrates that 'non-attitudes' show remarkable consistency over time, and seem relevantly linked with other public issues (*e.g.*, Schuman and Presser, 1981). Therefore, the mere expression of a monetary value should not be taken as evidence that this is founded in an underlying value construct. A difference in this respect is found between individual interviews and focus groups, the latter which seem to encourage respondents to more freely express their attitudes toward and concern over whether the proposal of public policy-making makes sense in

democratic context. Thus, apart from being more vulnerable to expectations and arguments presented by the researcher when people are less involved in a (public) issue (Bishop, 1990), this anomaly seems to vary with contextual factors of value assessment.

I believe that before any serious attempt is made to assess the individual economic value of natural resources, the procedure needs to be 'institutionalised' by being thoroughly discussed in a dialogue between politicians, citizens, businesses, researchers, and other involved parties over a significant period of time. A way of testing the possible influence of such communicative processes in the establishment of economic values of natural resources is to compare responses between individual and social contexts of valuation. This should facilitate an understanding of the value-concept and enhance the likelihood that suggested relationships between economics and preservation of natural resources are appreciated. If the valuation task is seen as feasible and realistic, respondents are also likely to consider their choices more consequential, and therefore, more tied to instrumental considerations and economic budget constraints. If people are given the opportunity to reflect upon what the policy proposal implies, and whether or not they consent to the foundations of this, they would presumably become more aware of their values and more able to provide well-founded estimates of WTP.

As a concluding remark, an important implication of this study is that there are a number of aspects surrounding the valuation task that will influence answers to CV studies and that are problematic for subsequent welfare analysis, at least when this concerns a global and more complex amenity. CV advocates generally believe that the impact of irrelevant factors of valuation, such as moral implications, issues of fairness, trust in responsible authorities, are possible to exclude by improved methodological procedures, for instance, by providing adequate and complete information of underlying purposes. However, mainly due to the hypothetical nature of the inquiry, the present research demonstrates the difficulties of positioning the respondents in a context wherein questions are interpreted as intended, and in which they are solely basing their responses on the personal (economic) benefits of the resource.

6. Imprecise Economic Preferences: Response Formats and Giving Respondents Time to Think

So far in this thesis it is demonstrated that statements of Willingness To Pay (WTP) represent something different than monetary value. Rather than solely reflecting instrumental value, WTP encompasses a variety of dimensions, such as social norms, symbolic values, moral implications, political constraints, etc. Possibly due to these multiple aspects of valuation, people are unsure as how to answer the questions posed. In particular, they seem uncertain regarding exactly how much they are willing to pay for the amenities, or what would be a 'reasonable' amount. This chapter takes notice of this phenomenon and examines specifically how uncertain people are of their Contingent Valuation (CV) responses. The ambivalence over trade-offs between money and environmental changes that respondents feel has been analysed by Dubourg *et al.* (1994), Gregory *et al.* (1995), Ready *et al.* (1995), Welsh and Poe (1998), and Ready *et al.*, (1999). A general conclusion of these papers is that people only have a vague idea as to within which range their WTP is situated, which will result in imprecise and vaguely represented estimates.

In this chapter, a standard Open-Ended (OE) valuation question is compared with a Polychotomous Choice (PC) question that allows the respondents to express the degree of uncertainty of their stated WTP (Welsh and Poe, 1998). The latter is furthermore compared to a more inclusive response format, originally developed by Blamey *et al.* (1999), in which respondents express attitudes toward multiple dimensions of the public good, rather than solely stating their support through a single measure. Finally, in one setting respondents are given some time to think about the valuation task before a response is elicited. It is anticipated that this will facilitate social processes in the form of discussions with friends and relatives. On the basis of previous findings, the main hypothesis is that people's supposedly strong feelings toward environmental resources are at best only vaguely represented in monetary terms, and the paper provides specific tests in order to understand how the above contexts and conditions of valuation contribute to the preciseness of stated WTP.

6.1. Ambivalence and Imprecise Willingness to Pay Estimates

Ready *et al.* (1999) argue that there exist thresholds outside which respondents are certain of accepting (or not accepting) a monetary bid posed in a CV questionnaire. However, for bids situated between these thresholds the individual is ambivalent over whether to pay or not, and therefore, any such bid should not be interpreted as a point estimate. The ambivalence region is illustrated by figure 6.1.

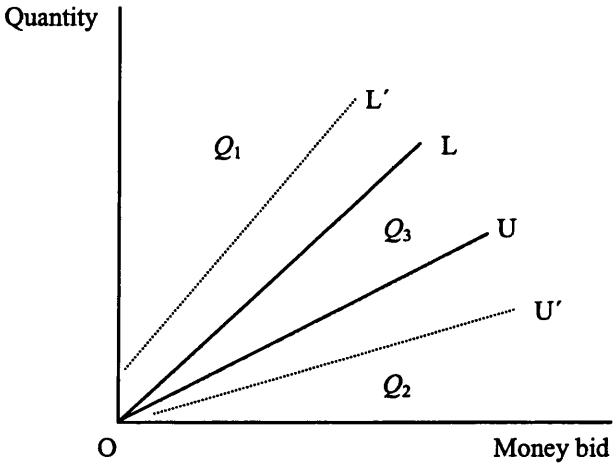

Figure 6.1. Ambivalence of WTP

Any combination of a monetary bid and a change in the quantity of the public good below and to the right of the line U (upper bound) will result in a rejection from the respondent, whereas any combination above and to the left of the line L (lower bound) will result in acceptance. The respondent will easily answer 'yes' to the combination Q_1, and easily 'no' to that of Q_2. The region of ambivalence lies between these thresholds. For example, she will be ambivalent to a monetary bid and a quantity change at Q_3. This does not imply that the individual is indifferent between a yes or no response, but rather that she is uncertain whether to support the project or not.[64]

[64] The region of ambivalence may obviously be wider or narrower depending on the character of the amenity, and is likely to vary between respondents. Another example is the region between L′ and U′. In this case the respondent is experiencing a wider region of ambivalence, and there are fewer combinations that she is certain to reject or accept. We also expect her to be more or less ambivalent toward any combination between L′ and U′. Thus, we may assume that the experienced ambivalence is a relative notion that may be expressed as 'rather uncertain', 'very uncertain', etc.

Although Ready *et al.* (1999) acknowledge that there are several reasons for respondents' uncertainty in a CV study, they put emphasis on the lack of detail in the hypothetical scenario description. This is likely to be true in many cases, but the novelty of the task, arising from the complexity of the environmental amenity, or due to the novelty of the hypothetical market, is likely to pose more fundamental problems that cannot easily be overcome by an improved scenario description. Findings by Judd *et al.* (1981) and others indicate that attitude expressions contain more residual variance and are less precise when people are less involved with a political issue, and it calls into question to what extent people possess meaningful attitudes in such cases (Converse, 1970). These findings are also in accordance with the hypothesised effects arising from various heuristics used in decision-making under uncertainty as postulated by Kahneman *et al.* (1982). Therefore, rather than routinely attributing people's ambivalence over their preferences to flaws in the methodology, there is an incentive to investigate whether fairly precise economic estimates may be at all possible to assess on the spot, and in what way and through which procedures of valuation these may be crystallised into a more stable measure.

6.1.1. Response Format and Uncertainty of Willingness to Pay

Ready *et al.* (1999) compared an OE with a Dichotomous Choice (DC) response format in a split sample CV study. For both formats, a payment card was used as a response aid. Consistent with previous studies (*e.g.*, Schulze *et al.*, 1996), the OE format generated lower estimates of WTP than did the DC format. On average, the standard DC question overstates WTP by a factor of 1.6. On the basis of some follow-up questions, Ready *et al.* (1999) concluded that DC respondents used a lower threshold of certainty compared to OE respondents. Accordingly, when facing an OE format, the respondents report a value that they are more certain of paying, although both formats seem to generate optimistic responses. In an attempt to more closely examine this effect, Welsh and Poe (1998) (and similarly Ready *et al.*, 1995) compared a traditional DC format with a PC format, in which the respondents choose between several response categories. By using more than two response alternatives, which traditionally only distinguish between a 'yes' and a 'no' response, the intensity of preferences may be measured, ranging from a definite yes (or strongly preferring), to a definite no (or strongly

against). A respondent that feels ambivalent over her choice is thereby allowed to express this by choosing any of the middle response alternatives. The general finding was that the traditional DC format results in higher estimates than the PC format.

6.2. Multi-Dimensional Approaches and Avoidance of 'Yes-Saying'

The most important finding of the study by Welsh and Poe (1998) is that people facing a DC format may be inclined to answer affirmatively in a situation when they are uncertain of their preferences. Blamey *et al.* (1999) have defined this tendency as 'yea-saying', which arises as a result of people's inclination to agree with statements regardless of their content or implications. While the overarching research perspective among the majority of CV proponents is that this is primarily a statistical nuisance, others view this type of response acquiescence as an inherent characteristic of human decision making that is not unique for CV surveys (*e.g.*, Bachman and O'Malley, 1984). Rather than being directly related to the content of questions, in many instances, responses reflect personality traits of the respondent. In research settings, this effect is even more likely to be present as argued by Schwarz (1994) and others. This presumption is empirically supported in chapter five, in which it is demonstrated that respondents tend to provide WTP amounts un-associated with their underlying preferences, and regardless of their eventual disapproval of a monetary valuation of the public good.

One particular reason for the occurrence of 'yea-saying' in CV contexts, and equally the lack of precision of WTP, may be that responses incorporate dimensions other than just instrumental value. Thus, the subordination of outcome-based considerations in favour of expressive motivations, particularly when these stand in conflict with each other, may lead respondents to experience uncertainty in their value statements. Similarly, when the latter motive adds to the former, overstatements of WTP are likely to occur. Hence, rather than confining ambivalence to indifference as suggested by Ready *et al.* (1995), or that people do not have any meaningful opinions at all (Converse, 1970), the observation of vague and unstable attitudes may be a much more complex phenomenon that arises when the individual tries to resolve and express multiple and often conflicting opinions (Zaller and Feldman, 1992). In relation to this, Blamey *et al.* (1999)

argue that the act of expressing support for a public good, captured only by WTP, is likely to have greater immediate emotional significance than losses in income. This is paralleled by the discounting of costs and accentuation of benefits accrued in the immediate as shown by (Slovic, 1969), which results in a tendency to agree with proposed WTP bids and, consequently, an overvaluation of the public good.[65]

As a remedy to this phenomenon, Blamey *et al.* (1999) suggest a different response format that originates from Multi-attribute Utility Theory (MUT). Instead of expressing their overall support on a single scale, people respond to more confined aspects of the public good that are anticipated to reflect multiple dimensions of value, some of which may be in conflict with each other. For example, people may support an environmental project of which they enjoy the benefits, but may on the other hand be reluctant to provide any monetary value because they do not think it is part of their responsibility to pay for this. Similarly, they may like the idea of proposed interventions, but at the same time be sceptical of whether these will achieve what they set out to achieve. By making the inquiry more specific and including more items, respondents are given the opportunity to refine their answers and provide more precise estimates of WTP. It is furthermore hypothesised that the procedure will make people more aware of affective and conflicting motives, thereby making it easier for them to assess economic values.

6.3. Social Processes and the Establishment of Economic Preferences

In CV studies respondents are asked to provide answers without being given much time to think about the issue. They are hence prevented from discussing the issue with friends and relatives, a process that is likely to influence opinions, particularly when

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[65] Interesting here is the finding that when subjects do not feel committed to the consequences of their actions, they similarly tend to maximise gains and discount potential losses (Slovic, 1969). On the contrary, when subjects know that they actually have to pay according to the choices made, they are acting more cautiously. Blamey (1998) conducted a study that partly built on these findings, in which he argued that overstatement and indecisiveness of WTP occur since the respondent anticipates that her answer will not be decisive of outcomes. Thus, we may claim that, apart from an inherent difficulty of assessing WTP, estimates will be even less precise since there is little motive for the respondents to seriously consider their 'true' opinions in many CV studies.

there is no previously formed judgement accessible in memory. Given that a core argument among CV critics is that rapid answers to complex questions are very unreliable (*e.g.*, Gregory *et al.*, 1993; Schkade and Payne, 1994), and rather should be interpreted as context dependent temporary constructions, it is somewhat surprising that very little attention has been paid to the role of *social processes* in the establishment of WTP. To my knowledge, there is only one study that has explicitly addressed this issue. Whittington *et al.* (1992) investigated whether WTP from respondents who were given time to evaluate a proposed water system in three Nigerian villages differed from those who were not. Their findings suggest that respondents in the former group were willing to pay significantly less than the latter. However, the discussion among the respondents may not have so much to do with social influence on attitude formation in a general sense, but rather was aimed toward reaching a common decision about a tangible issue that involved and affected everyone in the village.

A likely reason why the impact of social processes has not received much attention in the CV literature is that researchers interested in the field, both economists and psychologists, come mainly from an 'individualistic' tradition of research, which Morgan and Schwalbe (1990) term 'psychological social psychology'. This perspective generally pursues cognitive activities (and behaviour) in a 'structural vacuum' that ignores the influence of the social environment. Contrary to this, the European tradition of social psychology, pioneered by Moscovici (1984), stresses the importance of social interactions in the development and crystallisation of motivations, beliefs, attitudes, and behaviour. Rather than cognitive mental representations, this research tradition is concerned with the *social origin* of such schemata.

On the individual level, the local social environment creates expectations and imposes roles on the specific person, on which she reflects and acts upon (Morgan and Schwalbe, 1990). Taking this hypothesis a step further, we may as in chapter three argue that the development and crystallisation of beliefs and attitudes are similarly determined by the interaction with other people, since this process determines how we perceive the world, what values we have, which issues we are inclined to put emphasis on, what perspectives we hold, what interests we have, what should be considered as

important aspects of an inquiry, etc.[66] In this context I am interested in how people form and change attitudes toward specific issues as they interact with each other, and therefore, theories of social influence and social comparison (*e.g.*, Kelman, 1958; Fazio, 1979; Nowak *et al.*, 1990) are considered as most relevant for this research.

6.3.1. Social Interaction and Post-Influence

Social interaction and exposure to other sources of reference, such as media coverage and news stories, has two consequences. Firstly, they are vital, I would argue, in order to form an opinion of a matter that is novel to the individual. When little or no information exists about a particular issue, the consultation with other people may be useful in *constructing* a judgement (*e.g.*, Fazio, 1979). In chapter five it was demonstrated that some respondents ask the interviewer for advice regarding what will be a reasonable fee. In answering the question, they uttered phrases such as 'would that be alright', 'is this enough', etc. They furthermore expressed concern over whether other citizens would pay and how much, which indicates that the issue demands a collective effort that may not be adequately decided by individuals in isolation. Support for this hypothesis is also provided by the results of conducted focus groups, in which respondents tended to express their concern and possible disagreement toward the procedure more openly than in an individual context.[67]

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[66] The research on risk perception provides an example that people's valuations and choices cannot be fully understood by merely studying these in individual contexts. For example, Heimer (1988) proposes that various social influences shape how we perceive risky events. Drawing upon the works of Douglas and Wildavsky (1982) among others, she extends the experimental work on decision making under uncertainty, pioneered by Kahneman *et al.* (1982), by making enquires into the origin of various heuristics and framing effects. Her hypotheses is that institutions and social situations provide people with a set of vivid experiences that lead to that some risks are overestimated and other risks underestimated, regardless of involved objective probabilities and consequences.

[67] There are two forms of social influence. *Normative* influence occurs when the individual conforms to the expectations of other people, whereas *informational* influence acts as providing evidence about reality. The former force normally requires some kind of personal relation with the influencing parties, whereas the latter may occur among individuals that do not form a group, although it is reasonable to assume that homogeneity of the group enhances this influence (Deutsch and Gerard, 1955).

Furthermore, other people's judgements are important in order to develop and validate already but vaguely established opinions about issues that the individual is familiar with. The views of others reinforce in this sense the subjective *validity* of our own beliefs (*e.g.*, Festinger, 1950; Fazio, 1979; Zimbardo and Leippe, 1991). For instance, by discussing an issue with others, people are likely to learn supportive (or non-supportive) reasons for a particular standpoint. In this process, participants are also likely to become more involved, thereby making them more aware of their feelings and viewpoints (Bligh, 2000). It is finally envisaged that the frequency of talk regarding a (political) issue contributes to the stability and consistency of opinions (Evans and Lalljee, 1997). People seek confirmation and support among social groups, and once this is given, they may be more assured of their own opinion. Moreover, Evans and Lalljee (1997) suggest that making a statement somehow commits the speaker to a point of view, and that she is likely to repeat this and make similar statements in the future. Similarly, the more frequently a particular statement is made, the less likely is it that this later will be radically changed.

6.3.2. Internalisation and Pre-Influence

Internalisation of values from previous social experiences generally acts as an aid to interpret forthcoming events. Kelman (1958) argues that when a particular value or value system has been internalised, people tend to state an attitude or perform a behavioural response without the direct surveillance of other people. Hence, whenever the individual is thinking of an issue, or when she is considering doing something that others may care about, she is contemplating what other people would think and how they would behave or react in a similar situation. The approval (disapproval) of an act occurs when this is congruent (incongruent) with the underlying value system (Dornbusch, 1993). However, in the case of CVM, such internalisation hardly exists since the overwhelming majority of citizens have never been faced with a similar inquiry. There is no evaluative standard at hand, implying that the mental representation of the task is based primarily (or solely) on temporarily accessible information, and therefore more sensitive to context and framing effects (Schwarz, 1997).

To conclude these arguments, providing a valid and consistent WTP response without being given the time to think through the valuation task is likely to be difficult for people. It is hypothesised that monetary estimates constructed during the course of the elicitation process are more diffuse and not equally well represented as those elicited after the respondents have thought through the issue, during which time important social processes underlying preference formation are facilitated. The validity of WTP responses is thus assumed to improve partly as a result of the monitoring, influence and support from the (immediate) social environment. A collective discussion may also facilitate certain motives among the respondents that would possibly result in different choices than in an individual context, the latter which to a larger extent are predicted to evoke self-oriented wants and interests (Vatn and Bromley, 1994).

6.4. Design of Experiment and Model

Data were collected at the London School of Economics (LSE) between September and November 2000. Subjects were targeted in two different ways. One group of respondents was asked during class teaching if they wanted to participate in the study. If they were, they were asked to sign-up on an attendance list and were later notified through e-mail. The other group of respondents was randomly selected from the school's register and were told about the study through an e-mail. In order not to jeopardise the purpose of the study, they were only informed that this was about some environmental policy issues. Hence, no detailed information about the specific purpose of the study was provided prior to the interviews.

Those who were interested of participating were sent a second e-mail was sent that suggested various times for them to attend. Altogether 10 sessions with between 8-17 respondents in each were run. Each session lasted for approximately 30 minutes, and for taking part respondents were paid £5. Since all subjects are students I do not expect their WTP responses to be representative for the general population. However and common throughout this thesis, I am interested in the effect of various conditions imposed on valuation scenarios, and therefore, it is the comparability of the sub-samples that is important. The participants came from a variety of fields in the social sciences and different course categories are fairly evenly represented across all sub-samples.

6.4.1. Experimental Design

The questionnaire answered in the class-room experiment consisted of between 13 to 15 questions depending on the particular response format. It included instructions for the valuation task, some questions related to socio-economic characteristics, knowledge questions about the amenity being valued, attitude questions addressing the appropriateness of an economic valuation of natural resources, and finally, a description of the proposed environmental project. The environmental project was specified as the saving of the African Elephant, a campaign currently run by the World Wildlife Fund (WWF). The scenario read;

> The long-term survival of the African Elephant is a cause of great concern. The number of elephants has fallen drastically during the second half of last century. In 1979, there was an estimated 1.3 million elephants in Africa, but by 1995 this figure had shrunk to around 400000. Part of the decline is due to the availability of new dry-land adapted crop strains, with the consequence that former elephant rangelands are now being cultivated. Furthermore, in forest areas the impact of major logging programmes is opening up and destroying elephant habitat. Apart from such widespread changes in the extent and pattern of land use, a major cause of the decline is poaching to satisfy demand for ivory and recreational illegal hunting.
>
> As a consequence, approaches are needed to stop the decline in the number of elephants. Apart from traditional anti-poaching efforts and the elimination of market demand for ivory products, it is essential to ensure the survival of the remaining species. The World Wildlife Fund (WWF) is the major actor in this field. It is currently running a campaign by setting up and managing reserves in order to protect wild elephants. Experience has shown that local involvement is important in these attempts, such as community based management, whereby landowners share both responsibility for and benefits accrued from elephants.
>
> However successful these conservation approaches may be, they bear significant costs, and as the economic situation in many third world countries continues to decline, wildlife departments and local communities are suffering significant budget cuts. This makes international support for elephant conservation more important than ever. In this study we are interested to know how much the efforts to save the elephants are worth to you. More specifically, we would like to know how much you are willing to pay, as a yearly contribution, to support the WWF campaign.

In order to compare the influence of various response formats, four variations were presented to independent groups. In one sub-sample, WTP was assessed through a standard OE valuation question. In the remaining three sub-samples the respondents were presented with a PC valuation format that presented an ordered sequence of WTP amounts. The difference compared to a standard PC question is that in the format used here they were told to indicate how certain they were of paying each of the amounts suggested in the valuation question. This allows respondents to express the degree of uncertainty associated with each bid threshold, from one bid that they are definitely sure of paying (lower bound), to one that they are definitely sure that they will not pay (upper bound). The instructions preceding this task are presented below, and table 6.1. presents the specific certainty thresholds and bid amounts used.

> In the table below you are presented with 11 different amounts. We want you to state **how sure** you are of paying each of these as a contribution to the WWF campaign for saving the elephants. Please tick the appropriate box for each suggested amount. The willingness to pay is an annual payment. Take your time and try to consider the following before answering:
>
> - *your income and/or grants*
> - *your current expenses*
> - *your possible future use of your income*

Table 6.1. Multiple-bounded response format

	£2	£5	£7	£10	£15	£20	£30	£50	£100	£200	£400
I am **definitely sure** that I will pay											
I am **almost certain** (90% sure) that I will pay											
I am **rather certain** (75% sure) that I will pay											
It is **equally likely** (50% sure) that I will pay											
I am **rather certain** (75% sure) that I will **not** pay											
I am **almost certain** (90% sure) that I will **not** pay											
I am **definitely sure** that I will **not** pay											

The respondents were in addition told that the amount should represent their maximum WTP associated with each threshold, or alternatively, an amount beyond which they are not willing to pay. Thus, rather than providing a single point estimate, the format will disclose a range of possible WTP amounts that the individual is more or less sure of

paying, and apart from the size of mean and median WTP, the design of this study also reveals whether responses will be more precise through different approaches of estimating WTP. The particular range of amounts was chosen on the basis of the results of the OE format, which were assessed in a study prior to the PC formats.[68]

Exactly the same design, range of bids and certainty thresholds were used in all three experimental conditions relying on the valuation format presented in table 6.1. In one of these, the questionnaire was formulated as above. In the scenario that allows the respondents to respond to several dimensions of the environmental project, rather than merely stating their WTP, the following questions preceded the valuation questions;

To save the African Elephant is worth something to me	☐ Agree ☐ Disagree
To save the African Elephant is an important issue	☐ Agree ☐ Disagree
I cannot afford to pay too much for this issue	☐ Agree ☐ Disagree
I do not believe the particular campaign suggested will be efficient in saving the African Elephant	☐ Agree ☐ Disagree
I do not think this lies within my responsibility. Poachers and other responsible parties should pay	☐ Agree ☐ Disagree
There are other environmental issues that are more important and to which I rather contribute	☐ Agree ☐ Disagree
Although being worth a lot to me, I do not think it is appropriate to base policies on the public's WTP	☐ Agree ☐ Disagree

The format thus informs the respondents about various presumably important aspects of the valuation scenario and permits them to explicitly consider each of these, which, it is hypothesised, will result in different and possibly more informed responses to the subsequent WTP question, compared to the standard PC question. The format is principally similar to the one used by Blamey *et al.* (1999), who argued that this would

[68] The median WTP of the OE format was £25, with a mean WTP of £41.80.

facilitate more conservative WTP responses since the individual, for example, may express that they find the environmental issue important, but for other reasons are reluctant to pay for it, at least in this manner.

In the final sub-sample, the respondents were given some time to think about the environmental project and the valuation task before a WTP was elicited. The following information preceded the valuation question for this group of respondents;

> We want you to consider the question below. However, we do not want you to answer it now. Instead, you will be given a week or more to think about a monetary contribution to the WWF campaign. During this time we encourage you to discuss the environmental problem, as well as an economic valuation of this, with friends, spouse, relatives, etc. We also want you to think of your opinion when similar (environmental or public) issues are brought up in the media. Although receiving valuable comments from other sources, keep in mind that it is your own opinion that we are interested in.

The questionnaire was separated into two parts and the experiment was conducted in two sessions. In the first of these, the respondents answered the first part, which presented the whole scenario and some knowledge questions related to elephants and the WWF campaign. They were also presented with the valuation question and the range of WTP amounts illustrated in table 6.1., but were told to only use this as a guide for their subsequent responses, and were urged not to answer the question since I did not want them to commit themselves to any response at this stage. After reading through and completing this part of the questionnaire, they were asked to bring with them the first part of the questionnaire to the next occasion we met, at which time they provided their WTP. Three experimental groups were run, in which the respondents were given between 7 to 10 days to think about the issue. The subjects were paid £5 for each occasion they turned up.

In all PC formats the respondents were asked to state more precisely how much they were 90% sure of paying in a follow-up question. By comparing these responses to the results of the OE format it is possible to indirectly judge what level of certainty the latter respondents are basing their WTP amounts on. The WTP was elicited as a standard OE question and asked after to the PC question with certainty thresholds;

Please state exactly the amount you are **almost certain** (90% sure) of paying. The amount should be equal to or more than what you are definitely willing to pay, but less than or equal to what you are rather certain (75% sure) of paying.

I am **almost certain** (90% sure) I would pay £ ..... to the WWF campaign

To summarise the design of the study, four different valuation scenarios or formats were applied; a standard OE response format (in the following denoted *open-ended,* or *OE*), a PC question with certainty thresholds (*PC standard*), a PC question with certainty thresholds that in addition presented several questions relating to various dimensions of the environmental project (*PC multi-attribute*), and finally, a PC question with certainty thresholds in which the respondents were given time to think before they provided their WTP and answered some follow-up questions (*PC time to think*).

6.4.2. The Model

Responses to the OE format are analysed with an OLS regression model. The analysis of WTP data elicited through the PC format with certainty thresholds is based on a standard logit-model, however, with some modifications in the application of this. The model applied here postulates that, for each consumption alternative, the individual derives a certain utility that is defined by the various characteristics of this alternative. Apart from the systematic part of the utility function, V, that consists of the various goods available for consumption, there is a random term, ε, implying that the utility derived for individual i from choosing, in this case the environmental project, is;

$$u_i = V_i + \varepsilon_i \qquad (1)$$

The assumption of this model is furthermore that, between a 'yes' and 'no' response, the individual chooses the alternative with the highest utility.[69] The probability of choosing to contribute to the Environmental Project (EP) thus equals the probability that the

[69] If the utility from the environmental project exceeds that of an alternative use of the money represented by WTP, a 'yes' response will be provided, otherwise not. For further explanation of the random-utility framework and model estimation in economics, see for instance Long (1997).

utility from this is greater than the utility of an Alternative (A) use of the amount of money equal to the WTP bid. Therefore we have;

$$\Pr(Y_i = 1) = \Pr(V_{iEP} + \varepsilon_{iEP} > V_{iA} + \varepsilon_{iA}) = \Pr(\varepsilon_{iEP} - \varepsilon_{iA} > V_{iA} - V_{iEP}) \quad (2)$$

The variability in utility is accommodated by Socio-Economic Characteristics (SEC) among the individuals, and, as hypothesised, the different Response Formats (RF) applied. The probability of providing a 'yes' response furthermore depends on the WTP Bid (BID). Given that the systematic part of the utility function, V_i, is assumed to be linear in these attributes, it takes the following form;

$$V_i = \alpha + \beta \mathbf{x}_{SEC} + \beta \mathbf{x}_{RF} + \beta \mathbf{x}_{BID} = Z_i = L_i \quad (3)$$

The probability that the individual chooses to contribute with the WTP bid proposed for the environmental project is thus defined by;

$$\Pr(Y_i = 1) = \frac{\exp(Z_i)}{1 + \exp(Z_i)} \quad (4)$$

The model above can be applied to each of the certainty thresholds. It will thus define the probability that the individual respond with 'definitely sure', '90% sure', '75% sure', etc., to each WTP bid proposed.

6.5. Results

Altogether 146 people participated in the study. These respondents were further allocated to each sub-sample according to the following; *open-ended* (n = 35), *PC standard* (n = 37), *PC multi-attribute* (n = 37), and *PC time to think* (n = 37).

6.5.1. Ambivalence Bounds of PC Formats

Table 6.2. presents the parameter estimates of the logit regressions associated with various certainty levels. The *PC standard* format is in these set as the benchmark scenario. In addition to two dummy variables reflecting the intercept effect of the *PC multi-attribute* and *PC time to think* formats respectively, the regressions include two

socio-economic variables, *gender* and *income*. According to the table and as expected, the higher the WTP bid presented, the less likely is it that the individual will respond with a 'yes' response, a result that is highly significant across all four certainty levels. Furthermore, income is positively related to WTP, and finally, females are more likely to support the WWF campaign. Interesting in this respect is that the coefficient representing the impact of gender shows a particularly strong effect for the highest certainty level, indicating that women provide slightly more precise estimates of WTP.[70]

Table 6.2. Parameter estimates for various certainty thresholds[71]

Variable	**WTP 100% sure** Coefficient	**WTP 75% sure** Coefficient	**WTP 50% sure** Coefficient	**WTP 25% sure** Coefficient
Constant	0.831*** (3.24)	1.406*** (6.18)	1.659*** (7.61)	1.789*** (8.66)
WTP bid	-0.175*** (-10.73)	-0.111*** (-12.32)	-0.073*** (-12.30)	-0.036*** (-12.88)
PC multi-attribute	0.087 (0.39)	0.036 (0.19)	-0.204 (-1.07)	0.187 (0.96)
PC time to think	-0.254 (-1.15)	-0.336* (-1.72)	-0.621*** (-3.29)	-0.680*** (-3.70)
Gender (1 if male)	-0.485*** (-2.65)	-0.337** (-2.10)	-0.273* (-1.77)	-0.337** (-2.21)
Income	0.0005** (2.29)	0.0005** (2.33)	0.0004** (2.07)	0.0003* (1.76)
Log-likelihood	-371.622	-467.431	-507.510	-528.134
n	111	111	111	111

Note: t-values presented in brackets
*, **, and *** denotes significance at the 0.1, 0.05, and 0.01 level respectively

[70] The unrestricted models included two more variables (whether the respondents was a graduate or undergraduate student, and whether he or she was a member of an environmental organisation), but were on the basis of performed chi-square tests excluded in the restricted models presented in table 6.2.

[71] The parameter estimates of the remaining three thresholds presented in table 6.1. are as expected and according to the results here, but are for illustrative reasons not included in the table.

If we take a look at the difference between the three PC formats used, across all regressions, the respondents presented the *PC time to think* format are less likely to respond with a 'yes' response than respondents presented the *PC standard* format. However, as indicated by the significance level of the coefficients across the four regression models, the effect is more pronounced the lower the certainty threshold, resulting in wider ambivalence regions of the standard PC format compared to the *PC time to think* format.[72] Thus, the results demonstrate firstly that the respondents who were given time to think about the issue prior to the valuation question on average provided a lower WTP. Secondly, it is indicated that this process encourages respondents to revise their responses particularly for lower certainty thresholds (*i.e.*, their upper bound of WTP, that is, what they are rather or definitely sure of not paying), resulting in more precise estimates.

What is interesting to note is that, except for the 50% sure threshold, the likelihood of a 'yes' response among respondents presented the *PC multi-attribute* format is actually higher than among those presented the *PC standard* format. Although the parameter estimates are not statistically significant between these two formats, this result is somewhat unexpected since, according to the reasoning before and findings provided by Blamey *et al.* (1999), we would expect the opposite to occur. One possible reason for this effect is the slightly different design of this particular study; whereas the respondents in the study by Blamey *et al.* (1999) stated their WTP in association with their response to each aspect of the issue or procedure, here they were only subsequently asked about their WTP. Hence, no direct or explicit link is established between opinions toward various aspects of the environmental project and statements of WTP in the study presented here.

From the estimated logit regressions, ambivalence regions were constructed for each response format. Similar to Ready *et al.* (1995), the lower ambivalence bound is defined

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[72] To clarify this finding, it is indicated that for lower certainty levels (*i.e.*, 50% and 25% sure), respondents who are given time to think are significantly less likely to provide a 'yes' response for each bid presented (implying a lower WTP among these group of respondents), whereas no significant difference is found between the formats for higher certainty levels (*i.e.*, 100% and 75% sure).

as the amount to which 50% of the respondent would respond with a 'definitely yes', whereas the upper bound is defined as an amount to which 50% would respond with a 'definitely no'. The bounds according to these probabilities are calculated on the basis of other variables in the model set equal to their mean values of the sampled population. The ambivalence regions may hence be viewed as representing a typical or average respondent to the study. In order to take account of the possible sensitivity of the results of these categorisations to what is considered a 'yes' response and what is considered as a 'no' response, two alternative definitions of lower and upper bounds were used, defined as the amounts to which 60% and 70% of the respondents would respond with a 'definitely yes' and a 'definitely no' respectively.

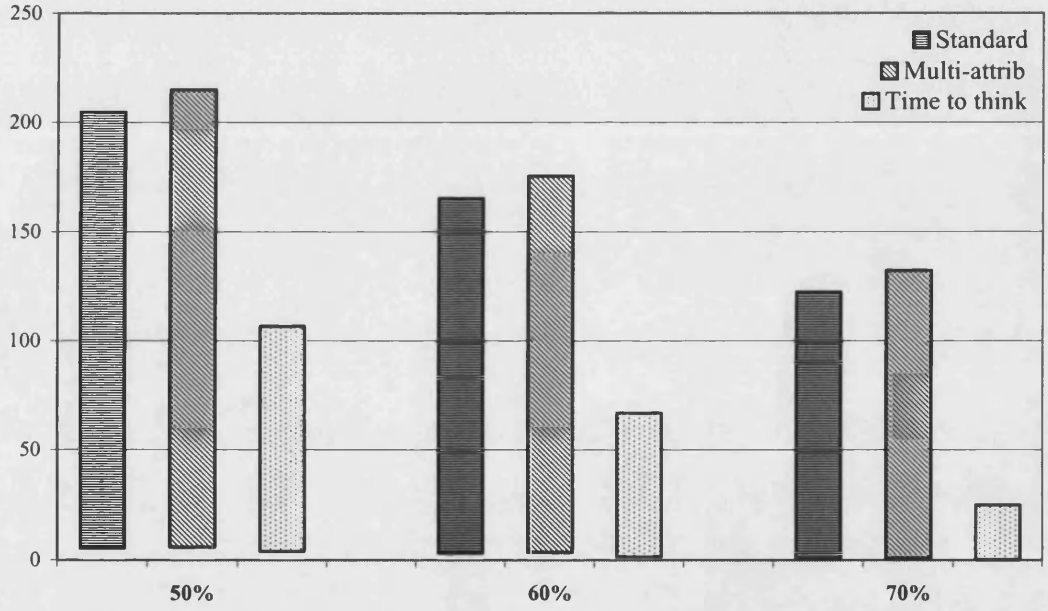

Figure 6.2. Ambivalence bounds of WTP (measured in £)

In Figure 6.2., the difference between lower bounds of WTP are not as pronounced as between the upper bounds, a result that is consistent across all three definitions of ambivalence regions (*i.e.*, for 50, 60 and 70%).[73] Whereas the *PC time to think* format

[73] However, due to the scale of the value axis, the difference between the lower bounds across formats is somewhat concealed in the figure. The exact ambivalence regions were as follows, presented in the order *PC standard, PC multi-attribute*, and *PC time to think*; 50% (5.4 - 199.5, 5.8 - 209.2, 3.9 - 102.7); 60% (3 - 162.3, 3.5 – 172, 1.5 –65.5); 70% (0.5 – 121.9, 0.9 – 131.4, 0.1 – 24.9).

results in much narrower ambivalence regions, these are approximately the same for the other two formats, however that of the *PC multi-attribute* format being slightly wider. To conclude, the region of ambivalence among the respondents who were given time to think about the issue and the valuation task is, according to the above definitions, half or less than half than that of the remaining two sub-samples, which leads us to conclude that the respondents in this sub-group provide more precise estimates of WTP. The parameter estimates of the logit-model in table 6.2. support this interpretation.

6.5.2. Qualitative Analysis

In a follow-up section of the questionnaire, the respondents in the *PC standard* format were asked to comment on how valuable it would be if given the opportunity to state their opinion on the basis of several aspects of the environmental issue, and how valuable it would be to have time to think about and discuss this with other people. The respondents in the remaining two sub-samples were asked how valuable each of these response formats or processes actually was. Overall and across all categories of respondents, both a more inclusive format that allows the respondents to express their WTP on the basis of several aspects of the issue, and one that gives them some time to think about this before stating their WTP, seems to be a helpful guide in the valuation process. However, the analysis does not provide any support for the idea that *PC time to think* format should be more valuable than the *PC multi-attribute* format.

If we examine specific comments made in relation to the question on the value of time to think, the majority perceived that, for various reasons, this would be more or less valuable or helpful. Responses ranged from those who consider the time as useful in order to reconcile some new aspects of the problem, such as comparison with other environmental issues, reflection of personal responsibility, trust in interventions, and to scrutinise budget constraints, to those who stated that it would be useful for whatever reason. What is particularly interesting and supportive of the findings in chapter five is some respondents' claim that it made them realise that their 'on the spot' WTP would be more based on political correctness and an aim to please the interviewer, rather than, perhaps, personal worth. Despite the fact that only a few respondents explicitly made this comment, this raises the question of whether the time-lapse from the presentation of

the valuation question to the elicitation of WTP may accentuate instrumental considerations involved, and subdue expressive motivations not directly linked to the environmental issue being valued.

Respondents were finally asked if they had discussed the issue or valuation task with someone else, and here only five out of 37 said that they had not. Yet, the influence of this discussion is not clear-cut. Whereas some respondents stated that it was very useful, the majority said that their opinion was pretty much established before knowing about other people's views. What the analysis does suggest, however, is that among some respondents this feed-back was valuable as a validation of their prior opinion, thereby supporting the arguments by Fazio (1979) and Zimbardo and Leippe (1991) who hypothesise that a discussion with other people is useful in order to become more sure of vaguely established attitudes and opinions. To conclude, we do not have any unambiguous indication of the extent to which social processes, the media and other sources of reference influence people's responses, but it seems likely that the former has some kind of validating role in the establishment of opinions in this study. It is also possible that people are unwilling or unable to recognise this type of influence, so the results here may not properly reflect the impact of this factor.

6.5.3. Open-Ended versus PC Responses with Certainty Thresholds

Figures 6.3. and 6.4. present the estimated logit distributions of the *PC standard* and *PC time to think* format. It also depicts the distributions of OE responses, the latter being defined according to the particular bid used in the PC format that the respondent would accept given her OE response of WTP.[74] Likewise the calculations of upper and lower ambivalence bounds in the previous section, the probabilities below are estimated when all other variables are set equal to their mean values of the sampled population.

[74] For example, if stating a WTP of £40, the individual is considered as providing a 'yes' response to the bid £30, but a 'no' response to the bid £50.

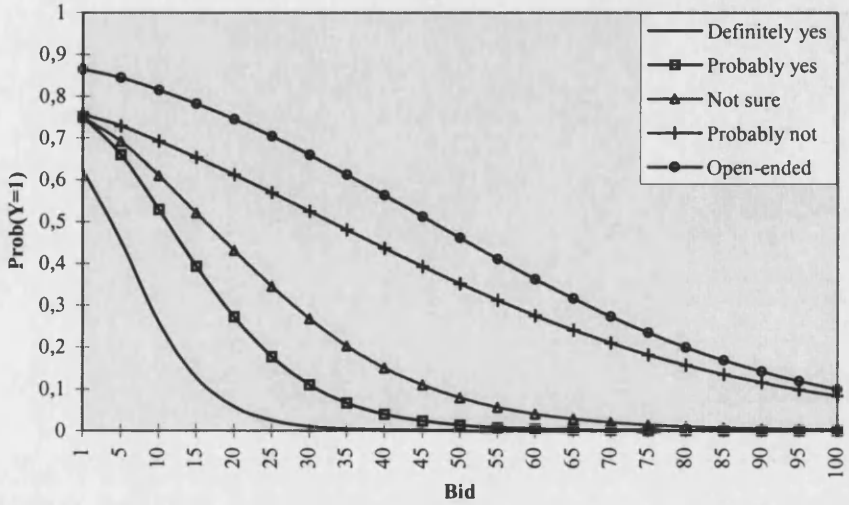

Figure 6.3. Logit distributions – PC time to think valuation format

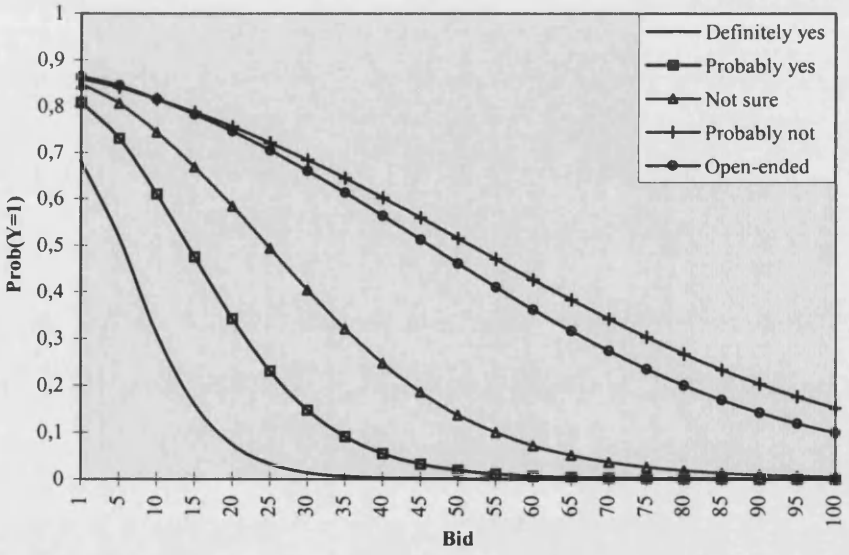

Figure 6.4. Logit distributions – PC standard valuation format

As the figures illustrate, the disparity between a 'definitely yes' and a 'probably not' response (*i.e.*, between what the respondent is '100% sure of paying' and what she is '75% sure of not paying') is considerable, particularly for responses to the *PC standard* format, thereby supporting the previous finding that the ambivalence bounds are quite large. Furthermore, the distribution of OE responses is similar to the distribution of 'probably not' responses of the *PC standard* format, and lies to the right of those of the

PC time to think format. It is thus shown that the standard OE response represents a rather low certainty level regarding the likelihood that this amount will later be paid by the individual, resulting in substantially larger estimates of WTP compared to the PC format as utilised here. These results are similar to but more pronounced than the findings by Welsh and Poe (1998), who found that the distribution of OE responses lies just to the right of the 'probably yes' distribution, rather than just below the 'probably not' distribution as is the case here.[75] Thus, respondents answering the OE question in Welsh and Poe's (1998) study seem to be more certain about their WTP statements than people are in this study. Similarly, Ready *et al.* (1999) found that only 33.5% of OE respondents stated an amount that they were less than 95% sure of paying.

There are, however, a number of possible reasons for the apparent difference across these studies. Firstly, Welsh and Poe (1998) used an OE valuation that was framed as a voting situation, rather than an inquiry of maximum WTP. Secondly, it is possible that the interpretation of the certainty levels 'probably yes', 'not sure', etc. used by Welsh and Poe (1998), is different from the definitions used in this study (*e.g.*, '75% sure', '50% sure', etc.). I am therefore inclined to argue that such seemingly subtle differences in question wording may have a significant impact on outcomes (*e.*g, Schuman and Presser, 1981), and a direct comparison of the different studies may therefore not be adequate. Thirdly, Ready *et al.* (1999) assessed OE estimates with the use of a payment card, which may not yield the same results as a standard OE question.[76] Finally, all three studies rely on different statistical procedures in estimating the distribution of OE responses, assigning different weights to outliers or extreme responses, different specification for defining upper and lower bounds, etc.

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[75] The relevant comparison between OE and PC responses would be within the *standard* format since this is conceptually similar to the designed used in other studies, which do not add any conditions such as those in the *multi-attribute* and *time to think* format of this study.

[76] In fact, the distribution of their OE estimates with payment card is very similar to the distribution of responses of a payment card estimated by Welsh and Poe (1998).

Table 6.3. presents the mean and median WTP that the respondents were 90% sure of paying. As mentioned previously, this estimate was elicited through a standard OE question that was asked subsequent to the main valuation question. Figure 6.5. further presents the distribution of OE responses for all four response formats.

Table 6.3. Mean and median WTP

Response format	Open-ended	PC standard	PC Multi-attribute	PC Time to think
Mean WTP	£ 41.80	£ 10.57	£ 12.30	£ 8.30
	$F = 38.26^{***}$			
Median WTP	£ 25	£ 7	£ 6	£ 5

Note: *** denotes significance at the 0.01 level

Since the respondents answering the valuation question through any of the three PC formats were explicitly told that their open-ended WTP should be in the region between the amount they were 100% sure of paying and what they were 75% sure of paying, the estimates are not directly comparable as such. Nevertheless, the OE format results in an estimate that is roughly four times larger than the latter three taken separately, suggesting that the OE response represents a much lower level of certainty. The histograms presented in figure 6.5. below also illustrate that the frequency of zero, or low responses of WTP, is higher in the PC format than in the OE format. Thus, WTP assessed through a standard OE format generates a more optimistic estimate regarding how much the issue is worth to people and what they actually want or can afford to pay. Moreover, allowing respondents to explicitly express the likelihood of actually paying the stated amount seems to distinguish what may be protest bids, or 'true' zero-WTP, that otherwise would be concealed since people tend to state an amount that they are unlikely to pay anyway.

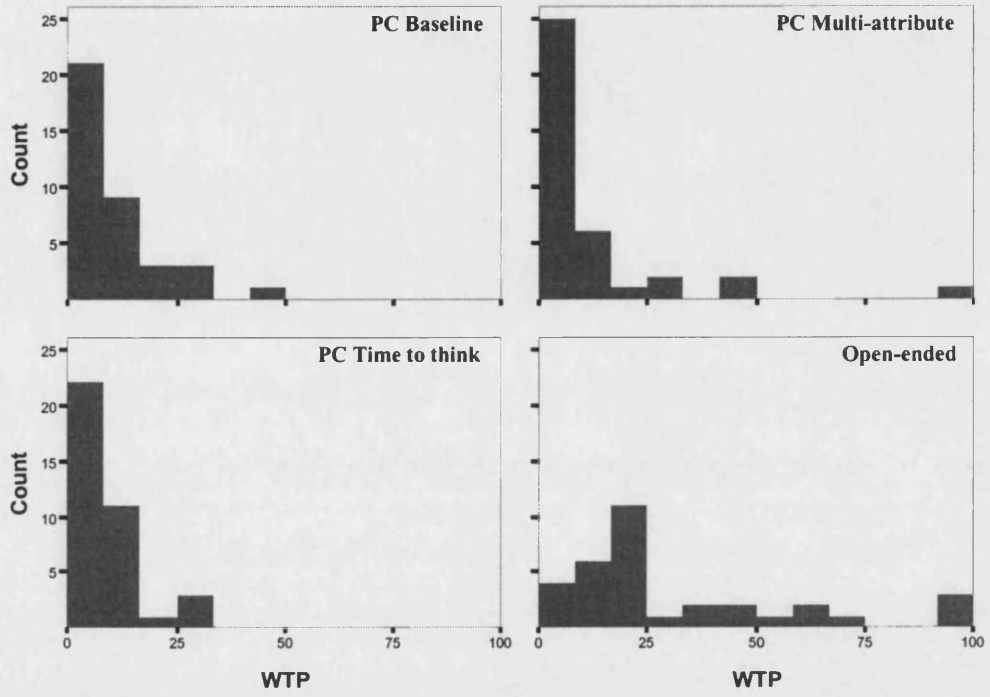

Figure 6.5. Frequency distributions of WTP

6.6. Conclusions

The fact that people provide answers in surveys and interviews, despite their lack of knowledge regarding the inquiry (Converse, 1970), and regardless of an uncertainty about their opinions (Nadeau and Niemi, 1995), has been demonstrated in other areas of social research. In chapter five it was shown that people have a tendency to state WTP amounts for an environmental project or issue, but these responses do not necessarily reflect whether they consent to the procedure presented, and there seems to be a large degree of uncertainty involved regarding what would properly reflect individual economic value. This study examines this type of uncertainty, or ambivalence, expressed as the difference between various thresholds of certainty regarding the likelihood that the individual will actually pay the WTP bid presented. Three variants of a Polychotomous Choice (PC) format were applied, one which posed various questions aimed at capturing various multidimensional aspects of economic value and their impact on estimated WTP, one that allowed the respondents some time to think about the issue before responding, and a more simple format employed in previous research (*e.g.*, Ready *et al.*, 1995; Welsh and Poe, 1998). These formats were finally compared to a standard Open-Ended (OE) valuation question.

The results indicate that people's decisions will be different when they are given time to think about the valuation issue. Particularly, it is indicated that WTP estimates are significantly more precise among this group of respondents; the ambivalence regions, measured as the difference between a bid that the individual is sure of paying and one that she is sure not to pay, is less than half as wide among the respondents given some time to think about the issue, compared to the other PC response formats. No definite reasons are provided for why these results occur, but it is assumed that this process enables respondents to put the issue in a broader context, whereby competing public issues, personal responsibility, and budget constraints are realised. Between the other two sub-samples, no statistically significant difference in WTP was found, although the respondents who were reminded of and responded to various other aspects of the valuation scenario seemed slightly more likely to respond with a 'yes' response, although the difference in the results is not statistically significant.

One hypothesis of this study is that the consultation with friends and relatives will reduce people's ambivalence over their WTP, particularly when the environmental issue is unfamiliar and the valuation task novel. According to the analysis of responses to some follow-up questions related to this idea, discussions with friends and relatives were conducted by the majority of respondents given the opportunity to do so, and this interaction further seems valuable in order to establish or validate opinions. Some of these respondents also claimed that this would be helpful in determining if and how much the environmental issue should be valued in monetary terms. However, this result is by no means unambiguous, and the study does not reveal exactly how frequent or extensive this interaction was, nor the nature of it. It hence does not explicitly provide an answer to whether the respondents rely on the same decision rules as in an individual context, or if a group discussion generates altogether different decision strategies as demonstrated by Kocher and Sutter (2000). It is also un-answered whether a collective discussion evokes different motives than in an individual context, which may be expected according to the theorising by Sen (1977) and Vatn and Bromley (1994).

Another important result of the study is that WTP assessed through a standard OE valuation question is substantially larger than WTP assessed through the PC format with certainty thresholds, thereby supporting the findings by Ready *et al.* (1995) and Welsh

and Poe (1998). Both the mean and median estimates of the former are 4-5 times larger than the estimates of the latter. In addition, the nature of the distribution of responses is different between these formats, and it was demonstrated that the frequency of zero and low WTP responses is higher in the PC format. Thus, when posed an OE elicitation question, respondents seem to implicitly adapt to a (much) lower level of certainty, and consequently, they are likely to report a figure that they are rather unsure of actually paying. Apart from the fact that the estimated welfare effect will be higher when assessed through the OE format, it may also give an overly optimistic picture of the general support among the public for the project being evaluated.

The policy-relevant implications of the above findings are that statements of WTP for a public good, such as the one valued here, are only vaguely represented in people's minds. Therefore, these should not be treated as point estimates, but rather as a measure that falls within a wider region of ambivalence that may (or may not) capture what would be a 'true' value. One way of dealing with this problem is to apply an elicitation format that reveals the width of this ambivalence, and on the basis of this information, approximate upper and lower bounds of involved welfare estimates could be calculated. On the basis of such formats, it is possible to study for which particular environmental policy issues people seem to possess more crystallised attitudes and values, and how these vary across individuals. Apart from the possibility of distinguishing well-founded values from non-attitudes in this sense, this procedure in itself is also likely to remind the respondents of how certain they actually are of paying the amount suggested, which is indicated to have consequences for their statements of WTP.

The next step is to develop methodologies that reduce the uncertainty that the respondents feel when answering a CV question. Encouragement and inducement to take more time in answering the valuation question seems like a fruitful approach in order to fulfil this aim, which is indicated to result in more precise statements of WTP. This study also provides some support for the idea that statements of WTP should not be considered as individual preferences only, but should be assessed in a context wherein social processes are present. Apart from the validating function these serve for the establishment of opinions, reactions to environmental problems commonly demand collective efforts that may not be adequately decided by individuals in isolation. CV

researchers are therefore recommended to be more attentive to underlying social processes of value assessments, and judgements need to be made regarding if and to what extent communicative processes are relevant for and should precede environmental benefit estimation.

Another approach to remedy the ambivalence involved is to apply a response format that more properly reflects the multidimensional character of the valuation task, albeit utilised in a different way than here. This recommendation is based on the hypothesis proposed by Zaller and Feldman (1992) that the individual is ambivalent as how to answer the questions because he or she possesses multiple and conflicting opinions toward the public issue. This prediction further appears plausible considering the various types of motivations and considerations behind economic value that respondents seem to have in CV contexts, some of which may lead to high statements of WTP, others to low statements of WTP, and for this reason it may be difficult for people to reduce their opinion(s) into a summary judgement.

7. Choice Experiments and Self Image: Hypothetical and Actual Willingness to Pay

As a result of the various problems that have been demonstrated in many Contingent Valuation (CV) studies (*e.g.*, Kahneman and Knetsch, 1992; Desvousges *et al.*, 1993; Blamey *et al.*, 1999; Kahneman *et al.*, 1999), Choice Experiments (CEs) have received prominent attention in recent years as an alternative approach to benefit estimation. In choice experiments, people are asked to choose one alternative from a choice set of two or several options, each of which is described by the attributes attached to it. Hence, it is hypothesised that the individual makes her choice on the basis of these attributes, which determine the benefits accrued. Hanley *et al.* (1998) discuss several potential advantages of CEs compared to the Contingent Valuation Method (CVM), including closer resemblance to real markets, easiness of valuing attributes rather than whole commodities, avoidance of yea-saying, and a built-in test of sensitivity to scope. It is thereby argued that CEs are more promising approaches to assessing economic values of environmental resources.

The aim of this chapter is to investigate the external validity of Stated Preferences (SP) in CEs. It will thus provide a test of how well hypothetical statements of economic value in hypothetical market scenarios predict behaviour, the latter represented by the actual or real payments people make in an experimental context. The rationale for testing this aspect on CEs is that those few tests of external validity that have been performed have mainly assessed benefits using the CVM, and a relevant question is if CEs perform better regarding this aspect. This study follows the design by Carlsson and Martinsson (2001), with some important exceptions. In particular, it examines whether respondents try to act in an internally consistent way when expressing both hypothetical and real WTP in subsequent order. Thus, by using a split-sample design, one in which subjects are asked to make actual payments after stating a hypothetical value, and another in which subjects are directly faced with a 'real' scenario, and hence not preceded by hypothetical statements, a tool is provided to test the impact of self-image and cognitive dissonance in these contexts. A further aim of the study is to assess the impact of the financial incentives introduced in the experiment.

The extent to which hypothetical statements of maximum Willingness To Pay (WTP) for an environmental amenity correspond to real or actual payments is often considered to be an ultimate validity test of Stated Preference Methods (SPMs). However, since the basic objective of these methods is to provide economic values when no market exists, such external validity tests are rare, and those tests that have been carried out are often conducted on various private goods. Due to the lack of empirical bases, researchers disagree if and to what extent the CVM and CEs are reliable tools of benefit estimation. For example, Mitchell and Carson (1989) are favourable to the potential of CVM to capture unbiased WTP estimates, whereas Neill *et al.* (1994) acknowledge that no solid empirical basis exists that supports the external validity of stated economic values.

The chapter is organised as follows. The section below presents previous research on the external validity of WTP estimates assessed through the CVM and CEs. After this follows a discussion related to self-image and the theory of Cognitive Dissonance (CD), and the implications for within-subject tests of SPMs. On the basis of this exposition, a theoretical model of choice behaviour, which incorporates self-image and CD in the utility function, is proposed. Before the empirical findings and conclusions are presented, the hypothesis to be tested, how the experiments were conducted, and the econometric models to be estimated are described.

7.1. External Validity of Stated Preferences

Seip and Strand (1992) asked respondents whether or not they were interested in becoming members of an environmental organisation in Norway and, if they were, how much they would be willing to pay for an annual membership. Those who stated an amount above the actual membership fee (200 NOK) were soon after mailed a letter from the organisation, requesting them to join. It turned out that 6 out of 64 respondents actually decided to pay the membership fee, indicating that hypothetical WTP may be a poor indicator of real WTP. In another study about biological diversity, people were urged to respond to a newspaper advertisement in order to support the preservation of endangered animals (Navrud, 1992). Less than a week later, those responding to the ad were sent an offer to become a member of World Wide Fund for Nature (WWFN), and

31 % of these respondents actually chose to pay the official membership fee.[77] Cummings *et al.* (1997) compared hypothetical statements with real payments in a CV study using a referendum elicitation format. The study was directed toward people who lived close to a contaminated area, and the respondents were told that if everybody taking part in the study paid 10 USD, the amount of money aggregated across all individuals would be sufficient to cover the costs to produce and distribute a 'citizens' guide' that provides valuable information regarding safe groundwater. In the hypothetical referendum 45% voted yes and 55% voted no, whereas when real-money was introduced, 27% voted yes and 73% voted no.

These studies then provide mixed results regarding the convergence of hypothetical and real WTP. However, there is a tendency for hypothetical WTP to overstate real WTP in CV studies, or at least for the number of respondents who agree to pay a certain amount to be more in a hypothetical compared with a real context. Similar results are found in studies that have examined hypothetical and real WTP for other than environmental goods, predominantly characterised as private goods (*e.g.*, McClelland *et al.*, 1993; Loomis *et al.*, 1996). Across these studies, hypothetical WTP overstates real WTP by a factor between 1.5 to 3.7. The problem, however, by assessing the value of private goods is that these do not possess the same characteristics as public goods, and hence the estimation of benefits is conceptually different.[78]

Carlsson and Martinsson (2001) is the only study I am aware of that tests the external validity of CEs applied to environmental amenities that are characterised as public goods. In this study, respondents first made 16 *hypothetical* pair-wise choices. In each choice set, the amount of money given to the respondent and the donation to three

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[77] However, the advertisement did not mention anything about monetary payment, nor was any actual amount specified. A response to the ad should therefore be interpreted as a general expression of support rather than an indicator of economic value. The targeted group may further be self-selected since it is likely that only environmentally concerned people responded, or read the advertisement in the first place.

[78] Apart from the fact that private goods lack some important characteristics of public goods, when valuing private goods that are marketed, people may also make educated guesses about the actual market price, which is likely to influence their statements of WTP.

different environmental projects varied, and each attribute had three different levels. Typically, if the amount of money given to the respondent was larger in one alternative, the donation was larger in the other alternative within the same choice set. In a second round of the experiment respondents repeated 16 similar pair-wise choices, but this time they were informed that one of these would be randomly drawn as the *actual* choice set. They would accordingly be paid the amount of money that corresponded to the choice made in this particular choice set, whereas the donation would be made anonymously by the research team to the project chosen. The results showed no significant difference between hypothetical and actual marginal WTP, although the former was slightly higher than the latter.

7.2. Within-Subject versus Between-Subject Test of External Validity

The results discussed above are problematic because of the fact that a significant number of the experiments have used within- rather than between-subject designs. All the above studies assessed real WTP subsequent to hypothetical WTP was provided by the same individuals. The major issue at stake is to what extent these real WTP estimates are in fact real. Many economists consider within-subject tests to be sufficient for investigating the correspondence between stated and real economic commitments, and Carson (1997) argues that "having consistently observed internal tests of the scope of insensitivity hypothesis being rejected in samples of any size, one might reasonably expect to see this hypothesis rejected in external tests" (p. 27). Even though this argument relates to embedding effects, it reveals a common opinion regarding what constitutes a sufficient criterion of external validity.

This paper takes a different view by suggesting that within-subject tests may not be fully appropriate to investigate the invariance of responses across contexts. It hypothesises that respondents strive to act in an internally consistent way in such experiments, and that pre-reported hypothetical bids therefore will influence subsequent actual WTP. In other areas where between-subject tests have been performed, these generally reveal a greater discrepancy between hypothetical WTP and real WTP. Slovic (1969) investigated the difference between hypothetical and real choices of gambles in a split-sample. The study does not report the difference of choices being made, but in

hypothetical contexts people tend to maximise gains and discount the impact of losses, whereas in real contexts the risk of losing money receives much greater attention. Due to this shift in focus, the implication for SPMs is that the approach may result in overestimation of WTP since the consequences of subsequent payments are not fully realised, whereas the benefits of environmental preservation are likely to be over-rated.

Irwin *et al.*'s (1992) study of preferences for insurance demonstrates that hypothetical WTP is greater than real WTP, although the difference is not statistically significant. They also report a greater variance of hypothetical WTP, with more very high bids and significantly more zero responses. The former result supports the hypothesis that people in these contexts are not as concerned about the actual payments involved, which results in more extreme bids. An experiment conducted by Neill *et al.* (1994) evaluated the WTP for both a painting and a map. They compared three contexts of valuation; generic CVM, a hypothetical Vickrey auction, and a Vickrey auction with real payments.[79] Hypothetical WTP is similar across the former two contexts, but each of these overstates real WTP by a factor of 27 and 25 respectively. Frykblom (1997) found that hypothetical WTP exceeds real WTP only moderately, thereby suggesting that respondents are responding 'truthfully' in within-subject tests. Thus, although on the whole indicating that the divergence of hypothetical WTP and real WTP may be greater in between-subject tests than in within-subject tests, the findings of previous empirical research are not unambiguous. Some of these results also relate to private goods that, for reasons discussed above, are not comparable with public goods.

7.2.1. Cognitive Dissonance and Self-Image

The attitudes that people report do not always reflect their 'true' convictions. Social norms, the requirements inherent in social roles, and self-presentational concerns sometimes lead people to claim things they do not genuinely believe (Eagly and Chaiken, 1993). Here I will focus on the latter of these constraints, whereby theories of *cognitive dissonance* and *counter-attitudinal advocacy* are relevant. Research on these

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[79] In a Vickrey auction, the respondents make repeated rounds bids, and it is assumed that through a learning effect they will eventually make choices that converge to economic theoretical assumptions.

phenomena was pioneered by Leon Festinger during the fifties. In his original statement, Festinger (1957) argued that people would not readily take inconsistent attitudinal positions, or positions that are in conflict with previous behaviour. The essence of the theory is that individuals strive to achieve harmony between their mental representations of beliefs, attitudes, intentions and behaviours. Disharmony between any of these *elements* tends to result in either changed behaviours, or cognitive manipulations in response to already performed behaviours. In other words, CD arises when two (or more) elements stand in conflict with each other, either by implying opposite positions, or simply by not matching each other.

Festinger (1957) assumed that dissonance varies in magnitude according to the *importance* of the elements. Importance is here determined by how much *value* is placed on the issue, and to what extent it is central to the perceiver's *self-concept*. Since Festinger's original proposal CD has been replicated in a number of studies (Aronson and Carlsmith, 1963; Zimbardo *et al.*, 1965; Scheier and Carver, 1980). More modern accounts of the theory assume that some auxiliary conditions must be fulfilled, thereby predicting attitude change in a narrower range of situations. The following important conditions have been proposed; *freedom of choice*, *aversive consequences*, and *commitment* (Eagly and Chaiken, 1993).

In order to result in any change of the cognitive elements, people must to some extent have performed the task, or vindicated a particular position, by 'free will'.[80] The second condition suggests that there must be some kind of consequence of the behaviour performed, or an attitude position, either related to physical outcomes or psychological affect (*e.g.* involvement). Finally, attitude change is more likely to occur when people

[80] When subjects are forced to carry out a certain task there is less incentive to change attitudes, because, after all they more or less have to comply with whatever instructions are given. Similarly, if people are not free to choose which behaviours to engage in, they would not feel personally responsible toward these. Festinger and Carlsmith's (1959) experiment demonstrates this; the less subjects are paid to perform a boring task, the greater the dissonance, since when monetary incentives for participating in the study are large, they are better able to motivate a contradictory behaviour, or state something publicly that is contrary to their private opinion. Hence, whenever given an opportunity to misattribute any conflict between various elements to external factors, dissonance is less likely to arise.

feel committed to their position, and commitment would be lower when subjects could not be identified with their counter-attitudinal statements. Therefore, public advocacy is likely to produce more attitude change (Scheier and Carver, 1980), although in many of experiments reviewed by Eagly and Chaiken (1993), subjects were indeed anonymous to the researchers. We may argue that the basic conditions for dissonance arousal are fulfilled in within-subject tests of stated preferences; respondents are free to make their own choices, they are committed to their hypothetical responses in the sense that these statements cannot be altered within the context of the experiment, and actual choices involving money are consequential. Therefore, it appears reasonable to expect that real WTP in CEs will be influenced by previously made hypothetical assessments.

The question is then, in what particular situations will a conflict arise between hypothetical and real assessments? In other words, when would choices be different had the individual not been influenced by her previous statements? On the basis of Katz' (1960) theorising related to the functional value of attitudes, I predict that there exists a difference in cases whereby people are largely motivated by value-expressive considerations, based on the idea that people would like to reassert a positive self-image. The self-image is assumed to improve when the respondent is doing what she considers to be 'good' and worthy actions (Andreoni, 1989), when answering hypothetical surveys in a way that implies that she would undertake such actions in real life, and when acting consistently with previously made statements (Greenwald and Ronis, 1978). The argument may for the purposes of this study be extended to claim also that people have a positive WTP to preserve or improve this image.

Support for this proposition is provided by *impression-management theory* (Tedeshi *et al.*, 1971), which emerged as a result of the controversy surrounding the motivational basis of CD. According to this interpretation, attitudes change because people want to manage an impression that others have of them. One aspect of this is to behave in a consistent manner and avoid attitudes that conflict with their behaviour and vice versa. Hence, impression-management theory assumes that the attitude change is not genuine and that participants in CD experiments only appear to change their behaviour in order to be viewed favorably by the experimenter. However, revisions of CD theory similarly stress the importance of self-consistency and self-affirmation as driving forces of

dissonance (*e.g.*, Aronson, 1992; Steele *et al.*, 1993). Given that most people have a positive self-concept, dissonance is likely to result when they act in a way that may be viewed as incompetent, immoral or irrational, for instance telling a lie to another person, which would be the implication if behaving inconsistently toward (previously) stated attitudes. Put shortly, people would like to see themselves as 'nice and smart' (Akerlöf and Dickens, 1982). Although commonly being informed that their responses will be treated anonymously and that no matching will be made between statements of WTP, respondents would, according to the latter theoretical account, still have an incentive to act consistently across different contexts of valuation.

According to the above insights, I hypothesise, and later test, that hypothetical WTP exceeds actual WTP particularly for issues that have an important ethical dimension. An ethical dimension is further assumed to be present for choices that involve other people's well-being, or those that involve non-human welfare, for example global environmental resources that are not of immediate concern to the individual. It thus builds on the hypothesis by Kahneman and Knetsch (1992), who argue that responses in CV studies commonly represent symbolic statements. However, in a context that is viewed as more consequential by the individual, for instance by involving real monetary trade-offs, and in which he or she is more committed to her actions and statements, these considerations will play a less influential role, and therefore, lead to different choices. To conclude, certain goals and motives, in this case value-expressive and instrumental considerations, become more or less salient between different contexts of valuation, and if the individual is asked to repeat the same task in various contexts in subsequent order, she is in addition influenced by an aim to act consistently between these, thereby making choices less different than they otherwise would have been.[81]

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[81] Another test of validity is to compare the results of SP methods with estimates derived from Revealed Preference (RP) methods. Carson (1996) found in a comprehensive meta-study that the estimated WTP in RP studies were of the same magnitude as those obtained from dichotomous-choice CV studies, and that they were actually somewhat larger on average. Wardman (1988) surveyed British value-of-time studies and found similar results when comparing SP and RP studies. However, RP methods are only applicable on well-defined goods that primarily accrue use values, such as access to recreation areas or hunting rights, and such comparison are according to the hypothesis provided here therefore not adequate as a general test whether hypothetical WTP corresponds to real WTP.

Apart from a general scepticism toward experimental results since these are derived in a context that fails to replicate everyday reality (*e.g.*, Rosenthal, 1966; Gaskell *et al.*, 1997; Loewenstein, 1999), we may also argue that the trade-offs from earned money in the experiment are not comparable to the trade-offs from current (or anticipated) income and wealth. In this sense, losses loom larger than foregone gains (Kahneman *et al.*, 1990). Moreover, the amount of money involved is rather small, implying that choices may not be sufficiently consequential, and therefore, not possible to generalise in a broader sense. I will therefore explicitly take into account the scale of the experiment in terms of the amount of money involved, both in the theoretical model and in the empirical tests. The prediction is that people still have an incentive to reassert a positive self-image in real-money choices as long as monetary trade-offs are reasonably small and therefore less consequential.

7.3. The Model[82]

In most SP experiments (including CVM) of environmental change, or a change in some other public good, respondents are (explicitly or implicitly) assumed to maximize a strictly quasi-concave utility function as follows:

$$u = u(x, G) \tag{1}$$

$$\text{where } \frac{\partial u}{\partial x} > 0, \frac{\partial u}{\partial G} > 0$$

where x is private consumption, and G is quantity of a public good, such as an index of environmental quality. The Marginal Willingness To Pay (MWTP) for an increase in G is then given by the marginal rate of substitution between G and x, *i.e.*, $MWTP = \frac{\partial u/\partial G}{\partial u/\partial x}$.

For a sufficiently small change in G, as normally assumed in CEs, the *average* WTP for an improvement will be approximately equal to the *marginal* WTP. The maximum WTP for a certain change in G, ΔG, is thus given by $\Delta G * MWTP$ (or $\Delta G * AWTP$). Hereafter this model will be referred to as the conventional reference model.

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[82] This section is rather technical and presents a mathematical formalisation of the choice problem. However, this part is not vital in any respect to understand the hypotheses and results of this study.

7.3.1. The Extended Model with Self-Image

Andreoni's (1989; 1990) model to explain charity and voluntary contributions to public goods is based on the utility function $u^i = u(x^i, G, g^i)$, where g^i is individual i's own voluntary contribution to the public good. Apart from the utility arising from the provision of the public good, the individual derives utility from the mere act of giving (*i.e.*, the 'warm glow' of giving). Thus, the utility depends on the particular circumstances of the contribution, and a private donation would be worth more than an equally large anonymously made donation due to the positive effect it has on the individual's self-image.[83] Introducing self-image in the model we have then instead;

$$u = u(x, G, s) \tag{2}$$

$$\text{where } \frac{\partial u}{\partial x} > 0, \frac{\partial u}{\partial G} > 0, \frac{\partial u}{\partial s} > 0$$

where s is self-image. The self-image is assumed to depend on the degree to which (*i*) the individual acts in accordance with her ethical beliefs, (*ii*) the honesty to herself, and (*iii*) in accordance with earlier made commitments or statements. Given the choice design in this experiment, people do not actually pay any money for increasing the donation; instead the associated income transfer to them is affected. The change in G is neither constant, but changes between the choice sets. Therefore, I assume that self-image is a function of the *implicit marginal WTP*, or the trade-off the respondent is willing to make between money to herself and a contribution to the WWF campaigns. In other words, how much money is needed to the campaigns in order to compensate for one dollar not given to the individual? This can be formalised as;

$$s = f\left(\left|MWTP^{*} - MWTP^{moral}\right|, \left|MWTP^{*} - MWTP^{true}\right|, \left|MWTP^{*} - MWTP^{*}_{t-1}\right|\right) \equiv f(d_1, d_2, d_3) \tag{3}$$

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[83] For the model this implies that an individual's utility is not equally affected by a donation from some other (unknown) person to an environmental organisation, as if the same donation were made personally. If this were not the case, so that, say, an individual derives the same utility for 0.2 USD given (by anyone) to an environmental organisation as one dollar to himself. This would imply that the individual would derive more utility from reading in the paper that the organisation has received 10000 USD in a donation (from some other unknown person) as she would derive from receiving 2000 USD himself. This is hard to believe.

where $\frac{\partial f}{\partial d_1} < 0, \frac{\partial f}{\partial d_2} < 0, \frac{\partial f}{\partial d_3} < 0$. In this model, $MWTP^*$ is the stated *MWTP* for a certain change in *G*, $MWTP^{moral}$ is the ethically superior value (*i.e.*, the value which would give the respondent the best self image if there were no conflicts with other determinants of the self-image), $MWTP^{true}$ is the true *MWTP* that keeps individual utility constant, ignoring welfare effects related to the survey response per se, and $MWTP^*_{t-1}$ is a previously stated *WTP*. Thus, both self-image and CD are now included in the utility function.

7.3.2. Hypothetical Willingness to Pay

In the conventional reference model it is implicitly assumed that respondents will reveal their true preferences, although the model itself gives no explanation of *why* the individuals in a hypothetical context would do so, and assumes that issues such as self-image have no important role to play. In the extended model, however, I assume that if respondents know or have reason to believe that the survey is hypothetical, they will maximize (3), implying that *x* and *G* will be treated as if they are unaffected by their responses, and the utility maximization is reduced to the maximization of *s*.

In a hypothetical choice where the ethical dimension is less important (assuming that others are not affected by the question), we have $\frac{\partial f}{\partial d_1}\frac{\partial d_1}{\partial MWTP} = 0$. If no earlier commitment or statement is made we also have $\frac{\partial f}{\partial d_3}\frac{\partial d_3}{\partial MWTP} = 0$, implying that *s* is maximized when $MWTP^* = MWTP^{true}$, *i.e.*, the optimal response is to answer 'truthfully'. For example, for issues such as recreational parks and hunting rights, the ethical dimension is very limited, and empirical results do not indicate any clear discrepancy between stated-preference and revealed-preference studies, which is consistent with the proposed theory (*e.g.*, Carson, 1996).

In environmental valuation studies, on the other hand, the perceived ethical dimension is often important, so we have $\frac{\partial f}{\partial d_1} < 0$. Assuming again that no earlier commitment or

statement is made, s is maximized for the WTP^* when $\frac{\partial f}{\partial d_1} = \frac{\partial f}{\partial d_2}$. Thus, the optimal response implies a trade-off between the ethically superior value (*i.e.*, the associated 'warm-glow' feelings) and honesty.[84] From the mean value theorem we then have that $MWTP^{true} < MWTP^{*}_{hyp.} < MWTP^{moral}$.

7.3.3. Real Willingness to Pay

In a question involving real money, and a real change in G, the respondent maximizes the following utility function

$$u = u(x, G, s(MWTP)) = u(x^0 + \Delta x, G^0 + \Delta G, s(MWTP)) \quad (4a)$$

where x^0 and G^0 are initial individual income (or wealth) and (overall) revenues for the WWF project, respectively, and Δx and ΔG are the corresponding increases due to the choice experiment. The higher ΔG that is chosen, the lower Δx is obtained, and vice versa. Although the choices are of course discrete in the CEs, I will for analytical simplicity model the amount of money foregone by the individual as $f(\Delta G)$, so that $\Delta x = T - f(\Delta G)$ where T is the maximum possible money transfer to the respondent. The marginal (or average) WTP in the interval is then given by $f(\Delta G)/\Delta G$, and the CEs are designed so that a higher ΔG also implies higher Marginal WTP (MWTP), or Average WTP (AWTP). We can then re-write the utility function to be maximised as;

$$u = u(x^0 + T - f(\Delta G), G^0 + \Delta G, s(f(\Delta G)/\Delta G)) \quad (4b)$$

The problem, as formulated, is to choose ΔG, *i.e.*, how much money that should be given to the WWF project. The more is given, the less money does the respondent

[84] The importance of the latter motive is recognised in the following example: Assume that you won 100,000 USD on a lottery, how much of this would you give away to charity? Even if we believe that the ethically superior value would be all of it, *i.e.* 100,000 USD, few of us would give away everything, and hence we would feel dishonest to ourselves if we gave that answer.

receive herself, and the higher self-image is achieved. We have the following first order condition:[85]

$$-\frac{\partial u}{\partial x}f'+\frac{\partial u}{\partial G}+\frac{\partial u}{\partial s}\frac{ds}{dMWTP}\left(\frac{f'}{\Delta G}-\frac{f}{\Delta G^2}\right)=0$$

or

$$\frac{-\frac{\partial u}{\partial x}f'+\frac{\partial u}{\partial G}}{f'-\frac{f}{\Delta G}}\Delta G+\frac{\partial u}{\partial s}\frac{ds}{dMWTP}=0 \qquad (5)$$

By the design of f we have that $f'-\frac{f}{\Delta G}>0$. Equation (5) reflects a tradeoff between self-image effects of a higher MWTP, given that we have an ethically important good so that $MWTP^{moral} > MWTP^{true}$, and real changes in G and x. Since the second term is positive, we have that the first term is negative. Since u is monotonic in s, and s monotonic in MWTP in the relevant interval, we can conclude from the mean-value theorem that hypothetical MWTP will exceed real-money MWTP.

In the second term of the equation, reflecting effects on self-image, there is no direct influence from scale, so that just doubling all monetary values in the experiment would not affect self-image provided that the respondent made the same choices as with the original scale. In the first term, however, the factor ΔG will reflect scale. Consider the limit case where ΔG goes to zero, implying that the first term vanishes relative to the second term, and the results converge to the hypothetical case.

As in the hypothetical case, the factor $\frac{ds}{dMWTP}$ can be separated into different elements. If respondents have not undertaken a previous hypothetical experiment we have;

$$\frac{-\frac{\partial u}{\partial x}f'+\frac{\partial u}{\partial G}}{f'-\frac{f}{\Delta G}}\Delta G+\frac{\partial u}{\partial s}\left(-\frac{\partial f}{\partial d_1}+\frac{\partial f}{\partial d_2}\right)=0 \qquad (6a)$$

but if they have, we have instead;

---

[85] Remember that the changes are considered sufficiently small so that the MWTP is constant in the interval and hence equal to the AWTP.

$$\frac{-\frac{\partial u}{\partial x}f'+\frac{\partial u}{\partial G}}{f'-\frac{f}{\Delta G}}\Delta G+\frac{\partial u}{\partial s}\left(-\frac{\partial f}{\partial d_1}+\frac{\partial f}{\partial d_2}+\frac{\partial f}{\partial d_3}\right)=0 \qquad (6b)$$

Since $\frac{\partial f}{\partial d_3}<0$ we have, again by the mean-value theorem, that MWTP is expected to be higher if respondent has participated in an earlier conducted hypothetical experiment.

7.4. Empirical Hypotheses

As implied before, the individual's self-image is assumed to depend on the degree to which (*i*) the individual acts in accordance with her ethical beliefs, (*ii*) the honesty to herself, and (*iii*) in accordance with earlier made commitments or statements. From these assumptions, the following hypotheses were derived:

H_1: Hypothetical MWTP is predicted to exceed real-money MWTP.

H_2: The MWTP from the real-money experiment that follows the hypothetical experiment is predicted to be below the hypothetical MWTP, but above the real-money MWTP provided by respondents who have not undertaken a hypothetical experiment before.

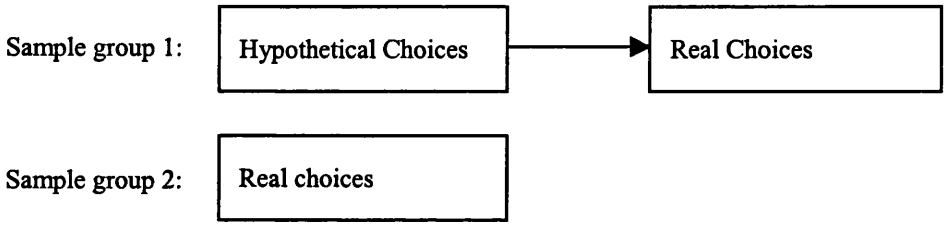
H_3: When comparing different real-money experiments it is predicted that the MWTP would decrease with the actual amount of money involved.

These hypotheses can be contrasted with the conventional reference model that neglects the influence self-image and CD, in which instead MWTP would be predicted not to vary with respect to the above circumstances. In the following section I will describe the experimental design in order to test hypotheses H_1 - H_3.

7.5. Experimental Design and Method

The experiment was conducted at the London School of Economics (LSE) in February 2000. It was first announced in association with class-teaching, and students interested in participating were later contacted by e-mail in order to arrange a date and time for the experiment. The subjects were divided into two sample groups. Respondents in one of

these firstly made hypothetical choices (*hypothetical*), followed by choices that involved real payments (*real after hypothetical*), whereas in the other sub-sample respondents made real choices that were not preceded by hypothetical choices (*real directly*). In each of these experimental settings, subjects were faced with 16 choice sets that were identical across all settings.[86] Thus, a design is applied that allows us not only to test the correspondence between hypothetical and real choices, but also to investigate the influence of the former on the latter, that is, to what extent individuals try to act in an internally consistent way in these contexts. The diagram below illustrates how the two samples were constructed.



Altogether 43 students from various courses were recruited, mainly graduate students but also a few undergraduates. Of these, 23 subjects first made hypothetical choices, followed by choices involving real money, whereas the remaining 20 subjects made real choices not preceded by hypothetical choices. The experiment was conducted in 4 sessions with 10-15 subjects in each. All sessions were run within the same week, and those sessions including respondents who made both hypothetical and real choices were run on the first day in order to avoid rumours about the purpose of the experiment. Although on the whole being very similar in terms of some possible key characteristics, various categories of subjects (*i.e.*, in terms of gender, age, etc.) are evenly distributed across the three sub-groups. It would obviously have been preferable to have a larger sample, but since the experiments involved real money, budgetary considerations imposed restrictions.

Each session started by asking some questions about socio-economic characteristics. Then the subjects received verbal and written instructions regarding the choice experiment. The instructions included some brief information about the general purpose

[86] The character of these choice sets will be explained further in the text.

of these types of procedures (*i.e.*, estimation of economic values to inform policy analysis), the nature and purpose of the environmental projects, and finally how the choice experiment works. The particular environmental projects chosen were two campaigns currently run by the World Wildlife Fund (WWF). In the hypothetical setting the instructions additionally read;

> *The choices are hypothetical but it is still very important that you answer them truthfully and as if they involved real money.*
>
> *There are altogether 16 choices for you to make. Try to consider each of these in isolation as if that was the only choice you have to make. If you want you may go back and change your earlier answers after second thought.*

The latter information was given in order to minimise order and learning effects. In the real conditions that were introduced subsequently to these choices, the subjects were given the following information:[87]

> *In the following you will be presented similar choice situations as before, although now your choices will in fact determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. It thus involves real money. The procedure is the following:*
>
> - *you will again make 16 pair-wise choices*
> - *afterwards one of these will be drawn randomly as the actual choice set*
> - *you will be paid the amount of money according to the alternative chosen in this particular choice set, whereas the corresponding contribution is paid anonymously by us to the WWF*
>
> *Thus, your choices will determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. If you want you may go back and change earlier answers after second thought.*

In each choice-set in all experimental conditions, subjects were asked to choose between two alternatives. Each alternative was characterised by three attributes; the

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[87] Essentially the same information was presented to the other sub-sample that were faced with real choices directly. By essentially I mean except from words such as 'again', 'as before', etc., since in this case the subjects had not made any hypothetical choices previously.

amount of money that they themselves would receive (*income*), the size of the donation paid to the particular campaign run by the WWF (*donation*), and the type of campaign. The amount of money paid to the respondents had four levels, the donation four levels, and there were two different campaigns to choose from. Both campaigns are currently run by the WWF in order to protect endangered wild animals. This was also explained to the respondents. Thus, we may argue that the scenario is perceived as fairly relevant and realistic by the respondents. The issues may further be considered as public goods, since they are not associated with a membership in the WWF, and there are no particular side-benefits associated with the donations. Still, in order to minimise the impact of any possible private-good characteristics, it was also stressed that the donations would be paid to the WWF anonymously by the research team. The respondents would receive evidence through copies of the receipt of *the whole* donation (across all respondents), but not any evidence or receipt of *their own* contribution. After the experiments were finished, all respondents left the class-room and were called back in one by one, whereby the draw was made that decided how much this individual should be paid, the size of her donation, and to which campaign. The draw was made under the supervision of the respondent due to be paid, but no one else. Table 7.1. below summarises the levels of attributes applied in the experiment.

Table 7.1. Level of attributes

Income	Donation	WWF campaign
£0	£0	The African Elephant
£5	£7	The Green Sea Turtle
£10	£14	
£15	£21	

Given these levels, a full factorial design has 32 combinations of attribute levels. In order to create an efficient design using 15 unique choice sets I largely relied on the search algorithm developed by Zwerina *et al.* (1996). They identify four criteria of an efficient design; orthogonality, level balance, utility balance, and minimal overlap,

among which I put emphasis on the former three.[88] In addition to these criteria, the levels of attributes were tested in two rounds prior to the experiment, involving 14 respondents altogether. Apart from the 15 choice sets used for estimating marginal WTP, I added one choice set in order to test for transitivity. This was done by repeating one of the original choice sets in which the alternatives were presented in the reverse order (*i.e.*, alternative *A* becomes alternative *B* and vice versa). An example of a choice set is presented below.

Table 7.2. Example of a choice set

Choice number 3	*Alternative A*	*Alternative B*
Money given to you	**£ 5**	**£ 10**
Contribution to campaign	**£ 14**	**£ 7**
Campaign	**Elephant**	**Sea Turtle**

In previous studies that have performed within-subject tests of external validity, it is not always clear how the choice sets in the real conditions have been designed. Preferably, a different order of the choice sets should be presented across the conditions in order to reduce the direct influence of previously made choices, which is accordingly done in this study; real choices that follow the hypothetical ones are presented in a different order than hypothetical choices. For half of the respondents, the order of the choice sets was reversed in order to cancel (and test for) any possible ordering effects.

In order to examine the influence of scale, four subjects[89] from the sample who made real choices (not preceded by hypothetical ones) were contacted a few weeks later. These respondents repeated the same task, only this time they were informed that each

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[88] Orthogonality implies that the levels of each attribute vary independently, level balance that the levels appear with equal frequency, utility balance that the utility of each alternative within a choice set is the same, and minimal overlap is satisfied when the alternatives within each choice sets have non-overlapping attribute levels. When these criteria are jointly fulfilled, the design will be optimal according to Zwerina *et al.* (1996).

[89] Again for financial reasons, since the amount of money is here considerable larger.

choice set would determine the donation and income earned, rather than one randomly drawn. Hence, the total donation possibly made, and the money possibly earned by each subject is now substantially higher than in the original setting. In the original experiment, the respondent could earn a maximum of £15, or make a donation up to £21, whereas in the follow-up experiment they could earn a maximum of £100, or chose to make a donation of £122.50.[90] Given that the sample group consists of students, these amounts are likely to have a significant impact on their monetary budgets, and may therefore result in a different behaviour than recorded in the original setting. In order to minimise the possible direct influence of previously made choices, the choice sets in the follow-up experiment were also presented in a different order.

7.5.1. The Empirical Model

In the empirical analysis I use a standard random-utility model (McFadden, 1974). The model is based on the assumption that, among 2 alternatives $A = 0,1$, the individual chooses the alternative with highest utility. Apart from a systematic part of the utility function, V, there is a random term, ε, so that the utility derived for individual i from choosing alternative 1 becomes;

$$u_{i1} = V_{i1} + \varepsilon_{i1} \tag{7}$$

The probability of choosing alternative 1 in each choice set equals the probability that the utility from this alternative is greater than the utility of alternative 2. Hence we have;

$$\Pr(A_i = 1) = \Pr(V_{i1} + \varepsilon_{i1} > V_{i2} + \varepsilon_{i2}) = \Pr(\varepsilon_{i1} - \varepsilon_{i2} > V_{i2} - V_{i1}) \tag{8}$$

The systematic part of the utility function (or the reduced form of the utility function) is assumed to be linear in the attributes, in the interval considered;

$$V_{i1} = \alpha + \beta_x x + \beta^E D^E + \beta^T D^T + \beta^z z_i (D^E + D^T) \tag{9}$$

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[90] Due to financial reasons, the level of income and donation were halved across all choice sets. However, the trade-off between the attributes is still the same as in the original setting.

where D^E and D^T are the donations given to the elephant and turtle projects respectively, and z is a vector of dummy variables. The marginal, or average, WTP for a change in one of the donations, say to the elephant campaign, is then equal to;

$$MWTP_i^E = AWTP_i^E = \frac{\partial u_i/\partial D^E}{\partial u_i/\partial x_i} = \frac{\partial V_i/\partial D^E}{\partial V_i/\partial x_i} = \frac{\beta^E + \beta^z z_i}{\beta^x} \tag{10}$$

Given such a utility function, and that the error terms of (7) follow a Gumbel (or type 1 extreme-value) distribution, implying that the differences between the error terms in (8) are logistically distributed, the probability of choosing alternative 1 becomes;

$$\begin{aligned}\Pr(\mathrm{A_i}=1) &= \frac{\mathrm{Exp}\left(-\boldsymbol{\beta}^x(\mathbf{x}_1-\mathbf{x}_0)\right)}{1+\mathrm{Exp}\left(-\boldsymbol{\beta}^x(\mathbf{x}_1-\mathbf{x}_0)\right)} \\ &= \frac{\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)(D_1^E-D_0^E)-(\beta^T+\beta^z z_i)(D_1^T-D_0^T)\right)}{1+\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)(D_1^E-D_0^E)-(\beta^T+\beta^z z_i)(D_1^T-D_0^T)\right)}\end{aligned} \tag{11}$$

As is common, I ordered the choice sets in the econometric analysis so that the alternative which included a donation to the elephant campaign is always modelled as $A = 1$, and vice versa, implying;

$$\begin{aligned}\Pr(\mathrm{A_i}=1) &= \frac{\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)D_1^E+(\beta^T+\beta^z z_i)D_0^T\right)}{1+\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)D_1^E+(\beta^T+\beta^z z_i)D_0^T\right)} \\ &= \frac{\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)(D_1^E-D_0^T)-(\beta^E-\beta^T)D_0^T\right)}{1+\mathrm{Exp}\left(-\beta^x(x_1-x_0)-(\beta^E+\beta^z z_i)(D_1^E-D_0^T)-(\beta^E-\beta^T)D_0^T\right)}\end{aligned} \tag{12}$$

However, since the utility function (9) is invariant to any monotonic transformation, we can without loss of generality multiply all parameters with any positive constant. For the interpretation of the results it is convenient to normalise the marginal utility of income to unity, so that $\beta^x = 1$. Using (11) we can then re-write (12) to obtain:

$$\begin{aligned}\Pr(\mathrm{A_i}=1) &= \frac{\mathrm{Exp}\left(-(x_1-x_0)-MWTP_i^E(D_1^E-D_0^T)-(MWTP_i^E-MWTP_i^T)D_0^T\right)}{1+\mathrm{Exp}\left(-(x_1-x_0)-MWTP_i^E(D_1^E-D_0^T)-(MWTP_i^E-MWTP_i^T)D_0^T\right)} \\ &= \frac{\mathrm{Exp}\left(-(x_1-x_0)-MWTP_{z=0}^E(D_1^E-D_0^T)-\Delta MWTP_i(D_1^E-D_0^T)z_i-(MWTP_i^E-MWTP_i^T)D_0^T\right)}{1+\mathrm{Exp}\left(-(x_1-x_0)-MWTP_{z=0}^E(D_1^E-D_0^T)-\Delta MWTP_i(D_1^E-D_0^T)z_i-(MWTP_i^E-MWTP_i^T)D_0^T\right)}\end{aligned} \tag{13}$$

In this expression, $MWTP_{z=0}^E$ is the MWTP for the elephant campaign, given that the dummy variables reflecting the experimental context and gender are zero; $\Delta MWTP_i$ is the increase in MWTP associated with an increase in dummy variable z_i from zero to

one; and $MWTP_i^E - MWTP_i^T$ is the MWTP difference between the elephant and the turtle campaign. The parameters associated with the variables $x_1 - x_0$, $D_1^E - D_0^T$, $(D_1^E - D_0^T)z_i$ and D_0^T in (13) can be estimated by a logit model. Thus, this formulation enables us to directly estimate the MWTPs for the elephant campaign, the MWTP-difference between the campaigns (assumed to be independent of the dummy variables), as well as the difference in MWTP due to the dummy variables reflecting gender and the experimental context (implicitly assumed to be the same for the campaigns).[91]

7.6. Results

Altogether 8 subjects had lexicographic preferences in the intervals presented in the experiment and in at least one of the contexts. Among these, 5 subjects always went for the alternative with highest donation, whereas 3 subjects always chose the alternative with the highest income given to them. Thus, responses on the whole seem to be balanced with respect to income and donation. There is a lack of consensus in the literature as to whether one should exclude such observations from the analysis or not. On the one hand, one may argue that these respondents have made no serious attempt to trade, and instead were chosen a cognitively easier (lexicographic) strategy. On the other hand, this unwillingness to trade may for some individuals reflect genuine preferences in the intervals considered, or at least that there may be some useful information in these observations. I am inclined to favour the latter argument, and hence have included these observations (*e.g.*, following Carlsson and Martinsson, 2001). Nevertheless, models excluding the lexicographic observations were also run, with no effect on the main results. Regarding the test of transitivity, it turns out that only 4 subjects have intransitive preferences within the same context, indicating that responses appear rather stable within each individual and context.[92]

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[91] Normally in a logit-model, the parameter estimates need to be transformed into probabilities before they can be meaningfully interpreted. However, in the formalisation here, since all variables are representing the same underlying unit (*i.e.*, income), the logit-estimates may be interpreted directly in terms of marginal WTP.

[92] Transitivity is a fundamental axiom of standard economic theory, and it hypothesises that a particular choice (*e.g.*, A > B) would be repeated across all choice sets, everything else equal.

7.6.1. Hypothetical versus Real Willingness to Pay

Table 7.3. below presents the estimated parameters associated with the three experiments based on (1) Hypothetical choices, (2) Real-money choices after the experiment hypothetical choices, and (3) Real-money choices not preceded by hypothetical choices. The estimates are obtained through standard logit models in which one parameter (*i.e.*, reflecting income) is normalised to unity.[93]

Table 7.3. Parameters of utility functions associated with different samples

Variable	**Pooled sample** Coefficient	**Hypothetical** Coefficient	**Real after hypothetical** Coefficient	**Real directly** Coefficient
β_{Income}	1.00**	1.00**	1.00**	1.00**
	(9.54)	(5.64)	(5.89)	(5.09)
$MWTP_{Elephant}$	0.89**	1.40**	1.11**	0.81**
	(8.01)	(7.55)	(7.12)	(5.14)
$MWTP_{Elephant} - MWTP_{Turtle}$	-0.03	-0.06	0.03	-0.05
	(-0.59)	(-0.82)	(0.36)	(-0.58)
$Dummy_{Hypothetical}$	0.41**			
	(3.52)			
$Dummy_{Real\ after\ hypothetical}$	0.25*			
	(2.19)			
$Dummy_{Gender=male}$	-0.55**	-0.82**	-0.48**	-0.38*
	(-5.75)	(-4.72)	(-3.06)	(-2.21)
Log-likelihood	-582.0313	-188.4628	-202.2818	-188.5554
n	990	345	345	300
Marginal WTP	0.89	1.40	1.11	0.81

Note: *t*-statistics are presented in brackets
** denotes significance on the 0.01 level; * denotes significance on the 0.05 level

[93] Ideally, a panel-data model may have been run, wherein the effect at the individual level is fixed. This was also performed, but yielded no significant difference of the parameter estimates in table 7.3.

The first model in the table presents the pooled estimates of the three separate experiments. As expected, the parameter estimates for marginal utility of consumption (or income = β_{Income}) and donation (to the elephant campaign = $MWTP_{Elephant}$) are both positive and significant at the 1% level across all models, indicating that a higher donation and a higher income transfer enhance the likelihood of choosing that alternative. Furthermore, we see that the MWTP for the sea turtles program is slightly (but insignificantly) larger compared to the elephant program (since the parameter estimates of ($MWTP_{Elephant} - MWTP_{Turtle}$) is negative). To test for possible order effects, a dummy variable was introduced for one of two different orders, but the corresponding parameter was never significant at the 0.10 level.[94]

I also tested for the influence of various socio-economic characteristics, including gender, age and income, but only gender had a significant explanatory effect.[95] Women turned out to provide a much higher marginal WTP across all contexts, supporting the experimental results by Eckel and Grossman (1998), who found that women in general tend to contribute more to public goods. Indeed, women's MWTP is larger then 1 in both the hypothetical and the real after hypothetical cases. This means that women tend to prefer that one additional dollar be given to the campaign instead of to themselves. However, the gender differences here are lower, both in absolute and relative terms, in the real-money experiment compared to the hypothetical experiment. This actually goes in the opposite direction compared to Brown and Taylor (2000), who in a CV framework found that men on average had a much higher 'hypothetical bias'.

As predicted by H_1, marginal WTP is higher in the hypothetical context compared to the real context not preceded by hypothetical choices. Whereas in a real situation the individual is indifferent between receiving £ 0.89 herself and donating £ 1 to the WWF campaign for elephants, in the hypothetical scenario she is indifferent between receiving

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[94] Since it has been suggested that individual error terms are likely to be larger within a hypothetical than a real context, a heteroscedastic pooled model was run, where the variance in each sample is allowed to differ. However, the difference in the distribution of the error terms is not statistically significant, and the parameter estimates are almost identical to the pooled model presented here.

[95] Since the sample consisted of students the variations in income and age were, naturally, limited.

£ 1.3 (*i.e.*, 0.89 + 0.41) herself and donating £ 1.[96] We can also see that marginal WTP is higher in the real-money experiment that follows after the hypothetical experiment (*i.e.*, 0.89 + 0.25 = 1.14), compared to real-money choices not preceded by hypothetical choices. These findings are statistically significant at the 0.01 and 0.05 level respectively (first column), and are reflected by the parameter estimates for MWTP in each of the restrictive models. However and contrary to what is predicted by H_2, marginal WTP in the hypothetical context is lower for men than in real-money experiment that follows after the hypothetical experiment, although the difference is small.[97] For women H_2 is quite clearly supported.

In addition to this test, I performed likelihood-ratio tests of pooled (across contexts) and restricted models, and test statistics are presented in table 7.4.[98] Given these, we can at the 0.01 level reject the hypothesis that the parameter estimates of the hypothetical and real contexts come from the same population. The main hypothesis that marginal WTP differs between a hypothetical context and a real context not preceded by hypothetical choices is thus supported. Moreover, replicating the results by Carlsson and Martinsson (2001), we cannot reject the hypothesis that marginal WTP differs between hypothetical choices, and real-money choices made after hypothetical choices, suggesting that the latter may be a poor indicator of external validity.

Table 7.4. Likelihood-ratio tests of pooled and restricted models

Model comparison	Test statistics	
Hypothetical *vs* Real after hypothetical	$\chi^2_4 = 4.9488$	
Hypothetical *vs* Real directly	$\chi^2_4 = 16.9608$	p<0.01
Real after hypothetical *vs* Real directly	$\chi^2_4 = 5.7654$	

[96] Thus, in the former situation the individual requires more income in order to make the same donation. The coefficient should be interpreted such as that a larger value of this reflects a higher MWTP.

[97] The MWTP for men are (1.40-0.82) = 0.58 in the hypothetical scenario, and (1.11-0.48) = 0.63 in the real scenario that follows after the hypothetical experiment.

[98] Likelihood ratio test: $\lambda = -2\left[\ln L_{pooled} - (\ln L_{restricted1} + \ln L_{restricted2})\right] \sim \chi^2$

7.6.2. Testing for the Influence of Scale

The same regression as in the main model was run for those 4 respondents who were followed-up with real-money choices involving much larger monetary incentives. These respondents were chosen on the basis of previously made choices; one respondent with a MWTP close to the average MWTP in the original sample group, two with a MWTP slightly higher than the average, and one who had almost lexicographic preferences in favour of donations. These four respondents were contacted a couple of weeks after the original experiment and asked to perform a similar task. Since the degree of anonymity would naturally be lower in an experiment involving only four subjects, I performed this follow-up experiment on the internet through attached documents in an e-mail. In this way, I believe, the potential bias arising if respondents do not feel that their answers will be treated anonymously is largely reduced. In the model below, each choice set in the original as well as in follow-up setting is accounted for independently, which leaves us with 120 observations altogether. Two respondents became much less altruistic, while the remaining 2 respondents did not behave very differently compared to the case with smaller amounts of money.

Table 7.5. Influence of large-scale monetary incentives.

Variable	**Pooled sample**	**Original scale**	**Large scale**
β_x	1.00*	1.00	1.00*
	(2.47)	(1.24)	(2.24)
$MWTP_{Elephant}$	0.62	1.83**	0.68*
	(1.90)	(2.65)	(2.18)
$MWTP_{Elephant} - MWTP_{Turtle}$	0.03	0.003	0.06*
	(1.71)	(0.12)	(2.21)
$D_{Original\ scale}$	0.99*		
	(2.56)		
Log-likelihood	-73.048	-35.237	-36.454
n	120	60	60

Note: t-statistics are presented in brackets
** denotes significance on the 0.01 level; * denotes significance on the 0.05 level

As illustrated by the table, estimated MWTP is substantially lower in the large-scale setting (0.68), compared to the average MWTP among the same respondents in the original setting (1.83). The dummy variable introduced in the pooled model to control for the overall difference between sample groups is furthermore statistically significant at the 0.05 level. Although being based on only 4 respondents here, the results still indicate that scale may be important, and it supports H_3.

7.7. Conclusions

A frequently raised critique against the CVM, CEs, and other SPMs is that such approaches are likely to result in overestimation of the (environmental) benefits. The empirical results regarding this differ, however, and it appears incorrect to conclude that using a hypothetical survey-method would always overstate benefits. Furthermore, with the exception of Carlsson and Martinsson (2001), the overwhelming majority of efforts in order to test for this have been employed in applications of the CVM (*e.g.*, Navrud, 1992; Neill *et al.*, 1994), and studies supporting the convergence of hypothetical and real WTP have mostly been conducted as within-subject tests (*e.g.*, McClelland *et al.*, 1993; Carlsson and Martinsson, 2001).[99] This study is an application of CEs and follows the design developed by Carlsson and Martinsson (2001), with some important differences. In particular, I use a split-sample design that enables me to examine whether stated marginal WTP for the environmental project will influence subsequent real Marginal WTP (MWTP).

A choice model is developed in which people derive utility from their self-image, which depends on the degree to which the individual acts in accordance with her ethical beliefs, the honesty to herself, and in accordance with hypothetical statements made earlier. According to this model, people have an incentive to overstate their MWTP if a high value corresponds to the respondents' ethical views, but not otherwise. It thus captures the hypothesis developed by Katz (1960) and Herek (1986) that attitudes serve multiple functions; rather than being solely outcome-related, these are also, among other

[99] This is directly related to the validity of within-subject, as opposed to between-subject tests of embedding in CVM (*e.g.*, Boyle *et al.*, 1994; Carson, 1997).

factors, determined by value-expressive motives. The model further predicts that, due to the desire to behave consistently with respect to previously expressed responses and reduce conflicting behaviour, people's MWTP in real-money experiments are affected upwards by previously stated high MWTP in a hypothetical experiment. Finally, the model predicts that the scale of monetary incentives will alter the results of real-money experiments, because the opportunity cost of maintaining a generous self-image is negligible when the amount of money involved is small, but presumably not so when these are substantially increased.

The results support these hypotheses, and are compatible with the proposed theoretical model, but incompatible with the conventional model typically used in the environmental valuation literature. It seems plausible to suggest that, depending on the context of valuation and how consequential responses are considered to be, certain goals and interests become more or less salient to the individual. In a hypothetical valuation scenario, the respondent is likely to be largely influenced by value-expressive motives (Kahneman and Knetsch, 1992), and in order to attain a self-image as a 'good' citizen contributing to a 'good' cause, this may lead them to provide high statements of WTP. This outcome is also likely to prevail in a context that involves real money if the individual has 'committed' herself to a certain response. The model suggested here appears reasonable on the basis of findings in social psychology, notably research on cognitive dissonance (*e.g.*, Festinger, 1957), which hypothesises that people would not readily take inconsistent attitude positions, or positions that conflict with accomplished behaviour, particularly when this imperils the individual's self concept as a moral and honest person (*e.g.*, Aronson, 1992). Given the influence of previous statements of WTP, an implication is that within-subject tests of SPMs may not be appropriate procedures for examining external validity.

Perhaps more importantly, experiments with real money trade-offs, no matter if preceded by earlier hypothetical questions or not, serve as no guarantee that people's utility (as a measure of well-being) will be adequately revealed when the good being valued has a strong ethical dimension, and the experimental scale differs from a real-world situation. In these situations, people still have an incentive to 'buy' a better self-image by providing responses compatible with a relatively larger MWTP. Thus, other

motives than profit maximisation operate also when monetary incentives are introduced, and people may be reluctant not to contribute to the public good since they are not losing any money anyway. However, when these incentives are increased to a level that, I anticipate, will have a significant impact on respondents' budgets, marginal WTP is significantly reduced. To conclude, when the opportunity cost of maintaining a high self-image is substantial, MWTP is likely to be lower, and therefore, the generalisation of small-scale experiments may be limited.

As a generalisation of the results, this study does not support the argument by Hanley *et al.* (1998) that CE's would provide more accurate and valid welfare estimates than the CVM. Although not testing for commonly observed anomalies such as embedding, strategic behaviour and divergences between WTP and Willingness To Accept (WTA) measures, the lack of correspondence between hypothetical and real MWTP in between-subject tests suggests that the former are poor indicators of real economic commitments. No matter if CE's do better on internal validity, the ability to generalise findings from the experimental laboratory to the contexts these are intended to approximate seems limited. However, such findings are not confined to stated preferences of environmental amenities, but have been the basis of a more general critique of experimental research (*e.g.*, Gaskell, 1990; Lowenstein, 1999). Further research is warranted regarding to what extent alternative methodologies to the CVM, such as CE's, are externally valid, and whether the unreasonably low internal validity found in many CV studies, compared to the majority of assessments in social research, may be improved through these approaches.

8. Discussion and Conclusions

The Contingent Valuation Method (CVM) is applied in attempts to estimate the economic benefits of public goods in order to inform policy-decisions. Unlike conventional economic methodologies that extrapolate economic value from actual choices or behaviour, it is based on hypothetical market scenarios in which respondents are posed Willingness To Pay (WTP) questions about non-marketed goods and services, such as natural resources. Apart from circumventing the absence of markets, it has the advantage of also including 'non-use' values in responses, and is hence considered a 'catch-all' approach that is assumed to capture all possible benefits involved, not only those that arise from a use of the resource. It further enables the valuation of anticipated but not yet realised changes in the good. Due to its potential merits, the methodology has become increasingly popular over the last decades and is by many economists seen as a powerful and viable tool of economic benefit estimation.

However, the validity of the CVM has been widely debated throughout the years (*e.g.*, Mead, 1993; Diamond and Hausman, 1994; Hanemann, 1994; Carson *et al.*, 1996a; Blamey, 1998; Kahneman *et al.*, 1999), and, as a result of the variety of anomalies that have been demonstrated in empirical research, there remains large scepticism regarding the possibility of assigning economic values to natural resources. Many of these anomalies and shortcomings were realised in early research, which was attentive to problems such as strategic behaviour, anchoring effects, sponsor bias, hypothetical bias, etc. The main concern among Contingent Valuation (CV) practitioners was therefore how these could be overcome by methodological refinements, argued on the basis of the assumption that people possess monetary values for all sorts of marketed and non-marketed goods. However, a large body of research has challenged the assertion that the failure to assess valid and consistent welfare estimates is mainly due to flawed methodological procedures. The central theme of this objection is that CV responses may not be anchored in economic preferences, and as such represent something different than economic value. Thus, the latter perspective entails a shift in focus from methodological concerns to the basic nature of hypothetical economic value.

The aim of this thesis has been to examine the content validity of economic estimates derived from the CVM and other Stated Preference Methods (SPMs). It thus had as its objective to investigate the extent to which assessed economic values for environmental amenities are 'intuitively plausible', and whether people's interpretations of valuation scenarios correspond to the intended meaning by the researcher. These aspects have been largely ignored within the mainstream research on the CVM, which has been overly concerned with specific outcomes and how well data fit with theoretical assumptions in economics. Given that the economic model of human decision-making fails to explain why certain types of stated behaviour are observed, this thesis adopted a broader perspective on people's responses in CV studies and similar contexts. In particular, it incorporated theoretical insights and notions in social psychology in order to illuminate the foundations of empirical anomalies, and that, it is envisaged, will help to improve our understanding of *how* and *why* people value the environment.

8.1. Summary of Main Findings

In order to fulfill the objectives of this research, four separate but theoretically and conceptually linked empirical studies were conducted. They centre on various key themes relevant to CV research, such as embedding, precision of economic value and correspondence between hypothetical and real WTP. The aim is to examine these aspects in contexts and in a manner that facilitate a discussion beyond (isolated) methodological issues, and which are not limited to how well data fit with economic theory. Methodologies and analysis are further different across the four case studies, which rely on mail-surveys, face-to-face interviews or experimental data, and combinations of these approaches. Both quantitative and qualitative analysis was performed. Finally, a number of different environmental resources that vary in complexity and familiarity were evaluated throughout the thesis.

8.1.1. Embedding Effects and Methodological Procedures

According to standard economic theory, economic value should be based solely on instrumental (or outcome-related) considerations among respondents. For instance, it

should be related to the magnitude or extent of the resource being valued, how important and urgent the problem is in terms of environmental damage, how effective suggested environmental measures are, etc. However, empirical research has demonstrated that CV respondents are often unresponsive to the scope of the environmental resource being valued (*e.g.*, Kahneman and Knetsch, 1992; Desvousges *et al.*, 1993). These studies have shown that people are not willing to pay more for a larger provision of a particular good, and as a result, very similar WTP estimates have been assessed for amenities that vary greatly in scope. Another finding is that the same resource is assigned a higher value when it is valued on its own compared to a situation when it is valued within a larger package of (natural) goods (*e.g.*, Strand and Taraldset, 1991; Kahneman and Knetsch, 1992). These phenomena have by Kahneman and Ritov (1994) been termed *perfect* and *regular embedding* respectively. They indicate a non-increasing utility function among respondents, and further that economic value is not independent of the inclusion of other alternatives in the valuation scenario.

A long-standing controversy in the CV literature has been what causes these anomalies. A central claim among opponents of the CV methodology is that respondents are 'inherently' unresponsive to the characteristics of the amenity, and that value statements have a basis in other, largely irrelevant, factors (Diamond and Hausman, 1994; Kahneman *et al.*, 1999). However, the majority of studies providing evidence of perfect and regular embedding are rather different from a typical CV study. In particular, they use a design that does not follow the guidelines and recommendations set out by the NOAA panel (Arrow *et al.*, 1993). As a consequence, CV proponents have been inclined to believe that embedding, along with a number of other anomalies, are due to flawed methodological approaches, with the implicit message that these could be overcome with improved survey design and administration. Thus, no unequivocal answer has been provided in the literature regarding the validity of the CV methodology in this respect.

This study applies a more 'rigorous' design than what is normally the case among studies demonstrating embedding. Most importantly, the nature and characteristics of four different amenities (rain forests, endangered wild animals, urban air pollution, and global warming), including the causes and consequences of their deterioration, are

clearly described in the valuation scenario. Moreover, credible interventions in order to prevent or improve each of these resources are presented. Hence, the study adopts an approach that is more similar to a typical CV study. It further employs between-subject tests of these anomalies, and is therefore different from studies that have rejected the embedding hypothesis, which mainly have relied on within-subject tests. The majority of respondents answered WTP questions associated with either one or simultaneously four environmental issues. In order to compare the responsiveness to scope of WTP with an alternative measure of environmental priorities, some respondents reported their attitudes toward the same four issues on the basis of a Categorical Rating (CR) format. Both these measures were derived using two different administration modes, either in the form of face-to-face interviews or through self-completed questionnaires.

The main findings are that neither an instrument of economic value nor a concept of attitude, as utilised here, are capable of making the respondents responsive to scope. No significant difference in WTP was found between minor and major scope for any of the issues. The results also indicate that embedding is independent of how the magnitudes are specified (*i.e.*, whether absolute magnitudes, percentage, number of events, or verbal cues are used). The weak relation between expressed economic value and the character of the amenity was also supported by small variations in mean WTP across the four issues. The presumption that a measure of economic value should be psychometrically inferior to a more traditional notion of attitude, as proposed by Kahneman and Ritov (1994), is however challenged as neither instrument showed responsiveness to scope. Finally, a considerable part-whole effect was demonstrated for one of the environmental issues being valued (*i.e.*, global warming), which was assigned a twofold value when evaluated on its own, compared to when evaluated as part of four issues.

Perfect and regular embedding may thus not be easily corrected for by improved methodologies. Their occurrence further appears reasonable according to theoretical predictions in (social) psychology. For instance, it has been argued that answers to CV studies should be understood as attitude expressions rather than economic preferences (Kahneman *et al.*, 1999). Since these types of constructs may not be based exclusively on the physical characteristics of the particular amenity, insensitivity to scope is likely

to occur. Furthermore and apart from the failure to take into account budget constraints and other consumption alternatives when only being presented one amenity, results are partly consistent with Thaler's (1990) hypothesis that people have 'mental accounts' for various categories of goods that are not easily separated into specific events. The particular amenity being valued will in this case represent a more inclusive good, such as all environmental problems, or public goods in general. Nevertheless, the above notions cannot completely account for the results, since the total value of several resources was significantly larger than the value obtained for just one of these, which would not be the case if responses were influenced solely by value-expressive motives.

8.1.2. People's Representations of Contingent Valuation Scenarios

The repeated demonstration of empirical anomalies, including embedding, has resulted in a divide regarding what WTP responses in CV studies actually measure. The basic presumption among CV proponents is that there exists a set of coherent and well-defined preferences for 'all' kinds of private and public goods, including natural resources. Hence, the task for the CV researcher is to design methodologies and pose questions that properly and completely reveal these preferences. This paradigm of thought has also lead to a particular perspective in explaining results. By and large, explanations have been rather 'reductionistic' in their character, pinpointing in detail isolated (economic) phenomena, such as income and substitution effects, whereas the broader issues of how people interpret and make sense of CV questions have been widely ignored. CV advocates have in this sense been more interested in the product, rather than the process, of economic thought.

This thesis argues that, apart from people's limited ability to provide valid and reliable answers when questions are adequately interpreted (Harris *et al.*, 1989), there may be more fundamental problems involved by showing that respondents in CV studies sometimes put the valuation question in a different context than that which is intended by the researcher. In order to evaluate this notion, a think-aloud study using concurrent protocols was conducted, where respondents were urged to express what they were thinking while considering and answering a valuation question relating to global warming. In addition, two focus-groups, each consisting of four subjects, were run.

DISCUSSION AND CONCLUSIONS

Two main findings emerged from this analysis. The first was that people, albeit interpreting the task 'properly', tend to discuss largely unrelated issues, such as their opinion regarding their own responsibility for the problem, their view on the link between economics and the natural environment, their belief or (mis)trust in the environmental intervention, etc. The other more problematic result was that some people appear to base their answers directly on such apects, without paying attention to the environmental resource per se. Sometimes they even respond with a WTP response, despite partly or completely misunderstanding the question, and regardless of their lack of consent toward the rationale of an economic valuation. Finally and as a result of the above, people expressed a large degree of uncertainty about reported economic value.

These effects may explain many of the anomalies discussed in the CV literature. For instance, perfect embedding may be explained by the fact that respondents' mental representations of the scope of the good are different from that described in the valuation scenario (Schwarz, 1997). It further provides a basis for the fact that WTP estimated for a wide variety of amenities are rather similar in magnitude (Kahneman and Ritov, 1994). The study discussed here, however, draws attention to a more fundamental problem by indicating that people's basic representation of the valuation question may deviate from that intended by the CV researcher. They tend to interpret this as reflecting what their view on how much everyone through the tax system ought to pay for environmental preservation, or how effective environmental measures in general are, which are clearly different inquires from how much each specific resource, according to the magnitudes as specified, is personally worth to them.

What also emerges from the analysis is that the respondents do not perceive the valuation scenario as particularly realistic; they do not readily believe in the usefulness or feasibility of the suggested programme and have difficulties in perceiving the link between stated hypothetical value, actual payments and policy implementation. This is a different issue from their eventual scepticism toward the success of the proposed environmental intervention, since the latter is a specific aspect of the valuation scenario that may persist despite a complete understanding of the procedure. Another insight is that people in focus groups tend to more openly express their scepticism toward the valuation task, compared to when interviewed on their own. It seems that people in this

context are not as vulnerable to the researcher's interpretation of what would be a sensible approach toward solving the problem at stake, since they may find support for their criticism from other participants.

8.1.3. Precision of Economic Value

That people provide answers in surveys and interviews, despite their lack of knowledge regarding the issue (Converse, 1970), and regardless of uncertainty about their 'sincere' opinion (Nadeau and Niemi, 1995), has been demonstrated in other areas of social research. In the previous study it was indicated that people will state economic values for an environmental project or issue, but there seems to be a large degree of uncertainty regarding what would exactly reflect their WTP. The third empirical chapter examined this type of uncertainty or ambivalence, operationalised as the difference between various thresholds of certainty regarding the likelihood that the individual will actually pay the WTP bid presented. Hence, rather than being expressed as a point estimate, WTP is measured as falling within a bounded range that is hypothesised to include an unknown 'true' estimate of economic value.

Furthermore, having illuminated people's misrepresentation of the valuation scenario when this relates to a rather complex and unfamiliar amenity, an interesting question is to what extent citizens can provide precise estimates for more tangible issues, for which the valuation task should be perceived as less novel. Specifically, in this study the valuation scenario was presented as a voluntary contribution for saving the African Elephant through a campaign run by the World Wildlife Fund (WWF). The study further made use of different elicitation formats. Three variants of a Polychotomous Choice (PC) format were applied; one which posed various questions aimed to measure the influence of multidimensional attributes that define economic value; one that allowed respondents some time to think about the issue before responding; and a more simple format similar to the ones used in previous research (Welsh and Poe, 1998). Thus, contextual factors of valuation that have been discussed in the literature (Vatn and Bromley, 1994; Blamey *et al.*, 1999) were more carefully examined here. These formats were finally compared to a standard Open-Ended (OE) valuation question. The study was performed as a class-room experiment.

The results indicate that people's decisions will be different when they are given time to think about the valuation task. More specifically, WTP estimates are significantly more precise among this group of respondents. The ambivalence regions, measured as the difference between a bid that the individual is sure of paying and one that she is sure not to pay, is less than half as wide among respondents given some time to think about the issue, compared to the other response formats with certainty thresholds. No definite reasons were provided for why these results occur, but it is envisaged that this process enables respondents to put the valuation task in a broader context, whereby competing public issues, personal responsibility, and budget constraints are more fully realised. Between the other two sub-samples, no statistically significant difference in WTP was found, although the respondents who were responding to multidimensional aspects of the environmental issue seemed slightly more likely to provide a 'yes' response.

On the basis of speculation in the CV literature (Vatn and Bromley, 1994), a main hypothesis of this thesis is that a consultation with friends and relatives will reduce people's ambivalence over their WTP. According to a qualitative analysis conducted in this study, a discussion with friends and relatives was conducted among the majority of respondents given the opportunity to do so. This interaction further seemed helpful in establishing an opinion and in deciding how much the environmental issue should be valued in monetary terms. However, this result is by no means unambiguous, and the study does not reveal exactly how frequent or extensive this discussion was, nor the nature of it. Thus, it does not explicitly provide an answer as to whether a group discussion generates altogether different decision strategies than in an individual context (Kocher and Sutter, 2000), or if it evokes different motives and values as hypothesised by Vatn and Bromley (1994). Nevertheless, it has previously been shown in this thesis that opinions seem to be less influenced by respondents' anticipation regarding what would be an adequate answer in the face of the researcher when this is evaluated in a social context. This indicates that respondents to some extent rely on fellow respondents in their decision-making.

Another important result from this chapter is that WTP assessed through a standard OE valuation question was substantially larger than WTP assessed through the PC format with certainty thresholds. Both the mean and median estimates of the former are 4-5

times larger than the estimates of the latter. In addition, the nature of the distribution of responses was different between these formats, and the frequency of zero and low responses of WTP was higher in the PC format. Thus, when posed an OE elicitation question, respondents seem to implicitly adopt a much lower level of certainty, and consequently they are likely to report a figure that they are rather unsure of actually paying. The estimated welfare effect will therefore be higher when assessed through the OE format, and it may give an overly optimistic picture of the general level of support among the public for the environmental resource being valued.

8.1.4. Hypothetical and Real Willingness To Pay

Due to the number of problems and empirical anomalies that have been demonstrated with the CV methodology, Choice Experiments (CEs) have received prominent attention in recent years as an alternative approach to economic benefit estimation. In CEs, people are presented with a number of choice sets, each which include two or more alternative scenarios that the individual is asked to choose between. The scenarios are characterised by some attributes attached to the resource(s) being valued, such as how much of it that will be preserved, in what way it will be provided, and how much the suggested intervention will cost. Hence, it is hypothesised that the individual makes her choice on the basis of these attributes, which determine the benefits accrued. Hanley *et al.* (1998) discuss several potential advantages of CEs compared to the CVM, including closer resemblance of real markets, easiness of valuing attributes rather than whole commodities, avoidance of yea-saying, and a built-in test of sensitivity to scope.

Chapter seven conducted CEs in order to estimate the WTP of two endangered wild animals. The overarching aim was to investigate if CEs suffer the same shortcomings as CVM. In particular, the study examines the correspondence between hypothetical and real WTP, the latter evaluated according to the actual payments people make for the amenities presented. A theoretical model is developed where people derive utility from their self-image, which depends on the degree to which the individual acts in accordance with her ethical beliefs, honesty to herself, and in accordance with earlier made statements. According to this model, people have an incentive to overstate their marginal WTP if a high value corresponds to the respondents' ethical views, but not

otherwise. The model also predicts that, arising from the desire to behave consistently with respect to previously expressed responses and reduce conflicting behaviour, people's marginal WTP in real-money experiments is affected upwards by previously stated high marginal WTP in a hypothetical experiment. A split-sample design is employed in order to test this hypothesis. Finally, the model predicts that the scale of monetary incentives will alter the results of real-money experiments, since the opportunity cost of maintaining a generous self-image is negligible when the amount of money involved is small, but presumably not so when monetary trade-offs are substantially increased.

The results were compatible with these predictions. Although not claiming that the model here is necessarily 'true', since people's behavior is undoubtedly influenced by other motives, it was nevertheless shown that the results are incompatible with the conventional models typically used in the environmental valuation literature. Theoretical notions in social psychology, particularly relating to cognitive dissonance and people's reluctance to behave inconsistently across contexts (Festinger, 1957), and their desire to reassert a positive self-image (Katz, 1960), also support this model. The implications of the study are firstly that within-subject tests of SPMs may not be appropriate for examining external validity. Furthermore, and more importantly, not even real-money experiments, without earlier hypothetical statements, seem to properly reflect people's utility (as a measure of well-being) when the good to be valued has a strong ethical dimension, together with an experimental scale that differs from a real-world situation. In such situations, people still have a strong incentive to 'buy' an improved self-image by providing a larger marginal WTP.

When explaining survey-responses for non-use values in the environmental valuation literature the most common addition to the standard model is based on either pure (solely utility-based) or paternalistic (*e.g.*, environment-focused) altruism (Hanemann, 1994; McConnell, 1997). However, such models cannot explain the results obtained here since there is nothing in these assumptions that would explain either the discrepancy between real and hypothetical WTPs, or the influence of previously expressed preferences. The same applies to (social) commitments (Sen, 1977) and genuine altruism (Edwards, 1992; Johansson-Stenman, 1998), where it is assumed that

people do not solely maximize their own utility, but also consider other elements, such as others' well-being, as intrinsic determinants of their actions. There is now a rapidly growing literature in experimental economics on social preferences that can explain the often large observed departures from pure self-interest in terms of monetary payoffs. For example, Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) argue in favour of various forms of difference or inequality aversion to explain observed behaviour in game-theoretical experiments. Rabin (1993), Bolton and Ockenfels (2000) and Charness and Rabin (2000) hypothesise, based on the same and similar experiments, that fairness and reciprocity are also important factors.

Given that self-image is an argument in the utility function, these explanations appear reasonable. Presumably, most people would like to see themselves as defenders, or at least supporters, of fairness, and many people probably find it more pleasant being in favour of equality rather inequality. However, an implication of the model here is that the influence of such social preferences (fairness, equality, etc.) in these experiments may be exaggerated compared to real-world behaviour. The money involved is typically not only small, but the experimental situation per se may induce people to think in terms of 'what kind of person am I?' to a larger extent than they would do otherwise. In other words, depending on the particular context of valuation (*i.e.*, a hypothetical versus a real scenario), certain values and motives become more salient. I therefore believe that it is important to additionally consider various kinds of unselfish behaviour, like the above authors who assume that people are not as selfish and greedy as the standard models predict. However, at the same time, they may not be as unselfish, or concerned with principles of fairness and equality, as some recent experimental results seem to suggest.

8.2. Caveats and Limitations

Although on the whole being designed to remedy some of the shortcomings of previous research, either arising from their specific methodological approaches, or due to somewhat narrow interests among researchers, a piece of research like this naturally has limitations of its own. The most important of these is that the thesis examines only a few aspects of validity, for which reason it should by no means be considered a 'complete' account of relevant problems of CVM and other SPMs. For obvious reasons,

a number of research enquires had to be left out. Notwithstanding its limited scope, I still believe that the thesis captures some of the most conceptually important issues surrounding the CV controversy, some of which have been extensively discussed in the previous literature, some of which have not. The issues surveyed and the way in which anomalies are investigated also facilitate an investigation into what lies behind people's answers in hypothetical valuation scenarios, allowing us to put the results in a broader theoretical framework where perspectives outside economics may be considered.

Secondly, in mail-surveys, interviews, and experiments, students are primarily used as the targeted group of respondents. Due to their specific socio-economic characteristics, they may not be representative of the broader population. While acknowledging the lack of generality that this implies, the purpose of this thesis was not to generalise dollar estimates of specific environmental amenities, but to examine how various experimental conditions affect the character, stability and size of WTP. Hence, likewise other research with similar objectives, it is the comparability between various sub-groups of respondents that is the crucial element. I am inclined to argue that this fundamental criterion for validating the results is even better satisfied than it would be in a case that involved subjects with different backgrounds and characteristics. Given that I am interested in the cognitive limitations, strategies and motivations among people, and how these vary across different contexts, a problem would only arise if we have reason to believe that the targeted group of respondents are more vulnerable to such factors than the remaining population. Taking into account the fact that more knowledgeable individuals are generally less reactive to persuasive communication and experimental manipulations by the researcher (Wood *et al.*, 1985; Petty and Cacioppo, 1986), and assuming that students are more knowledgeable than the general population, we would on the contrary expect that the anomalies demonstrated here would be less pronounced for this group of respondents.

Thirdly, as discussed previously, a major problem of validating results and their causes is that different CV studies tend to use different study-designs and methodological approaches. This is particularly obvious between studies conducted by proponents and opponents of the methodology. Although the NOAA panel has established various guidelines and recommendations for conducting reliable CV studies (Arrow *et al.*,

1993), these are not indisputable, and they are further focused on how to estimate actual WTP estimates, not how to validate these. As a result, there is no uniform benchmark to which the methodological approach in this thesis can be judged. The aim of this thesis was to apply designs that closely follow those proposed by the NOAA panel and the majority of CV practitioners, thereby avoiding some of the criticism that has been frequently raised against studies demonstrating various problems of the CVM. At the same time, established procedures of psychological research that are used in order to validate theoretical predictions are adopted. Thus, I have strived to pay attention to methodological recommendations from various fields and interests of research, with the underlying aim of making results comparable.

Finally, the amenities valued in this thesis have in common that they are global resources that involve large non-use values. The issues evaluated in the early chapters are also quite complex and unfamiliar. An anticipated criticism would therefore be that findings are not valid for environmental resources or public goods in general. Admitting that this may be so, the amenities covered still vary in their character and complexity, although on the whole they may not be considered as the most tangible. However, this is neither the case for the majority of CV studies, which have as their aim to estimate non-use values of broad issues, and the objective here is to critically examine the validity of such studies. What the thesis argues is that the endeavour to assign economic values to natural resources for which environmental qualities and functions are difficult to foresee, involves a number of problems and is rarely a straightforward task. No overall attempts are made to generalise findings to more well-defined amenities, or to cases when the valuation task is less novel and more easily comprehended.

8.3. Implications and Directions for Future Research

In the following sections I will discuss the implications of this research. These take the form of either recommendations for the estimation of real economic benefits by CV practitioners and how these should or could be accounted for by policy makers, or as procedures for validating results and existent methodologies. Emphasis will be put on insights and perspectives that have been largely ignored in the literature, but which may hopefully enlighten the CV research.

8.3.1. Affective Processes of Valuation

The results of this thesis replicate the findings of Kahneman and Knetsch (1992) and others by indicating that statements of WTP seem to represent attitudes rather than economic preferences. As attitude expressions, WTP comprises other factors than those that are the target of Cost Benefit Analysis (CBA). Apart from reflecting a desire to gain approval from the interviewer, they also serve a value expressive (or symbolic) function that mediates the need for self-approval and self-realisation. Kahneman and Knetsch (1992), and similarly Andreoni (1989), hypothesise that people provide estimates of WTP in order to acquire a sense of moral satisfaction, or 'warm glow', from contributing to a good cause. Thus, CV scenarios are likely to evoke an emotional response toward preserving the environment (Kahneman *et al.*, 1999). Support for this hypothesis is provided by theoretical notions developed by Katz (1960) and Herek (1986), which acknowledge that attitudes serve many distinct functions apart from being instrumentally oriented.

The problem with value expressive functions (or affective processes of valuation) is that attitude reports are independent of and insensitive to rational arguments in the valuation scenario, such as the scope and extent of the amenity being valued. As argued in the theoretical chapter of this thesis, the major problem here is that the fundamental objective of CBA is to reflect the choices people would make on the basis of exactly such characteristics, not the affective value of objects considered one at the time. If economic values captured in hypothetical valuation scenarios are only loosely related to the particular amenity being valued, they should not be interpreted as a measure reflecting its relative importance. Moreover, the affective response may not be confined to the amenity described in the valuation scenario, but may incorporate and represent a more inclusive class of goods, or a prototype of this class, such as the environment in general.[100] Thus, what is essentially reflected in responses is something different than what the policy intervention encompasses.

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[100] The latter exemplifies the representative heuristic developed by Kahneman *et al.* (1982), implying that people tend to base their judgement on an event that is familiar to them (*i.e.*, 'the environment reminds me of the depletion of the rain forest in South America I heard on the news the other day').

Value-expressive functions are likely to be most prominent on occasions when the valuation is not perceived as consequential by the respondents. If they do not see the forthcoming policy intervention as particularly feasible, affective processes are more likely to be pronounced since their answers are not anticipated to have any (major) impact on policy decisions anyway, and the question is if we can expect respondents to be responsive to relevant factors if they do not take the task seriously enough. Furthermore, people need to realise the environmental functions of the natural resource. Given that the benefits of amenities most commonly evaluated in CV studies are quite unforeseeable, they are unlikely to make an informed judgement regarding these. Apart from imposing important restrictions on CBA, value-expressive motives also explain many of the observed anomalies in CV research. Focusing on the results of this thesis, we may firstly argue that insensitivity to scope and part-whole effects arises due to respondents' failure to confine their answers to instrumental considerations. Furthermore, direct evidence is provided from conducted CEs; in a hypothetical context, in which choices and statements may be perceived as less consequential, value-expressive motives become more salient than in a context involving real payments. Responses are also likely to be less precise if the benefits and features upon which responses should be based are unknown or obscured. Overall, such statements are likely to be less predictive of future behaviour (Krosnick, 1986), and therefore, less relevant for economic policy analysis.

8.3.2. Comprehension of the Valuation Task

Before people can express their preferences, they must understand the structure, content and purpose of the valuation task. Furthermore, they need to figure our what their options are. In a CV study, people are asked to report an economic value of something that they have presumably never thought of before in monetary terms. This is not to say that they do not realise that the benefits of public goods somehow must be balanced against their costs, but they are unfamiliar with the particular question raised, and they may as a result not perceive the suggested basis of policy decisions as particularly sensible or realistic. Fischhoff (1991) suggests that people have well-defined preferences over only a very limited set of goods, and when posed a WTP question on an unfamiliar issue, they are forced to construct a value on the spot. Schkade and Payne

(1994) and Vadnjal and O'Connor (1994) show that this construct suffers from a number of problems, from being based on irrelevant factors, to just being made up by respondents in a guessing game, thereby resulting in the registration of 'non-attitudes'.

The construal processes involved in interpreting survey questions, interviews and experimental inquiries have been extensively studied in decision sciences (*e.g.*, Gregory *et al.*, 1993; Schkade and Payne, 1994; Fischhoff *et al.*, 1999). The major discovery is that people interpret tasks in simpler, more complicated, or just different ways than investigators assume, but rarely in exactly the way they are required to by the researcher. Furthermore, although interpreting the task correctly, a number of aspects surrounding the valuation task will influence the answer elicited, some of which are not directly relevant (Fischhoff *et al.*, 1999). For instance, in a CV study, respondents are likely to reflect on the basic purpose of the inquiry, who is sponsoring this, who will be responsible for its implementation, their (mis)trust in involved parties, the nature of the transaction, what the notion 'household opinion' entails, etc. At the same time, relevant factors are sometimes ignored or forgotten.[101] People also often rely on a pre-defined mental representation of the valuation task in their struggle to find out what the investigator is aiming for (Schwarz, 1997).

Such construal processes of preference assessment are rarely paid adequate attention to in CV research. They are merely considered as a means to an end, and the general idea is that people will interpret the CV question exactly as presented, and any misunderstanding of this is attributed to a lack of specification in the valuation scenario. Thus, some true value is presupposed. However, as the above accounts and the findings of this thesis imply, deviations from intended purposes are not easily corrected for. Normally in survey research we choose to live with the various anomalies arising from respondents (mis)interpretation of the questions asked, being aware of that the latter do not necessarily reflect exactly what they are intended to measure. In CV studies this problem is likely to be more pronounced, since they present an issue of which people

[101] For instance, Fischhoff *et al.* (1999) found that on average less than half of the respondents in their study remembered details of the valuation scenario, such as how much of the resource will be restored, how effective the restoration will be, how the programme will be paid far and who will pay for it.

may only have a vague idea of its causes and consequences, and that further posit a procedure of dealing with this that is not yet 'institutionalised', that is, which does not comply with established (democratic) principles of public policy-making.

In order to make the valuation task real enough to answer, respondents are, intentionally or unintentionally, trying to put this in a context that makes sense to them and which complies with what a survey or opinion poll would normally ask for, such as their opinion as to how much effort society in general should spend on solving environmental problems, who should take responsibility for these, how they should be paid for and so on. Similarly, they are searching their experiences of how public issues are normally decided upon in society, which guides them in their interpretation of the questions posed. The respondents are thus asking questions about the questions posed by the researchers. Unfortunately, rather than being perfectly clear toward the researcher about their uncertainty, they are sometimes inventing their own answers to these questions, because, after all, the questions are in fact asked by an 'eminent' researcher and they must therefore, in one way or the other, be meaningful and warranted (Schwarz, 1994). As a result, people may evaluate a proposal differently from the one being the target of the inquiry, or may misinterpret its purposes, which leads us to conclude that CV responses should not always be taken at face value.

8.3.3. Contextual and Social Factors

It is envisaged that a discussion with friends and relatives may help respondents to develop and stabilise opinions toward the research inquiry. The general conclusion of previous research that has looked into the role of social processes on decision-making is that people who communicate regularly think similarly (Zimbardo and Leippe, 1991). People further rely on 'significant others' in order to establish new opinions or validate previously established views. Apart from friends and relatives, people are influenced by the media and other sources of reference in their decision-making. These sources divert the attention of people, they suggest what would be a reasonable answer, and they make people more confident of their opinions by transferring their confidence in authorities into their own judgements. Theories of social impact, social influence and social comparison (*e.g.*, Kelman, 1958; Fazio, 1979; Latané, 1981; Nowak *et al.*, 1990) all

acknowledge the role of social interaction in the establishment of opinions and preferences. In economics, the impact of other individuals has been explored in theories of herd behaviour and information cascades (Bikhchandani *et al.*, 1992), which entail that people's buying behaviour is largely determined by how other people act in the market place. In an individual CV interview, respondents thereby lack guidance that they would otherwise have and find useful in their everyday decision-making.

It is somehow odd that the dynamics of social processes and the role of dialogue in formulating opinions regarding what in the end would be a proper action to take in relation to environmental issues have been virtually ignored in the CV literature. On the basis of research conducted by Sen (1987) and others, who emphasise the difference between decisions in the market place and moral commitments in a social world, and who subscribe to the basic argument that people do not respond to CV surveys as self-oriented consumers, but rather as citizens concerned with fairness and equality, we ought to ask why preferences are typically assessed in individual contexts and not through collective discussions. Assuming that social norms, conventions and shared values are necessary components in helping the individual to provide reasonable answers to surveys about public issues, these should be conducted in an environment that facilitates such factors, and that frame the valuation task in an appropriate way.

Similar to Vatn and Bromley (1994), this thesis argues that communicative processes are vital to developing an understanding of the valuation task, to decide what is worth valuing, and why that is so. It posits that there is a functional meaning of the relationship between society and the natural environment that is unlikely to be completely or properly explored in an individual context. This may also explain why respondents, in their efforts to understand the valuation task, tend to discuss more general issues of the link and conflicts between environmental preservation and social progression, rather than reflecting upon its individual worth. It is not the main objective of this research to decide in what particular contexts WTP is most appropriately assessed, and whether other than utilitarian considerations should be (completely) excluded from responses, but it nevertheless demonstrates that results are sensitive to various contextual factors in a more general sense, such as whether WTP is elicited on the spot or assessed after the respondents have been given the opportunity to reflect

upon their opinions, or whether statements are hypothetical or involve real payments. Future attempts at assessing economic values of public goods should be more attentive to such contextual factors and investigate how and to what extent these influence estimated welfare effects.

8.3.4. Rational Decision-Making and Philosophical Concerns

Assuming that CV studies and other SPMs could be designed in ways that entice respondents to behave in a satisfactory way and that would fulfil the requirements of economic impact analysis, we are still left with two problems. Firstly, the use of CV studies to make judgements of public goods implies that the more well-off would have considerably more to say, because they could afford to state (and later pay) a higher value than other citizens, and thereby their opinions would be assigned greater weight. However, such criterion of policy making is likely to result in resentment from people, not only from the less well-off because they may feel that their decision power is hampered, but also from the public generally. This is due to the fact that most people, in addition to purely selfish motives, are concerned also about morale, loyalty and a sense of fairness. Thus, there are competing claims between utilities, rights, social contracts, core values, etc., whereas WTP is only indirectly, and sometimes quite weakly, related to the first of these. Sen (1977) illustrates this aspect with an amusing example. The following tells the story of two boys who find two apples, one large and one small;

> Boy *A* tells boy *B*, "You choose." *B* immediately picks the larger apple. *A* is upset and permits himself to remark that this was grossly unfair. "Why?" asks *B*. "Which one would you have chosen, if you were to choose rather than me?" "The smaller one, of course," *A* replies. *B* is now triumphant: "Then what are you complaining about? That's the one you've got!" (Sen, 1977; p. 328)

Thus, there is often a contrast between commitments and (purely) selfish motives concerning issues that involve fellow citizens, and market-based decision-making is therefore not easily transferable to non-market domains. Apart from large difficulties of adequately capturing the latter, embodied in economic value, the question is whether such a criterion of natural preservation is appropriate. I believe that the CV research has progressed without paying full attention to this aspect. A more sensible approach would

be to firstly discuss the meaningfulness of economic value in public policy analysis, and whether welfare effects should be estimated on the basis of survey results. In this process it is important to involve the public, which arguably should be given an opportunity to express their opinions toward how and on what basis environmental policies should be shaped. As is otherwise common in a democratic society, a political discussion should precede implementation of specific approaches to public policy-making in order to make these 'democratically legitimate', and to provide collective frames of meanings for environmental values and policy. Although citizens may consent to the inclusion of economic welfare effects, they are then better equipped to put forthcoming CV studies in an adequate context, which would lead them to interpret questions as intended.

Secondly, whereas real world decisions and behaviour are clouded by emotions and a lack of clearly defined objectives, surveys and experiments often state or hint what the respondents should pay attention to and what they should disregard, thus suggesting what would be a reasonable response. For example, let us assume that it is possible to design a 'perfect' CV scenario that would direct the respondents into only considering the resource being valued, thereby minimising the impact of symbolic value expressions. However, if people in a real-world situation do find the broader context important (*i.e.*, the environment in general), possibly due to the moral implications of the policy intervention, would it be correct to disregard such motivations and considerations among the public?

As demonstrated in this thesis, we may equally end up in an opposite situation, that is, that people in the survey and experimental context exaggerate or distort statements in order to appear as 'good' and fair citizens in the eyes of the researcher, but when acting in a real world context, they are indeed rather selfish and less concerned with ethical and moral principles. The problem of generalising results is common for all kinds of experimental research, but whereas this normally is focused on cognitive effects and the impact of experimental conditions in order to learn about the nature of human behaviour and decision-making, the purpose of SPMs is actually to estimate 'true' and real world opinions. Therefore, my recommendation to CV practitioners is that they should be more aware of the caveats and limitations discussed in mainstream survey research.

8.3.5. Methodological Limitations and Recommendations

The elicitation of affective value processes and misunderstanding of valuation scenarios should preferably be avoided, or at least minimised, in CV studies. One way of achieving this goal is to confine the measurement of economic values to tangible and familiar issues, which is likely to result in less novel valuation tasks. I agree with Bjornstad and Kahn (1996) that before attempts at estimating non-use values are pursued, we ought to investigate how well people respond to hypothetical valuation scenarios that mostly or exclusively capture use values. Implicit in this argument is the idea that focus should be placed on amenities that respondents have a moderate experience or knowledge of, and that somehow have an established link with ordinary economic decision-making. Not only should people's attitudes toward such goods be more developed, thereby making it easier for them to provide unbiased value estimates. It is also more likely that respondents will genuinely believe in the suggested environmental program and comprehend the link between hypothetical statements of WTP, subsequent actual payments (either through taxes, fees or voluntary contributions), and policy implementation. If the valuation scenario is perceived as realistic in this sense, respondents should be more aware of and motivated by instrumental consideration in their responses, whereby various anomalies and the influence of contextual factors are reduced.

The problem of assessing valid WTP estimates for more complex amenities that involve large non-use values, which are un-avoidable if the CVM is to fulfil its objectives, does not imply despair about the possibility of using economic value as an aid in policy making. Certainly it is useful, and even if people are motivated by emotional processes in their responses to CV studies, such motivations may still provide some valuable information regarding what the targeted amenity is worth to them, which in the long-run have implications for what is worth preserving and what is not. However, it should not be the only input to policy-making as some committed CV practitioners seem to suggest. Rather, it should be considered as one of several criteria, weighted along with professional advice, expert judgements and the outcome of other democratic decision processes. Considering that decisions in other areas of public policy-making, such as health care and education, are not (or at least rarely) made according to principles of

consumer sovereignty, one may wonder why it should be the only basis as far as environmental resources are concerned. Policy makers need also be aware that, rather than representing point estimates or 'true attitudes' that exclusively reflect all dimensions involved, assessed economic vales reveal a balance of considerations among people who strive to resolve multiple and often conflicting opinions in making a summary judgement (Zaller and Feldman, 1992).

An approach toward remedying, or at least make these limitations explicit, is to introduce methodological approaches that capture the motivations behind WTP, which enables an analysis of whether WTP statements pass as economic value as defined by utilitarian principles. The disentanglement of value processes will also reveal to what extent respondents understand the valuation task, if they agree to the suggested proposal, and whether they perceive this to be realistic and feasible. Apart from the design of specific items in questionnaires that are asked subsequent to the valuation question, respondents should be encouraged to 'think aloud' while being confronted with this. Concurrent verbal protocols are used extensively in psychological research when investigating perspectives and decision-making among lay people, and there should be a lot to gain from importing these tools to the techniques of environmental valuation. On the basis of the results from verbal reports, more informed judgements regarding the validity of WTP statements can be made, which either could be disqualified if there is a lack of a fundamental understanding of underlying purposes, or adjusted when 'merely' specific attributes of valuation scenarios are misrepresented.

Such approaches are finally valuable in order to judge what type of issues are well suited for economic analysis, and in what particular contexts economic values may be estimated. It should also be helpful in order to distinguish between various (categories of) respondents, because it may well be that whereas many individuals do not have any meaningful attitudes at all in these contexts as suggested by Converse (1970), others, particularly those who are more involved in the public issue being valued, may possess (fairly) well-represented and stable values toward this. Researchers are for similar purposes encouraged to perform adequate manipulation checks, such as controlling for respondents' interpretation of the amenity, including the extent and effectiveness of proposed interventions. Between-subject tests of anomalies should be employed in these

efforts since it has been indicated that within-subject tests are not sufficient, nor always appropriate, to validate results. Generally speaking, CV practitioners are urged to be more attentive to the fact that some outcomes in CV studies are behavioural regularities that cannot be attributed to insufficient or improper valuation techniques, and a future avenue of research is to investigate exactly what these are, for which amenities, and for which individuals they are likely to be present.[102]

8.4. Concluding Remarks

Over a decade ago, Peterson *et al.* (1988) pulled together a number of scholars from various domains of the behavioral sciences in an attempt to broaden the perspective among researchers in the CV community. Harris *et al.* (1989) similarly called for more multidisciplinary studies and attention to social psychological issues relevant to CVM, such as limitations of information-processing and judgement-making abilities among humans. At approximately the same time, Mitchell and Carson (1989) provided a state-of-the-art account of the current CV research, adopting the basic view that the assessment of hypothetical economic values was indeed meaningful, fundamentally possible, and without any major problems. By and large, the role of factors traditionally viewed as outside the field of economics were downplayed, and the feeling was that it was now more of a matter of fine-tuning the methodology to correct for problems such as strategic behaviour, measurement bias, sampling and aggregation issues, etc. Judging on the basis of the character and objectives of mainstream research conducted up to the present date, it appears that the latter perspective has won significantly more ground.

The present research stresses the importance of establishing a research agenda that focuses on people's understanding and interpretation of CV scenarios. Attempts at valuing environmental resources should first be subject to content validity before

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[102] Yet another issue that needs to be addressed in CV research is how well assessed values are representative for the general public. Given the low response rates in CV studies, a problem arises if only environmentally concerned or interested people are taking part in these. CV practitioners are therefore recommended to be more attentive to concepts and procedures in other fields of political science that place emphasis on such aspects.

moving onto other aspects of validity. The problem should in this respect dictate the methodology rather than the other way around. Many CV researchers would probably argue that the correspondence between revealed and stated preferences, in addition to how well hypothetical WTP predicts real economic commitments, are the most fundamental criteria of whether the CVM measures economic value with accuracy. Without denying the importance of these aspects, revealed preferences only reflect use values and are therefore not readily comparable with stated preferences, the latter which are also assumed to capture passive use values and non-use values. Moreover, real WTP as measured in experimental contexts may not always properly reflect how people would act in a real-world context, partly because certain motives become more salient in these, partly because monetary trade-offs generally are small.

The most fundamental requirement in order to move beyond technical inquires of measurement bias, statistical analysis, elicitation formats, calibration of estimated values, aggregation issues, etc., is to integrate economics with other disciplines, most notably psychology, sociology and decision-sciences. The extent to which this has happened is not great, but I believe there is a clear value in broadening the participation to include more diverse methods, backgrounds, and objectives of research. Although there are examples that endorse other than purely economic interests and procedures (*e.g.*, Bjornstad and Kahn, 1996), these attempts are destined to be insufficient since, again, they arise from an eagerness to explain more specific anomalies and outcomes. In this sense there is a lack of interest in theory-testing among CV practitioners, in deference to the practical aim of estimating the value of particular environmental amenities. The rarity of genuine interdisciplinary approaches to understanding the fundamentals of economic value-expressions in hypothetical market scenarios is best reflected by Boulding and Lundstedt (1988);

> ... economics and psychology ... are continents of the mind separated by a very wide ocean, no doubt produced by academic continental drift. Furthermore, they seem to be continents without any good harbors. ... It is a fundamental principle of economics that specialization without trade is worthless. Unfortunately, in the continents of the mind, specialization seems to feed on itself, and there are large, invisible tariff barriers against the interchange of ideas (p.21).

One suspects that CV practitioners are not particularly congenial to adapting to psychological insights because these may be seen as suggesting, due to all the involved problems of human-decision making, that there would be not much of an idea to continue with the endeavour of assessing monetary values of environmental resources. However, much psychological research shows that there are patterns of decision-making and behaviour that are not the result of human ignorance, but of human intelligence, reflecting its limitations as well as its strength. Rather than dismissing alternative explanations, I believe there is a lot to learn from these in order to develop an understanding of the limits and possibilities of environmental valuation. Instead of spending too much time in quantifying environmental values suitable for mechanical aggregation, more attention should be diverted towards the fundamental problems of the underlying value construct. Methodological approaches in social psychology, which by tradition are much more concerned with how well methodologies measure the theoretical construct they are aimed to measure, would also prove vital in attempts to improve specific environmental valuation techniques. A constructive dialogue between researchers from different disciplines should, I believe, result in a more enlightened debate that extends beyond the narrow dogmatism that has too frequently characterised CV research over the last decade.

Appendix A. Questionnaire Design Chapter 4

SURVEY OF ENVIRONMENTAL PRIORITIES

My name is Henrik Svedsater and I am a research student at the London School of Economics. In this survey I am going to ask some questions about your opinions on various environmental issues which our society is facing today.

Please note that I am interested in **your** opinions; other people may think differently about the questions I am going to ask, but there are no right or wrong answers in this respect. Your answers will be treated in confidence and not shown to anyone outside the research team. The questionnaire consists of 17 questions and takes no more than 10 minutes to complete.

As thanks for your participation, there will be a **lottery of £ 30** among all who hand in the survey. In case you want to take part in this lottery, please write down your place of residence and room number on the top of this page. The winner will be notified on Wednesday 26/11.

Thank you beforehand for your cooperation!
And good luck in the lottery!

APPENDICES

INTRODUCTION

Environmental pollution and the exploitation of natural resources are indeed important problems that our society is facing today, and most people would probably argue that these should be put high on the political agenda. However, solving all environmental problems at once is neither possible, nor perhaps desirable. Rather, we need to make priorities and allocate our public and private budgets to those environmental issues we find most important.

SECTION A: WILLINGNESS TO PAY FOR ENVIRONMENTAL IMPROVEMENTS[103]

One way of deciding on what are environmental priorities is to ask people for their willingness to pay for solving various environmental problems, either through higher taxes, voluntary donations or higher prices for various products. **I am interested in how much the environmental improvements in the list below are worth to you.** I want you to consider your maximum willingness to pay for each of these, given that the proposed interventions will be carried through successfully.

The willingness to pay involves an **annual voluntary contribution**. Before answering any question in this section, please read through the whole list of issues. Try also to consider your current household income, expenses and possible future use of your income when making an assessment.

Think carefully about each issue and try to give your best answer!

1. **Preservation of the rain forest in Bolivia.** Rain forests contain the largest number of habitats and are therefore a source of much irreplaceable material for medicine, industry and agriculture. The main causes of deforestation are timber exploitation and conversion of forests into grazing land and agriculture. In order to stop this, international initiatives have been taken to establish national reserves throughout the country, implying a sustainable use of the rain forest. The results will be that the current deforestation rate of **50,000 ha** annually is prevented.

   My willingness to pay for this environmental improvement is £.....

[103] Variations of scope between sub-samples are presented in a later section.

2. **Saving of the endangered African elephant.** This animal is threatened by extinction due to illegal ivory hunting and the exploitation of important habitats and breeding grounds. The foundation of an international wildlife fund, the establishment of game parks and stricter hunting laws will entail its survival.

   My willingness to pay for this environmental improvement is £.....

3. **An improvement of the air-quality in the London area,** by imposing stricter emission controls and subsidising more environmentally friendly fuels. High concentration of substances such as carbon monoxide, nitrogen oxides, sulphur dioxide, lead and black smoke, reduce plant growth, cause visible damage to sensible crops and add to acid deposition (acid rain). Moreover, they are toxic for humans, and high concentrations or acute exposure might cause breathing problems.

   My willingness to pay for this environmental improvement is £.....

4. **A reduction of 20% in the gases that give rise to global warming.** The emission of greenhouse gases give rise to global warming, and to stop this we need to be more efficient in the way we use energy for heating, transport and industry. The effects of global warming is somewhat uncertain, but it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be possible. There are also considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate.

   My willingness to pay for this environmental improvement is £.....

SECTION B: FOLLOW-UP QUESTIONS

In this section I would like to ask you about the questions you have answered in the above. Specifically, I am interested in how difficult it was for you to make these assessments, how confident you are with your answers and what kind of considerations you paid attention to.

5. Overall, how difficult did you find it to make the assessments in section A?

- ☐ *Very difficult*
- ☐ *Rather difficult*
- ☐ *Rather easy*
- ☐ *No problems really*

6. Regardless of how difficult or easy the task in section A might be, people can be more or less confident about their ability to make these assessments. Overall, how confident are you of your answers in section A?

- ☐ *Very confident*
- ☐ *Rather confident*
- ☐ *Rather uncertain*
- ☐ *Very uncertain*
- ☐ *I basically just guessed*

Please comment if you care to .....

.....

.....

.....

7. Among the issues, for which one are you least confident with your answer, and for which one are you most confident? (please indicate by question number)

The one I am least confident about is question number .....

The one I am most confident about is question number .....

8. What consideration(s) did you pay attention to when making your assessments? Please think for a moment and tick the three most important reasons for your assessments. Could you also briefly describe below how you come up with your answers in section A?

- *How much I personally care about the issues* ☐
- *The seriousness and extent of each problem* ☐
- *What I can afford to pay* ☐
- *What other people would pay (a fair share)* ☐
- *Consideration of how many other environmental issues that need support* ☐
- *I want to feel that I contribute something to the environment* ☐
- *My belief that the improvement actually will be carried through successfully* ☐
- *What the likely costs for the intervention will be* ☐
- *To what extent I feel responsible for solving the problem* ☐
- *Consideration of how many people might contribute to the issue* ☐

9. What motivated your answers? Please think carefully and tick the appropriate box(es).

Self interest, including own family	☐
In the interest of society	☐
In the interest of future generations	☐
Non human interests (i.e. concern for plants and animals)	☐

10. Could you please add up (in rough figures) the total amount you have agreed to support all environmental issues in this survey with, and then indicate below from which of your "private accounts" you would take this amount, keeping in mind that the WTP involves an annual fee.

Rent / living expenses	☐
Travel expenses	☐
Clothes	☐
Entertainment (cinema, theatre, sports etc.)	☐
Specific hobby that I am spending money on	☐
Savings	☐
Other type of spending	☐

.....

.....

11. When you have considered from where you should get the money, are you still willing to make the same total contribution for the environmental issues involved in this survey?

No, I am willing to reduce my contribution substantially	☐
No, I am willing to reduce my contribution slightly	☐
Yes, I am willing to keep it the same	☐

SECTION C: QUESTIONS ABOUT YOURSELF

As a last section I would like to ask you a few questions about yourself. These are raised in order to classify people into different groups according to some key characteristics.

12. Are you ☐ *Male*
☐ *Female*

13. How old are you? (please state age, not birthdate) ..... *years*

14. Which country do you come from? .....

15. For how long time have you been living in England? ..... *years*

16. What is your main subject at the university? .....

17. What is your total income per year before taxes? **£**..... *per year*

number of dependants of this income ..... persons

Thank you very much for your cooperation!
It will be very valuable for me.

VARIATIONS OF SCOPE: ALTERNATIVE 1

1. **Preservation of the rain forest in South America.** Rain forests contain the largest number of habitats and are therefore a source of much irreplaceable material for medicine, industry and agriculture. The main causes of deforestation are timber exploitation and conversion of forests into grazing land and agriculture. In order to stop this, international initiatives have been taken to establish national reserves throughout the continent, implying a sustainable use of the rain forest. The results will be that the current deforestation rate of **2 million ha** annually is prevented.

   My willingness to pay for this environmental improvement is **£**.....

2. **Saving of the most endangered mammals in the world,** including the Sumatran rhino, the pygmy chimpanzee, the African elephant, the koala and the Siberian tiger. All these animals are currently on the verge of extinction due to illegal hunting and the exploitation of important habitats and breeding grounds. The foundation of an international wildlife fund, the establishment of game parks and stricter hunting laws will entail their survival.

   My willingness to pay for this environmental improvement is **£**.....

3. **An improvement of the air-quality in the London area,** by imposing stricter emission controls and subsidising more environmentally friendly fuels. High concentration of substances such as carbon monoxide, nitrogen oxides, sulphur dioxide, lead and black smoke, reduce plant growth, cause visible damage to sensible crops and add to acid deposition (acid rain). Moreover, they are toxic for humans, and high concentrations or acute exposure might cause breathing problems.

   My willingness to pay for this environmental improvement is **£**.....

4. **A reduction of 20% in the gases that give rise to global warming.** The emission of greenhouse gases give rise to global warming, and to stop this we need to be more efficient in the way we use energy for heating, transport and industry. The effects of global warming is somewhat uncertain, but it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be possible. There are also considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate.

   My willingness to pay for this environmental improvement is **£**.....

VARIATIONS OF SCOPE: ALTERNATIVE 2

1. **Preservation of the rain forest in Bolivia.** Rain forests contain the largest number of habitats and are therefore a source of much irreplaceable material for medicine, industry and agriculture. The main causes of deforestation are timber exploitation and conversion of forests into grazing land and agriculture. In order to stop this, international initiatives have been taken to establish national reserves throughout the country, implying a sustainable use of the rain forest. The results will be that the current deforestation rate of **50,000 ha** annually is prevented.

   My willingness to pay for this environmental improvement is **£**.....

2. **Saving of the endangered African elephant.** This animal is threatened by extinction due to illegal ivory hunting and the exploitation of important habitats and breeding grounds. The foundation of an international wildlife fund, the establishment of game parks and stricter hunting laws will entail its survival.

   My willingness to pay for this environmental improvement is **£**.....

3. **A major improvement of the air-quality in the London area,** by imposing stricter emission controls and subsidising more environmentally friendly fuels. High concentration of substances such as carbon monoxide, nitrogen oxides, sulphur dioxide, lead and black smoke, reduce plant growth, cause visible damage to sensible crops and add to acid deposition (acid rain). Moreover, they are toxic for humans, and high concentrations or acute exposure might cause breathing problems.

   My willingness to pay for this environmental improvement is **£**.....

4. **A reduction of 60% in the gases that give rise to global warming.** The emission of greenhouse gases give rise to global warming, and to stop this we need to be more efficient in the way we use energy for heating, transport and industry. The effects of global warming is somewhat uncertain, but it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be possible. There are also considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate.

   My willingness to pay for this environmental improvement is **£**.....

Appendix B. Design of Interviews and Focus-Groups Chapter 5

'Think-Aloud' Interviews

INTRODUCTION

In this interview I am going to ask you some questions that relate to the natural environment. Specifically we are going to discuss one particular environmental issue that our society is facing today. However, before we come to this I will ask you some general questions about the environment and also present some background information for the forthcoming task.

It is important for me to hear what you think. Try not to hit on what other people would say, or what might be an "acceptable" answer. There are no "right" or "wrong" answers in this respect. Your answers will be treated in confidence and will not be shown to anyone outside the research team.

Do you have any questions?

1. *The natural environment is a rather broad issue which encompasses many different topics and areas. Could you please describe what first comes to mind when thinking about environmental degradation? Are these major problems?*

.....

.....

.....

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VALUATION OF ENVIRONMENTAL RESOURCES

Environmental pollution and the degradation of natural resources are indeed important problems that our society is facing today, and there is a widespread concern that these issues should be put high on the political agenda. However, solving all environmental problems at once is neither possible, nor perhaps desirable. Rather, we need to make priorities and allocate our public and private budgets to those issues we find most important.

One way of deciding on what are environmental priorities, is to ask people for their willingness to pay for solving various environmental problems. This could be put in the contexts of higher taxes, voluntary donations or higher prices for various products. Sometimes the underlying economic value is derived by establishing a hypothetical market associated with a particular environmental project, whereby people are asked to value the actual resource in monetary terms. The main rationale of these approaches is that the efforts and costs of solving various environmental problems ought to be compared with their benefits. Only when the latter (that is, the aggregated money people are willing to pay) exceed the costs will it be worthwile to carry out proposed preservation activities.

SPECIFIC ENVIRONMENTAL ISSUE - GLOBAL WARMING

Over the last decade there has been a concern that human activities have impact on the earth's atmosphere. Debates about global warming have been conveyed frequently in the media and probably few people are completely unaware of the issue.

2. *Before proceeding I would like to ask what you know about global warming, and could you please mention some effects or consequences that you believe would result?*

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.....

SCENARIO DESCRIPTION

Global warming results from the emission of greenhouse gases, primarily carbon dioxides, which are bi-products of manufacturing, heating and transportation. The effects of global warming is somewhat uncertain, and there prevail some disagreement among involved researchers what and exactly how large the effects would be. However, it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be efficient nor possible in the future. Whereas some places will get warmer, other will become colder, leading to changes in the liveability at different places. Due to alterations in global and regional temperatures, there are considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate. Conservation biologists are further

concerned with the effects on biodiversity, from extinction of single populations of highly habitat-specific endangered plants to the extirpation of entire species and communities. On a more broader level, these changes might cause yet unknown but possibly serious effects on the global eco-system.

In order to stop this we need to be more efficient in the way we use energy for heating, transport and industry. As a first step toward solving the problem, a treaty was signed by 38 countries in Kyoto Japan, agreeing to reduce emissions of greenhouse gases 7 percent below 1990 levels by the year 2012. Yet, there are a significant number of people, including environmental groups, climate scientists and governmental officials, who argue that these efforts are not sufficient and who therefore urge for much tougher restrictions. However, by imposing higher charges on the emission of greenhouse gases, along with making more use of biological fuels, various fuels and other forms of energy will become more expensive. Apart from the direct effect on taxes, such measures will eventually have an impact on the prices of various consumer products.

Suppose now that a policy is implemented that will ensure that the emission of greenhouse gases are reduced to the extent that the above problems are prevented. There has been some approximation of how much such a policy will cost for the average citizen in terms of higher prices and taxes, and the core question is if people are prepared to pay this. I would therefore like to know how much such initiatives are worth to you.

THINK-ALOUD

Before coming to the next question, I want to inform you that one important purpose of this research is to find out what people are thinking when answering questions about environmental values. Therefore I am asking you to **think-aloud** while you are working on the question given below. By think-aloud I am simply interested in everything that you are thinking, from the moment you have read or heard the question until you give me an answer you are satisfied with. In this process it is important that you do not plan what to say, nor do you have to explain what you are saying unless probed to do so. Just speak out loud what comes to mind. If you are silent for some time I will remind you to continue talking.

An example is the following mathematical problem: *What is the result of 11 times 14?*

Do you understand this procedure?

The willingness to pay involves an **annual payment**. It is conditioned by the fact that the proposed intervention is carried through successfully. Try to consider your current household income, expenses and possible future use of your income before making an assessment. Think carefully about the issue and try to give your best answer. **Remember to tell me what you are thinking while answering the question!**

3. *How much would the proposed intervention has to cost you before you would vote no to this? To put it differently, what is your annual maximum willingness to pay for this environmental improvement in terms of higher prices and taxes?*

The maximum amount I am willing to pay is £ ..... *annually*

FOLLOW-UP QUESTIONS

In this section I would like to ask you about the question you have answered in the above.

4. *Firstly, how do you feel about being presented with the procedure above? Do you think it is sensible or appropriate to base policy decisions on a similar basis, that is, how much citizens value similar problems in economic terms? Explain why or why not, and tell what you think about the issue of responsibility related to the problem.*

.....

.....

5. *It might indeed be difficult to state an exact sum in an inquiry like this. How confident are you about the amount you have agreed to contribute? Please indicate your willingness to pay on the line below, and use this when indicating within which range your contribution most likely will fall: (i.e., how precise is your amount?)*

I am rather confident that I would pay at least £ .....

I am rather confident that I would not pay more than £ .....

0 1 5 10 25 50 100 1000

6. *To what extent do you believe that you will actually pay, or being required to pay, the amount you were asked in this survey? Put in other words, how credible or realistic do you perceive a procedure like this? (compare to an auction for instance)*

.....

.....

.....

.....

7. *Listed below are a number of selected issues that need public resources. Please rank the 5 most importance of these, implicitly stating which ones are in most need of public support. Imagine that you are in charge of policy decisions, and your current task is to allocate money to the following issues. Indicate the most important with "1" and so on.*

Air pollution in cities ☐
Climate change ☐
Drinking water quality and reliability ☐
Ozone depletion ☐
Radioactivity and nuclear waste ☐
Rain forest destruction ☐
Reduction in the availability and quality of wildlife and natural parks ☐
Soil erosion ☐
The spread of poisonous metals and chemicals to the environment ☐
Threats to seas and lakes ☐

8. *You have listed ..... issues that you find more important than climate change. Would you hereby say that you are willing to pay at least as much for each of these, or does this make you rather uncertain about your stated amount? Please comment on this, and tell me if you had a more general picture of environmental problems when figuring out your willingness to pay.*

.....

.....

.....

9. *Finally, what do you perceive the effects of global warming in the future will be on:*

	None	*Very small*	*Small*	*Moderate*	*Large*	*Very large*
Your own quality of life	☐	☐	☐	☐	☐	☐
The consequences for society	☐	☐	☐	☐	☐	☐
The consequences for animals, plants, and eco-systems	☐	☐	☐	☐	☐	☐

Thank you very much for your co-operation. It will be very valuable for me!

APPENDICES

Focus-Groups

INTRODUCTION

In this interview I am going to ask you some questions that relate to the natural environment. Before answering any questions I want you to discuss the questions with each other. It is important that everyone in the group participate in this and are active in arriving at an answer. If you are silent for a longer time I might ask you about your opinion.

Specifically we are going to discuss one particular environmental issue that our society is facing today. However, before coming to this I will ask you some general questions about the environment and also present some background information for the forthcoming task.

Do you have any questions?

1. *The natural environment is a very broad issue which covers many different concepts and areas. Could you please discuss and describe what first comes to mind when thinking about environmental degradation?*

2. *Are these major problems? Is it possible to solve them? Do you think people, politicians, and/or industries have the will to solve these problems? Why or why not?*

VALUATION OF ENVIRONMENTAL RESOURCES

Environmental pollution and the degradation of natural resources are indeed important problems that our society is facing today, and there is a widespread concern that these issues should be put high on the political agenda. However, solving all environmental problems at once is neither possible, nor perhaps desirable. Rather, we need to make priorities and allocate our public and private budgets to those issues we find most important.

One way of deciding on what are environmental priorities, is to ask people for their willingness to pay for solving various environmental problems. This could be put in the contexts of higher taxes, voluntary donations or higher prices for various products. Sometimes the underlying economic value is derived by establishing a hypothetical market associated with a particular environmental project, whereby people are asked to value the actual resource in monetary terms. The main rationale of these approaches is that the efforts and costs of solving various environmental problems ought to be compared with their benefits.

Only when the latter (that is, the aggregated money people are willing to pay) exceed the costs will it be worthwile to carry out proposed preservation activities.

SPECIFIC ENVIRONMENTAL ISSUE - GLOBAL WARMING

Global warming, or climate change, results from the emission of greenhouse gases, primarily carbon dioxides, which are bi-products of manufacturing, heating and transportation. The effects of global warming is somewhat uncertain, and there prevail some disagreement among involved researchers what and exactly how large the effects would be. However, it is believed that some areas will get too hot, leading to that some types of agriculture will no longer be efficient nor possible in the future. Whereas some places will get warmer, other will become colder, leading to changes in the liveability at different places. Due to alterations in global and regional temperatures, there are considerable risks of rising sea-level and the frequency of droughts, tropical storms and other unexpected changes to the climate. Conservation biologists are further concerned with the effects on biodiversity, from extinction of single populations of highly habitat-specific endangered plants to the extirpation of entire species and communities. On a more broader level, these changes might cause yet unknown but possibly serious effects on the global eco-system.

In order to stop this we need to be more efficient in the way we use energy for heating, transport and industry. As a first step toward solving the problem, a treaty was signed by 38 countries in Kyoto Japan, agreeing to reduce emissions of greenhouse gases 7 percent below 1990 levels by the year 2012. Yet, there are a significant number of people, including environmental groups, climate scientists and governmental officials, who argue that these efforts are not sufficient and who therefore urge for much tougher restrictions. However, by imposing higher charges on the emission of greenhouse gases, along with making more use of biological fuels, various fuels and other forms of energy will become more expensive. Apart from the direct effect on taxes, such measures will eventually have an impact on the prices of various consumer products.

Suppose now that a policy is implemented that will ensure that the emission of greenhouse gases are reduced to the extent that the above problems are prevented. There has been some approximation of how much such a policy will cost for the average citizen in terms of higher prices and taxes, and the core question is if people are prepared to pay this. I would therefore like to know how much such initiatives are worth to you, that is, how much you are willing to pay for these.

The willingness to pay involves an **annual payment**. It is conditioned by the fact that the proposed intervention is carried through succesfully. Try to consider your current household income, expenses and possible future use of your income before making an assessment. Think carefully about the issue and try to give your best answer.

The willingness to pay ought to reflect what you as individuals think it is worth, not what the group in aggregate are willing or could afford to pay. You do not necessarily have to agree on a specific amount! **The important thin is that you discuss with each other how you approach the task of assigning an economic value to this issue (i.e., reasons, considerations, motivations, etc.)!**

3. *How much would the proposed intervention has to cost you before you would vote no to this? To put it differently, what is your annual maximum willingness to pay for this environmental improvement in terms of higher prices and taxes?*

   The maximum amount I am willing to pay is £ ..... *annually*

FOLLOW-UP QUESTIONS

In this section I would like to ask you about the question you have answered in the above.

4. Firstly, how do you feel about being presented with the procedure above? Do you think it is sensible or appropriate to base policy decisions on a similar basis, that is, how much citizens value similar problems in monetary terms? Explain why or why not, and tell what you think about the issue of responsibility related to the problem.

5. It might indeed be difficult to state an exact sum in an inquiry like this. How confident are you about the amount you have agreed to contribute? Please indicate your willingness to pay on the line below, and use this when indicating within which range your contribution most likely will fall: (i.e., how precise is your amount?)

   I am rather confident that I would pay at least £ .....

   I am rather confident that I would not pay more than £ .....

6. *To what extent do you believe that you will actually pay, or being required to pay, the amount you were asked in this survey? Put in other words, how credible or realistic do you perceive a procedure like this? (compare to an auction for instance)*

.....

.....

.....

.....

7. *Some of you have listed several issues that you find more important than climate change. Would you hereby say that you are willing to pay at least as much for each of these, or does th is make you rather uncertain about your stated amount? Please comment on this. Did you have a more general picture of environmental problems when figuring out your willingness to pay.*

.....

.....

.....

.....

8. *Finally, what do you perceive the effects of global warming in the future will be on:*

	None	*Very small*	*Small*	*Moderate*	*Large*	*Very large*
Your own quality of life	☐	☐	☐	☐	☐	☐
The consequences for society	☐	☐	☐	☐	☐	☐
The consequences for animals, plants, and eco-systems	☐	☐	☐	☐	☐	☐

Thank you very much for your co-operation. It will be very valuable for me!

Appendix C. Design of Experiment Chapter 6

Open-Ended Valuation Format

INTRODUCTION[104]

You are about to participate in a study about environmental policy issues. Please follow the written and verbal instructions carefully. The questionnaire is separated into two sections; first you will be asked some questions about yourself, and then follows some questions related to a particular environmental issue. We would like to remind you that your responses are confidential. Your name will not be associated with the answers that you provide.

QUESTIONS ABOUT YOURSELF

1. *Are you* ☐ *Male*
☐ *Female*

2. *How old are you?* ..... *years*

3. *What is your nationality?* .....

4. *What course are you studying at the LSE? Please state B.Sc., M.Sc., or MBA.*

.....

5. *Could you please estimate the disposable amount of money you have each month, including grants, loans, income from part-time jobs, savings, etc.*

£ ..... *month*

6. *Do you have any children?* ☐ *Yes*
☐ *No*

[104] The introductory part of the questionnaire is the same across all four valuation formats.

7. *Are you currently a member of any environmental organisation?* ☐ *Yes* ☐ *No*

ECONOMIC VALUATION OF ENVIRONMENTAL RESOURCES

In the following you will be asked how much you would be willing to pay to prevent an environmental problem that our society is facing today. More specifically, the study is focused on saving the African elephant, which is an endangered wild animal. Please read the text below carefully before answering the forthcoming questions.

SCENARIO DESCRIPTION – MEASURES TO SAVE THE AFRICAN ELEPHANT

The long-term survival of the African Elephant is cause of great concern. The number of elephants has fallen drastically during the second half of last century. In 1979, there was an estimated 1.3 million elephants in Africa, but by 1995 this figure had shrunk to around 400000. Part of the decline is due to the availability of new dry-land adapted crop strains, with the consequence that former elephant rangelands are now being cultivated. Furthermore, in forest areas the impact of major logging programmes is opening up and destroying elephant habitat. Apart from such widespread changes in the extent and pattern of land use, a major cause of the decline is poaching to satisfy demand for ivory and recreational illegal hunting.

8. *What did you previously know about this problem?*

☐ *I knew that the African elephant was a threatened animal*
☐ *I have heard about the problem but did not know much about it*
☐ *I did not know that the African elephant was a threatened animal*

As a consequence, approaches are needed to stop the decline in the number of elephants. Apart from traditional anti-poaching efforts and the elimination of market demand for ivory products, it is essential to ensure the survival of the remaining species. The World Wildlife Fund (WWF) is the major actor in this field. It is currently running a campaign by setting up and managing reserves in order to protect wild elephants. Experience has shown that local involvement is important in these attempts, such as community based management, whereby landowners share both responsibility for and benefits accrued from elephants.

However successful these conservation approaches may be, they bear significant costs, and as the economic situation in many third world countries continues to decline, wildlife departments and local

communities are suffering significant budget cuts. This makes international support for elephant conservation more important than ever. In this study we are interested to know how much the efforts to save the elephants are worth to you. More specifically, we would like to know how much you are willing to pay, as a yearly contribution, to support the WWF campaign.

In the question below we want you to state how much you are of willing to pay as a contribution to the WWF campaign for saving the elephants. The willingness to pay is an annual payment. Take your time and try to consider the following before answering:

- *your income and/or grants*
- *your current expenses*
- *your possible future use of your income*

9. *My maximum willingness to pay for saving the African Elephant is* £ ..... *yearly*

FOLLOW-UP QUESTIONS

10. *Please state the most important reason for the amount that you have agreed to pay. Tick one option only.*

☐ *It is what saving the African elephant is worth to me*
☐ *I cannot afford to pay more*
☐ *Based on the average contribution, I think this will be sufficient to cover the costs*
☐ *I believe this is a fair amount given my own responsibility of the problem*
☐ *I believe this is a reasonable amount considering what other people would pay*

☐ *Other consideration(s)* .....

.....

.....

.....

11. *To what extent do you agree or disagree with the following statements:*

"People have to make choices between environmental issues and economic development"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

"To make decisions and priorities about this and other similar environmental problems on the basis of citizens' willingness to pay is an appropriate and sensible approach"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

12. *Please comment how valuable it would if you were given the opportunity to state your opinion on the basis of several aspects (such as importance of problem, its personal worth to you, responsibility of problem, how much you could afford to pay, etc.), rather than expressing a single value that is supposed to capture all these aspects.*

.....

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.....

.....

13. *Please comment regarding how valuable it would be to have time to think about the issue before developing an opinion and decide on your willingness to pay.*

.....

.....

.....

Thank you for participating in this study. Your responses will be very valuable!

Standard Polychotomous Valuation Format

ECONOMIC VALUATION OF ENVIRONMENTAL RESOURCES

In the following you will be asked how much you would be willing to pay to prevent an environmental problem that our society is facing today. More specifically, the study is focused on saving the African elephant, which is an endangered wild animal. Please read the text below carefully before answering the forthcoming questions.

SCENARIO DESCRIPTION – MEASURES TO SAVE THE AFRICAN ELEPHANT

The long-term survival of the African Elephant is cause of great concern. The number of elephants has fallen drastically during the second half of last century. In 1979, there was an estimated 1.3 million elephants in Africa, but by 1995 this figure had shrunk to around 400000. Part of the decline is due to the availability of new dry-land adapted crop strains, with the consequence that former elephant rangelands are now being cultivated. Furthermore, in forest areas the impact of major logging programmes is opening up and destroying elephant habitat. Apart from such widespread changes in the extent and pattern of land use, a major cause of the decline is poaching to satisfy demand for ivory and recreational illegal hunting.

8. *What did you previously know about this problem?*

- ☐ *I knew that the African elephant was a threatened animal*
- ☐ *I have heard about the problem but did not know much about it*
- ☐ *I did not know that the African elephant was a threatened animal*

As a consequence, approaches are needed to stop the decline in the number of elephants. Apart from traditional anti-poaching efforts and the elimination of market demand for ivory products, it is essential to ensure the survival of the remaining species. The World Wildlife Fund (WWF) is the major actor in this field. It is currently running a campaign by setting up and managing reserves in order to protect wild elephants. Experience has shown that local involvement is important in these attempts, such as community based management, whereby landowners share both responsibility for and benefits accrued from elephants.

However successful these conservation approaches may be, they bear significant costs, and as the economic situation in many third world countries continues to decline, wildlife depac[ments and local communities are suffering significant budget cuts. This makes international support for elephant

conservation more important than ever. In this study we are interested to know how much the efforts to save the elephants are worth to you. More specifically, we would like to know how much you are willing to pay, as a yearly contribution, to support the WWF campaign.

In the table below you are presented with 12 different amounts. We want you to state **how sure** you are of paying each of these as a contribution to the WWF campaign for saving the elephants. Please tick the appropriate box for each suggested amount. The willingness to pay is an annual payment. Take your time and try to consider the following before answering:

- *your income and/or grants*
- *your current expenses*
- *your possible future use of your income*

	£2	**£5**	**£7**	**£10**	**£15**	**£20**	**£30**	**£50**	**£100**	**£200**	**£400**
I am **definitely sure** that I will pay											
I am **almost certain** (90% sure) that I will pay											
I am **rather certain** (75% sure) that I will pay											
It is **equally likely** (50% sure) that I will pay											
I am **rather certain** (75% sure) that I will **not** pay											
I am **almost certain** (90% sure) that I will **not** pay											
I am **definitely sure** that I will **not** pay											

9. *Please state exactly the amount you are **almost certain** (90% sure) of paying. The amount should be less or equal to what you are rather certain (75% sure) of paying, but equal or more than what you are definitely willing to pay.*

*I am **almost certain** (90% sure) I would pay* £ ..... *to the WWF campaign*

FOLLOW-UP QUESTIONS

10. *Please state the most important reason for the amount that you have agreed to pay. Tick one option only.*

- ☐ *It is what saving the African elephant is worth to me*
- ☐ *I cannot afford to pay more*
- ☐ *Based on the average contribution, I think this will be sufficient to cover the costs*
- ☐ *I believe this is a fair amount given my own responsibility of the problem*
- ☐ *I believe this is a reasonable amount considering what other people would pay*

☐ *Other consideration(s)* .....

11. *To what extent do you agree or disagree with the following statements:*

"People have to make choices between environmental issues and economic development"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

"To make decisions and priorities about this and other similar environmental problems on the basis of citizens' willingness to pay is an appropriate and sensible approach"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

12. *Please comment how valuable it would if you were given the opportunity to state your opinion on the basis of several aspects (such as importance of problem, its personal worth to you, responsibility of problem, how much you could afford to pay, etc.), rather than expressing a single value that is supposed to capture all these aspects.*

.....

.....

.....

13. *Please comment regarding how valuable it would be to have time to think about the issue before developing an opinion and decide on your willingness to pay.*

.....

.....

.....

.....

Thank you for participating in this study. Your responses will be very valuable!

APPENDICES

Polychotomous Multi-Attribute Valuation Format

ECONOMIC VALUATION OF ENVIRONMENTAL RESOURCES

In the following you will be asked how much you would be willing to pay to prevent an environmental problem that our society is facing today. More specifically, the study is focused on saving the African elephant, which is an endangered wild animal. Please read the text below carefully before answering the forthcoming questions.

SCENARIO DESCRIPTION – MEASURES TO SAVE THE AFRICAN ELEPHANT

The long-term survival of the African Elephant is cause of great concern. The number of elephants has fallen drastically during the second half of last century. In 1979, there was an estimated 1.3 million elephants in Africa, but by 1995 this figure had shrunk to around 400000. Part of the decline is due to the availability of new dry-land adapted crop strains, with the consequence that former elephant rangelands are now being cultivated. Furthermore, in forest areas the impact of major logging programmes is opening up and destroying elephant habitat. Apart from such widespread changes in the extent and pattern of land use, a major cause of the decline is poaching to satisfy demand for ivory and recreational illegal hunting.

8. *What did you previously know about this problem?*

- ☐ *I knew that the African elephant was a threatened animal*
- ☐ *I have heard about the problem but did not know much about it*
- ☐ *I did not know that the African elephant was a threatened animal*

As a consequence, approaches are needed to stop the decline in the number of elephants. Apart from traditional anti-poaching efforts and the elimination of market demand for ivory products, it is essential to ensure the survival of the remaining species. The World Wildlife Fund (WWF) is the major actor in this field. It is currently running a campaign by setting up and managing reserves in order to protect wild elephants. Experience has shown that local involvement is important in these attempts, such as community based management, whereby landowners share both responsibility for and benefits accrued from elephants.

However successful these conservation approaches may be, they bear significant costs, and as the economic situation in many third world countries continues to decline, wildlife departments and local communities are suffering significant budget cuts. This makes international support for elephant

conservation more important than ever. In this study we are interested to know how much the efforts to save the elephants are worth to you. More specifically, we would like to know how much you are willing to pay, as a yearly contribution, to support the WWF campaign.

Before coming to this question, however, we would like you to consider a number of aspects of the WWF campaign. The reason for presenting you with the items below is so you could refine your opinion, rather than expressing this on a single monetary scale. Thus, you will be given the opportunity to state more precisely what you think about the issue and the proposed intervention. For instance, it may be worth a lot to you, but you may still be reluctant to pay if you do not believe in the campaign will be effective, or believe it is not really your responsibility since you have not contributed to the problem.

9. *To save the African Elephant is worth something to me* ☐ *Agree* ☐ *Disagree*

.....

To save the African Elephant is an important issue ☐ *Agree* ☐ *Disagree*

.....

I cannot afford to pay too much for this issue ☐ *Agree* ☐ *Disagree*

.....

I do not believe the particular campaign suggested will be efficient in saving the African Elephant ☐ *Agree* ☐ *Disagree*

.....

I do not think this lies within my responsibility. Poachers and other responsible parties should pay ☐ *Agree* ☐ *Disagree*

.....

There are other environmental issues that are more important and to which I rather contribute ☐ *Agree* ☐ *Disagree*

.....

Although being worth a lot to me, I do not think it is appropriate to base policies on the public's WTP ☐ *Agree* ☐ *Disagree*

.....

In the table below you are presented with 12 different amounts. Given your opinion above, we want you to state **how sure** you are of paying each of these as a contribution to the WWF campaign for saving the elephants. Please tick the appropriate box for each suggested amount. The willingness to pay is an annual payment. Take your time and try to consider the following before answering:

- *your income and/or grants*
- *your current expenses*
- *your possible future use of your income*

	£2	£5	£7	£10	£15	£20	£30	£50	£100	£200	£400
I am **definitely sure** that I will pay											
I am **almost certain** (90% sure) that I will pay											
I am **rather certain** (75% sure) that I will pay											
It is **equally likely** (50% sure) that I will pay											
I am **rather certain** (75% sure) that I will **not** pay											
I am **almost certain** (90% sure) that I will **not** pay											
I am **definitely sure** that I will **not** pay											

10. *Please state exactly the amount you are **almost certain** (90% sure) of paying. The amount should be less or equal to what you are rather certain (75% sure) of paying, but equal or more than what you are definitely willing to pay.*

*I am **almost certain** (90% sure) I would pay* £ ..... *to the WWF campaign*

FOLLOW-UP QUESTIONS

11. *To what extent do you agree or disagree with the following statements:*

"People have to make choices between environmental issues and economic development"

Strongly agree ☐ Agree ☐ Undecided ☐ Disagree ☐ Strongly disagree ☐

"To make decisions and priorities about this and other similar environmental problems on the basis of citizens' willingness to pay is an appropriate and sensible approach"

Strongly agree ☐ Agree ☐ Undecided ☐ Disagree ☐ Strongly disagree ☐

12. *Please comment how valuable it was to state your opinion on the basis of several aspects (such as importance of problem, its personal worth to you, responsibility of problem, how much you could afford to pay, etc.), rather than expressing a single value that is supposed to capture all these aspects.*

.....

.....

.....

.....

13. *Please comment regarding how valuable it would be to have time to think about the issue before developing an opinion and decide on your willingness to pay.*

.....

.....

.....

.....

Thank you for participating in this study. Your responses will be very valuable!

Polychotomous Time To Think Valuation Format

ECONOMIC VALUATION OF ENVIRONMENTAL RESOURCES

In the following you will be asked how much you would be willing to pay to prevent an environmental problem that our society is facing today. More specifically, the study is focused on saving the African elephant, which is an endangered wild animal. Please read the text below carefully before answering the forthcoming questions.

SCENARIO DESCRIPTION – MEASURES TO SAVE THE AFRICAN ELEPHANT

The long-term survival of the African Elephant is cause of great concern. The number of elephants has fallen drastically during the second half of last century. In 1979, there was an estimated 1.3 million elephants in Africa, but by 1995 this figure had shrunk to around 400000. Part of the decline is due to the availability of new dry-land adapted crop strains, with the consequence that former elephant rangelands are now being cultivated. Furthermore, in forest areas the impact of major logging programmes is opening up and destroying elephant habitat. Apart from such widespread changes in the extent and pattern of land use, a major cause of the decline is poaching to satisfy demand for ivory and recreational illegal hunting.

8. *What did you previously know about this problem?*

- ☐ *I knew that the African elephant was a threatened animal*
- ☐ *I have heard about the problem but did not know much about it*
- ☐ *I did not know that the African elephant was a threatened animal*

As a consequence, approaches are needed to stop the decline in the number of elephants. Apart from traditional anti-poaching efforts and the elimination of market demand for ivory products, it is essential to ensure the survival of the remaining species. The World Wildlife Fund (WWF) is the major actor in this field. It is currently running a campaign by setting up and managing reserves in order to protect wild elephants. Experience has shown that local involvement is important in these attempts, such as community based management, whereby landowners share both responsibility for and benefits accrued from elephants.

However successful these conservation approaches may be, they bear significant costs, and as the economic situation in many third world countries continues to decline, wildlife departments and local communities are suffering significant budget cuts. This makes international support for elephant

conservation more important than ever. In this study we are interested to know how much the efforts to save the elephants are worth to you. More specifically, we would like to know how much you are willing to pay, as a yearly contribution, to support the WWF campaign.

We want you to consider the question below. However, we do not want you to answer it now. Instead, you will be given a week or more to think about a monetary contribution to the WWF campaign. During this time we encourage you to discuss the environmental problem, as well as an economic valuation of this, with friends, spouse, relatives, etc. We also want you to think of your opinion when similar (environmental or public) issues are brought up in the media. Although receiving valuable comments from other sources, keep in mind that it is your own opinion that we are interested of.

In the table below you are presented with 12 different amounts. We want you to state **how sure** you are of paying each of these as a contribution to the WWF campaign for saving the elephants. Please tick the appropriate box for each suggested amount. The willingness to pay is an annual payment. Take your time and try to consider the following before answering:

- *your income and/or grants*
- *your current expenses*
- *your possible future use of your income*

You are free to use the table below as a guideline when thinking of your willingness to pay.

<u>However, it is very important that you do not answer this or the subsequent question until we see each other again in a week or two!</u>

	£2	£5	£7	£10	£15	£20	£30	£50	£100	£200	£400
I am **definitely sure** that I will pay											
I am **almost certain** (90% sure) that I will pay											
I am **rather certain** (75% sure) that I will pay											
It is **equally likely** (50% sure) that I will pay											
I am **rather certain** (75% sure) that I will **not** pay											
I am **almost certain** (90% sure) that I will **not** pay											
I am **definitely sure** that I will **not** pay											

9. *Please state exactly the amount you are **almost certain** (90% sure) of paying. The amount should be less or equal to what you are rather certain (75% sure) of paying, but equal or more than what you are definitely willing to pay.*

*I am **almost certain** (90% sure) I would pay* £ ..... *to the WWF campaign*

Please bring the questionnaire with you to the next session!

FOLLOW-UP QUESTIONS – SESSION 2

10. *Please state the most important reason for the amount that you have agreed to pay. Tick one option only.*

- ☐ *It is what saving the African elephant is worth to me*
- ☐ *I cannot afford to pay more*
- ☐ *Based on the average contribution, I think this will be sufficient to cover the costs*
- ☐ *I believe this is a fair amount given my own responsibility of the problem*
- ☐ *I believe this is a reasonable amount considering what other people would pay*

☐ *Other consideration(s)* .....

.....

.....

11. *To what extent do you agree or disagree with the following statements:*

"People have to make choices between environmental issues and economic development"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

"To make decisions and priorities about this and other similar environmental problems on the basis of citizens' willingness to pay is an appropriate and sensible approach"

Strongly agree	Agree	Undecided	Disagree	Strongly disagree
☐	☐	☐	☐	☐

12. *Please comment how valuable it would if you were given the opportunity to state your opinion on the basis of several aspects (such as importance of problem, its personal worth to you, responsibility of problem, how much you could afford to pay, etc.), rather than expressing a single value that is supposed to capture all these aspects.*

.....

.....

.....

.....

13. *How many times and with whom did you discuss or mention your participation in this study and/or a contribution to the WWF for saving the African Elephant (one or several persons? Note: mention type of relationship with these persons, not names.*

..... *times with* .....

14. *If yes, please comment regarding how valuable this "feed-back" was in order to develop an opinion in the matter and to figure out your contribution?*

.....

.....

.....

.....

15. *Could you please comment regarding how valuable it was to just have time to think about the issue before developing an opinion and decide on your contribution?*

.....

.....

.....

.....

Thank you for participating in this study. Your responses will be very valuable!

Appendix D. Design of Choice Experiments Chapter 7

Hypothetical WTP

QUESTIONNAIRE – ENVIRONMENTAL VALUES

Thank you for participating in this study! As you may know it is focused on environmental values and their influence on policy decisions. However, before starting with this I would like to ask some questions about yourself. I would like to stress that your answers would be treated anonymuously. If you have any questions please ask them now.

PART A: QUESTIONS ABOUT YOURSELF

1. Are you ☐ *Male* ☐ *Female*

2. How old are you? ..... *years*

3. Which country do you come from? .....

4. What B.Sc., M.Sc., or MBA course are you studying at the LSE?

.....

5. Could you please estimate the disposable amount of money you have each month, including grants, loans, income from part-time jobs, savings, etc.

£ ..... *month*

6. Do you have any children? ☐ *Yes* ☐ *No*

7. Are you a member of any environmental organisation? ☐ *Yes* ☐ *No*

8. How much do you roughly contribute to environmental organisations yearly? £ .....

PART B: EVALUATION OF ENVIRONMENTAL PROJECTS

This part of the questionnaire is focused on the value people place on various aspects of the environment. Normally values are reflected in actual market behaviour, but since no markets generally exist for natural resources we need to obtain this information in some other way. One frequently used approach is to ask people to make hypothetical choices between different environmental issues and the amount of money allocated to these. The outcome will then reflect the value people place on these environmental goods and services.

We are in this study interested of how you would choose between two different campaigns run by the World Wildlife Fund (WWF). You will be presented 16 choice situations and for each choice there will be two alternatives to choose from. Each alternative differ with respect to the amount of:

- ***money given to you***
- ***contribution to a campaign, paid by us***

Both campaigns included in this study are run by the WWF in order to protect endangered wild animals. The contribution will, depending on your choice, be earmarked for either of the following two wild animals:

a *the **African Elephant***
b *the **Green Sea Turtle***

The **example** below illustrates a typical choice problem.

Example	*Alternative A*	*Alternative B*
Money given to you	**£ 10**	**£ 5**
Contribution to campaign	**£ 3**	**£ 12**
Campaign	**Rain forests**	**Coral reefs**

If you choose *alternative A*, you prefer the alternative where you receive £10 and where £3 is given to the WWF campaign for rainforests in Brazil. If you choose *alternative B* you prefer instead the alternative where you receive £5 and where £12 is given to the WWF campaign for protecting coral reefs in East Africa. Hence, by choosing *alternative A* you receive £5 more than in *alternative B*, but the money given to a campaign is £9 larger in *alternative B* than in *alternative A* (but note that there are different campaigns in the alternatives *A* and *B*).

The choices are hypothetical but it is still very important that you answer them truthfully and as if they involved real money. Remember that the purpose of the study is to inform policy analysis. There are altogether 16 choices for you to make. Try to consider each of these in isolation as if that was the only choice you have to make. If you want you may go back and change your earlier answers after second thought.

Do you understand this procedure? Otherwise it is important that you let me know.

SECTION C: WILLINGNESS TO PAY FOR ENVIRONMENTAL PROJECTS[105]

As you were informed in the previous section, this kind of hypothetical study is frequently employed in order to estimate economic values when no markets exist. However, in the following we will establish a market for these goods. You will be presented similar choice situations as before, although now your choices will in fact determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. It thus involves real money. The procedure is the following:

- ***you will again make 16 pair-wise choices***
- ***afterwards one of these will be drawn randomly as the actual choice set***
- ***you will be paid the amount of money according to the alternative chosen in this particular choice set, whereas the contribution is paid anonymously by us to the WWF***

Thus, your choices will now determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. If you want you may go back and change earlier answers after second thought.

Do you have any questions?

[105] This section concerns real choices made by the respondents who previously have made hypothetical choices.

Choice Experiments Real WTP

QUESTIONNAIRE – ENVIRONMENTAL VALUES

Thank you for participating in this study! As you may know it is focused on environmental values and their influence on policy decisions. However, before starting with this I would like to ask some questions about yourself. I would like to stress that your answers would be treated anonymuously. If you have any questions please ask them now.

PART A: QUESTIONS ABOUT YOURSELF

1. Are you ☐ *Male* ☐ *Female*

2. How old are you? ..... *years*

3. Which country do you come from? .....

4. What B.Sc., M.Sc., or MBA course are you studying at the LSE?

.....

5. Could you please estimate the disposable amount of money you have each month, including grants, loans, income from part-time jobs, savings, etc.

£ ..... *month*

6. Do you have any children? ☐ *Yes* ☐ *No*

7. Are you a member of any environmental organisation? ☐ *Yes* ☐ *No*

8. How much do you roughly contribute to environmental organisations yearly? £ .....

PART B: WILLINGNESS TO PAY ENVIRONMENTAL PROJECTS

This part of the questionnaire is focused on the value people place on various aspects of the environment. Normally values are reflected in actual market behaviour, but since no markets generally exist for natural resources we need to obtain this information in some other way. One frequently used approach is to ask people to make choices between various environmental issues and the amount of money allocated to these.

We are in this study interested of how you would choose between two different campaigns run by the World Wildlife Fund (WWF). You will be presented 16 choice situations and for each choice there will be two alternatives to choose from. Each alternative differ with respect to the amount of:

- ***money given to you***
- ***contribution to a campaign, paid by us***

Both campaigns included in this study are run by the WWF in order to protect endangered wild animals. The contribution will, depending on your choice, be earmarked for either of the following two wild animals:

a *the **African Elephant***
b *the **Green Sea Turtle***

The **example** below illustrates a typical choice problem.

Example	*Alternative A*	*Alternative B*
Money given to you	**£ 10**	**£ 5**
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Campaign	**Rain forests**	**Coral reefs**

If you choose *alternative A*, you prefer the alternative where you receive £10 and where £3 is given to the WWF campaign for rainforests in Brazil. If you choose *alternative B* you prefer instead the alternative where you receive £5 and where £12 is given to the WWF campaign for protecting coral reefs in East Africa. Hence, by choosing *alternative A* you receive £5 more than in *alternative B*, but the money given to a campaign is £9 larger in *alternative B* than in *alternative A* (but note that there are different campaigns in the alternatives *A* and *B*).

The procedure for the experiment is the following:

- ***you make altogether 16 pair-wise choices***
- ***afterwards one of these will be drawn randomly as the actual choice set***
- ***you will be paid the amount of money according to the alternative chosen in this particular choice set, whereas the contribution is paid anonymously by us to the WWF***

Thus, your choices will determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. If you want you may go back and change earlier answers after second thought.

Do you understand this procedure? Otherwise it is important that you let me know.

Design of Choice Sets[106]

Choice number 1	*Alternative A*	*Alternative B*
Money given to you	**5**	**15**
Contribution to campaign	**7**	**0**
Campaign	**Elephant**	**Sea Turtle**

Choice number 2	*Alternative A*	*Alternative B*
Money given to you	**15**	**10**
Contribution to campaign	**0**	**14**
Campaign	**Sea Turtle**	**Elephant**

Choice number 3	*Alternative A*	*Alternative B*
Money given to you	**5**	**10**
Contribution to campaign	**14**	**7**
Campaign	**Elephant**	**Sea Turtle**

Choice number 4	*Alternative A*	*Alternative B*
Money given to you	**10**	**15**
Contribution to campaign	**21**	**14**
Campaign	**Sea Turtle**	**Elephant**

Choice number 5	*Alternative A*	*Alternative B*
Money given to you	**15**	**0**
Contribution to campaign	**14**	**21**
Campaign	**Sea Turtle**	**Elephant**

[106] These choice sets were presented in a different order between hypothetical and real contexts of valuation, and between different sub-groups of respondents.

Choice number 6	*Alternative A*	*Alternative B*
Money given to you	**15**	**5**
Contribution to campaign	**0**	**14**
Campaign	**Elephant**	**Sea Turtle**

Choice number 7	*Alternative A*	*Alternative B*
Money given to you	**5**	**10**
Contribution to campaign	**21**	**0**
Campaign	**Elephant**	**Sea Turtle**

Choice number 8	*Alternative A*	*Alternative B*
Money given to you	**5**	**10**
Contribution to campaign	**7**	**0**
Campaign	**Sea Turtle**	**Elephant**

Choice number 9	*Alternative A*	*Alternative B*
Money given to you	**10**	**5**
Contribution to campaign	**7**	**21**
Campaign	**Elephant**	**Sea Turtle**

Choice number 10	*Alternative A*	*Alternative B*
Money given to you	**15**	**10**
Contribution to campaign	**0**	**21**
Campaign	**Elephant**	**Sea Turtle**

Choice number 11	*Alternative A*	*Alternative B*
Money given to you	**5**	**15**
Contribution to campaign	**14**	**7**
Campaign	**Sea Turtle**	**Elephant**

Choice number 12	*Alternative A*	*Alternative B*
Money given to you	**15**	**10**
Contribution to campaign	**7**	**21**
Campaign	**Sea Turtle**	**Elephant**

Choice number 13	*Alternative A*	*Alternative B*
Money given to you	**0**	**15**
Contribution to campaign	**14**	**7**
Campaign	**Sea Turtle**	**Elephant**

Choice number 14	*Alternative A*	*Alternative B*
Money given to you	**5**	**15**
Contribution to campaign	**14**	**0**
Campaign	**Elephant**	**Sea Turtle**

Choice number 15	*Alternative A*	*Alternative B*
Money given to you	**10**	**5**
Contribution to campaign	**14**	**21**
Campaign	**Sea Turtle**	**Elephant**

Choice number 16	*Alternative A*	*Alternative B*
Money given to you	**10**	**15**
Contribution to campaign	**14**	**0**
Campaign	**Elephant**	**Sea Turtle**

Bibliography

Abelson, R. P. (1976). "Script Processing in Attitude Formation and Decision Making". in *Cognition and Social Behaviour*, edited by J. S. Carroll and J. W. Payne. Hillsdale, NJ: Erlbaum

Abelson, R. P. (1986). "Beliefs Are Like Possessions". *Journal for the Theory of Social Behaviour*, 16, 223-248

Adamowicz, W., J. Louviere, and M. Williams. (1994). "Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities". *Journal of Environmental Economics and Management*, 26, 271-292

Ajzen, I., T. C. Brown, and L. H. Rosenthal. (1996). "Information Bias in Contingent Valuation: Effects of Personal Relevance, Quality of Information, and Motivational Orientation". *Journal of Environmental Economics and Management*, 30, 43-57

Ajzen, I., and M. Fishbein. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall

Ajzen, K. J., and G. L. Peterson. (1988). "Contingent Value Measurement: The Price of Everything and the Value of Nothing". in *Amenity Resource Valuation: Integrating Economics with Other Disciplines*, edited by G. L. Peterson, B. L. Driver, and R. Gregory. State College, PA: Venture Publishing, Inc

Akerlöf, G. A., and W. T. Dickens. (1982). "The Economic Consequences of Cognitive Dissonance". *American Economic Review*, 72, 307-319

Anderson, E. (1993). *Value in Ethics and Economics*. London: Cambridge University Press

Andreoni, J. (1989). "Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence". *Journal of Political Economy*, 97, 1447-1458

Andreoni, J. (1990). "Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving". *The Economic Journal*, 100, 464-477

Aronson, E. (1992). "The Return of the Repressed: Dissonance Theory Makes a Comeback". *Psychological Inquiry*, 3, 303-311

BIBLIOGRAPHY

Aronson, E., and J. M. Carlsmith. (1963). "Effect of the Severity of Threat on the Devaluation of Forbidden Behavior". *Journal of Abnormal and Social Psychology*, 66, 584-588

Arrow, K. J. (1997). "Invaluable Goods". *Journal of Economic Literature*, 35, 757-765

Arrow, K. J., R. Solow, P. R. Portney, E. E. Leamer, R. Radner, and H. Schuman. (1993). "Report of the NOAA Panel on Contingent Valuation". Washington D.C.: National Oceanic and Atmospheric Administration

Bachman, J. G., and P. M. O'Malley. (1984). "Yea-Saying, Nay-Saying, and Going to Extremes: Black-White Differences in Response Styles". *Public Opinion Quarterly*, 48, 491-509

Baron, J., and N. P. Maxwell. (1996). "Cost of Public Goods Affects Willingness to Pay for Them". *Journal of Behavioral Decision Making*, 9, 173-183

Barry, B. (1995). *Justice as Impartiality*. Oxford: Clarendon Press

Beattie, J., J. Covey, P. Dolan, L. Hopkins, M. Jones-Lee, G. Loomes, N. Pidgeon, A. Robinson, and A. Spencer. (1998). "On the Contingent Valuation of Safety and the Safety of Contingent Valuation: Part 1-Caveat Investigator". *Journal of Risk and Uncertainty*, 17, 5-25

Bikhchandani, S. D., D. Hirshleifer, and I. Welch. (1992). "A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades". *Journal of Political Economy*, 100, 992-1026

Bishop, G. F. (1990). "Issue Involvement and Response Effects in Public Opinion Surveys". *Public Opinion Quarterly*, 54, 209-218

Bishop, R. C., and T. A. Heberlein. (1979). "Measuring Values of Extra-Market Goods: Are Indirect Measures Biased?". *American Journal of Agricultural Economics*, 61, 926-930

Bjornstad, D. J., and J. R. Kahn. (1996). "Structuring a Research Agenda to Estimate Environmental Values". in *The Contingent Valuation of Environmental Resources: Methodological Issues and Research Needs*, edited by D. J. Bjornstad and J. R. Kahn. Cheltenham, UK: Edwar Elgar

Blamey, R. K. (1998). "Decisiveness, Attitude Expression and Symbolic Responses in Contingent Valuation Surveys". *Journal of Economic Behaviour and Organization*, 34, 577-601

BIBLIOGRAPHY

Blamey, R. K., J. W. Bennett, and M. D. Morrison. (1999). "Yes-Saying in Contingent Valuation Surveys". *Land Economics*, 75, 126-141

Bligh, D. (2000). *What's the Point of Discussion?* Exeter: Intellect Books

Bohm, P. (1972). "Estimating the Demand for Public Goods: An Experiment". *European Economic Review*, 3, 111-130

Bolton, G. E., and A. Ockenfels. (2000). "A Theory of Equity, Reciprocity and Competition". *American Economic Review*, 90, 166-193

Boulding, K. E., and S. B. Lundstedt. (1988). "Value Concepts and Justifications". in *Amenity Resource Valuation: Integrating Economics with Other Disciplines*, edited by G. L. Peterson, B. L. Driver, and R. Gregory. State College, PA: Venture Publishing, Inc.

Boyce, R. R., T. C. Brown, G. H. McClelland, G. L. Peterson, and W. D. Schulze. (1992). "An Experimental Examination of Intrinsic Values as a Source of the WTA-WTP Disparity". *American Economic Review*, 82, 1366-1373

Boyle, K. J., W. H. Desvousges, F. R. Johnson, R. W. Dunford, and S. P. Hudson. (1994). "An Investigation of Part-Whole Biases in Contingent Valuation Studies". *Journal of Environmental Economics and Management*, 27, 64-83

Brown, K. M., and L. O. Taylor. (2000). "Do as You Say, Say as You Do: Evidence on Gender Differences in Actual and Stated Contribution to Public Goods". *Journal of Economic Behavior and Organization*, 43, 127-139

Brown, R. (1986). *Social Psychology*. New York: Macmillan, Inc.

Carlsson, F., and P. Martinsson. (2001). "Do Hypothetical and Actual Willingness to Pay Differ in Choice Experiments? Application to the Valuation of the Environment". *Journal of Environmental Economics and Management*, 41, 179-192

Carson, R. T. (1996). "Contingent Valuation and Revealed Preference Methodologies: Comparing the Estimates for Quasi-Public Goods". *Land Economics*, 72, 80-99

Carson, R. T. (1997). "Contingent Valuation Surveys and Tests of Insensitivity to Scope". in *Determining the Value of Non-Marketed Goods: Economic, Psychological, and Policy Relevant Aspects of Contingent Valuation Methods*, edited by R. J. Kopp, W. W. Pommerhene, and N. Schwarz. Boston: Kluwer Academic Press

BIBLIOGRAPHY

Carson, R. T., N. E. Flores, and N. Meade. (1996a). "Contingent Valuation: Controversies and Evidence". San Diego: Department of Economics, University of California

Carson, R. T., R. C. Mitchell, W. M. Hanemann, R. J. Kopp, S. Presser, and P. A. Ruud. (1992). "A Contingent Valuation Study of Lost Passive Use Values Resulting from the Exxon Valdez Oil Spill". The Attorney General of the State of Alaska

Carson, R. T., J. Wright, N. Carson, A. Alberini, and N. Flores. (1996b). "A Bibliography of Contingent Valuation Studies and Papers". National Resource Damage Assessment

Charness, G., and M. Rabin. (2000). "Social Preferences: Some Simple Tests and a New Model". . Berkeley: Department of Economics, University of California

Clark, H. H., and M. F. Schober. (1992). "Asking Questions and Influencing Answers". in *Questions About Questions*, edited by J. M. Tanur. New York: Russel Sage

Conlisk, J. (1996). "Why Bounded Rationality?". *Journal of Economic Literature*, 34, 669-700

Converse, P. E. (1970). "Attitudes and Non-Attitudes: Continuation of a Dialogue". in *The Quantitative Analysis of Social Problems*, edited by E. R. Tufte. Reading, MA: Addison-Wesley

Converse, P. E. (1974). "Nonattitudes and American Public Opinion: Comment". *The American Political Science Review*, 68, 650-660

Coursey, D. L., J. L. Hovis, and W. D. Schulze. (1987). "The Disparity Between Willingness To Accept and Willingness To Pay Measures of Economic Value". *Quarterly Journal of Economics*, 102, 679-690

Cummings, R. G., D. S. Brookshire, and W. D. Schulze. (1986). *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method.* Totowa, New Jersey: Rowman and Allanheld

Cummings, R. G., S. Elliott, G. W. Harrison, and J. Murphy. (1997). "Are Hypothetical Referenda Incentive Compatible?". *Journal of Political Economy*, 105, 609-621

Dawes, R. M. (1999). "A Message from Psychologists to Economists: Mere Predictibility Doesn't Matter like it Should (Without a Good Story Appended to it)". *Journal of Economic Behavior and Organisation*, 39, 29-40

Delli Carpini, M. X., and S. Keeter. (1996). *What Americans Know about Politics and Why It Matters.* New Haven: Yale University Press

BIBLIOGRAPHY

Department of the Environment, U. K. (1992). "The UK Environment". London: Government Statistical Service

Desvousges, W. H., F. R. Johnson, R. W. Dunford, S. P. Hudson, K. N. Wilson, and K. J. Boyle. (1993). "Measuring Natural Resource Damages with Contingent Valuation: Tests of Validity and Reliability". in *Contingent Valuation: A Critical Assessment*, edited by J. A. Hausman. Amsterdam: North Holland Press

Deutsch, M., and H. B. Gerard. (1955). "A Study of Normative and Informational Social Influences Upon Individual Judgment". *Journal of Abnormal and Social Psychology*, 51, 629-636

Diamond, P. A., and J. A. Hausman. (1993). "On Contingent Valuation Measurement of Non-Use Values". in *Contingent Valuation: A Critical Assessment*, edited by J. A. Hausman. Amsterdam: North Holland Press

Diamond, P. A., and J. A. Hausman. (1994). "Contingent Valuation: Is Some Number Better than No Number?". *Journal of Economic Perspectives*, 8, 45-64

Diamond, P. A., J. A. Hausman, G. K. Leonard, and M. A. Denning. (1993). "Does Contingent Valuation Measure Preferences? Experimental Evidence". in *Contingent Valuation: A Critical Assessment*, edited by J. A. Hausman. Amsterdam: North Holland Press

Dornbusch, S. M. (1993). "Individual Moral Choices and Social Evaluations: A Research Oddyssey". in *Social Psychology of Groups: A Reader*, edited by E. J. Lawler and B. Markovsky. Greenwich, Connecticut: Jai Press, Inc.

Douglas, M., and A. Wildavsky. (1982). *Risk and Culture*. Berkeley: University of California Press

Dubourg, W. R., M. W. Jones-Lee, and G. Loomes. (1994). "Imprecise Preferences and the WTP - WTA Disparity". *Journal of Risk and Uncertainty*, 9, 115-133

Eagly, A. H., and S. Chaiken. (1993). *The Psychology of Attitudes*. Forth Worth: Harcourt Brace College Publishers

Eagly, A. H., and P. Kulesa. (1997). "Attitudes, Attitude Structure, and Resistance to Change: Implications for Persuasion on Environmental Issues". in *Environment, Ethics, and Behavior*, edited by M. H. Bazerman, D. M. Messick, A. E. Tenbrunsel, and K. A. Wade-Benzoni. San Francisco: The new Lexington Press

Eckel, C. C., and P. J. Grossman. (1998). "Are Women Less Selfish than Men? Evidence from Dictator Experiments". *The Economic Journal*, 108, 726-735

BIBLIOGRAPHY

Edwards, S. F. (1992). "Rethinking Existence Values". *Land Economics*, 68, 120-122

Ericson, O., and H. Svedsäter. (1994). "Willingness to Pay for Improved Water Supplies in Rural Laos". . Gothenburg: Department of Economics, Gothenburg University

Ericsson, K. A., and H. Simon. (1984). *Protocol Analysis: Verbal Reports as Data.* Cambridge, MA: MIT Press

Etzioni, A. (1986). "Rationality is Anti-Entropic". *Journal of Economic Psychology*, 7, 17-36

Evans, G., and M. Lalljee. (1997). "Political Talk and the Stability and Consistency of Political Orientation". CREST

Fazio, R. H. (1979). "Motives for Social Comparison: The Construction-Validation Distinction". *Journal of Personality and Social Psychology*, 37, 1683-1698

Fazio, R. H. (1990). "Multiple Processes by Which Attitudes Guide Behavior: The Mode Model as an Integrative Framework". *Advances in Experimental Social Psychology*, 23, 75-109

Fehr, E., and M. Schmidt. (1999). "A Theory of Fairness, Competition and Cooperation". *Quarterly Journal of Economics*, 114, 817-868

Festinger, L. (1950). "Informal Social Communication". *Psychological Review*, 57, 271-282

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Evanston, IL: Row, Peterson

Festinger, L., and J. M. Carlsmith. (1959). "Cognitive Consequences of Forced Compliance". *Journal of Abnormal and Social Psychology*, 58, 203-210

Fischhoff, B. (1991). "Value Elicitation: Is There Anything in There?". *American Psychologist*, 46, 835-847

Fischhoff, B. (1997). "What Do Psychologists Want? Contingent Valuation as a Special Case of Asking Questions". in *Determining the Value of Non-Marketed Goods: Economic, Psychological, and Policy Relevant Aspects of Contingent Valuation Methods*, edited by R. J. Kopp, W. W. Pommerhene, and N. Schwarz. Boston: Kluwer Academic Press

Fischhoff, B., P. Slovic, and S. Lichtenstein. (1988). "Knowing What You Want: Measuring Labile Values". in *Decision Making: Descriptive, Normative, and Prescriptive Interactions*, edited by D. E. Bell, H. Raiffa, and A. Tversky. New York: Cambridge University Press

Fischhoff, B., M. J. Quadrel, M. Kamlet, R. Dawes, P. Fischbeck, S. Klepper, J. Leland, and G. Loewenstein. (1993). "Embedding Effects: Stimulus Representation and Response Modes". *Journal of Risk and Uncertainty*, 6, 211-234

Fischhoff, B., N. Welch, and S. Frederick. (1999). "Construal Processes in Preference Assessment". *Journal of Risk and Uncertainty*, 19, 139-164

Fisher, A. C. (1996). "The Conceptual Underpinnings of the Contingent Valuation Method". in *The Contingent Valuation of Environmental Resources: Methodological Issues and Research Needs*, edited by D. J. Bjornstad and J. R. Kahn. Cheltenham, UK: Edward Elgar

Fredricks, A. J., and D. L. Dossett. (1983). "Attitude-Behavior Relations: A Comparison of the Fishbein- Ajzen and the Bentler-Speckart Models". *Journal of Personality and Social Psychology*, 45, 501-512

Freeman, A. M. (1993). *The Measurement of Environmental and Resource Values: Theory and Methods*. Washington D.C.: Resources for the Future

Frykblom, P. (1997). "Hypothetical Question Modes and Real Willingness to Pay". *Journal of Environmental Economics and Management*, 34, 275-287

Gaskell, G. (1990). "Collective Behaviour in a Societal Context". in *Societal Psychology*, edited by H. T. Himmelweit and G. Gaskell. London: Sage Publications

Gaskell, G., M. Bauer, and J. Durant. (1997). "Europe Ambivalent on Biotechnology". *Nature*, 387, 845-847

Gigerenzer, G. (1996). "On Narrow Norms and Vague Heuristics: A Reply to Kahneman and Tversky". *Psychological Review*, 103, 592-596

Greenwald, A. G., and D. L. Ronis. (1978). "Twenty Years of Cognitive Dissonance: Case Study of the Evolution of a Theory". *Psychological Review*, 85, 53-57

Gregory, R., S. Lichtenstein, T. C. Brown, G. L. Peterson, and P. Slovic. (1995). "How Precise are Monetary Representations of Environmental Improvements?". *Land Economics*, 71, 462-473

Gregory, R., S. Lichtenstein, and P. Slovic. (1993). "Valuing Environmental Resources: A Constructive Approach". *Journal of Risk and Uncertainty*, 7, 177-197

Grunert, S., and H. J. Juhl. (1995). "Values, Environmental Attitudes, and Buying of Organic Foods". *Journal of Economic Psychology*, 16, 39-62

Gärling, T., and A. Biel. (1995). "Resursdilemman: Ett Miljöpsykologiskt Forskningsproblem". Department of Psychology, Gothenburg University

Halvorsen, B. (1993). "Willingness to Pay for Reduced Health Damages from Air Pollution". Centre for Research in Economics and Business Administration, Research Council of Norway

Hammack, J., and G. M. Brown. (1974). *Waterfowl and Wetlands: Toward Bioeconomic Analysis*. Baltimore: Johns Hopkins University Press

Hanemann, W. M. (1991). "Willingness to Pay and Willingness to Accept: How Much Can They Differ?". *American Economic Review*, 81, 635-647

Hanemann, W. M. (1994). "Valuing the Environment Through Contingent Valuation". *Journal of Economic Perspectives*, 8, 19-43

Hanley, N., C. Spash, and L. Walker. (1995). "Problems in Valuing Benefits of Biodiversity Protection". *Environmental and Resource Economics*, 5, 249-272

Hanley, N., R. E. Wright, and V. Adamowicz. (1998). "Using Choice Experiments to Value the Environment: Design Issues, Current Experience and Future Prospects". *Environmental and Resource Economics*, 3, 413-428

Hansen, A. (1991). "The Media and the Social Construction of the Environment". *Media, Culture and Society*, 13, 443-458

Hansen, T. B. (1997). "The Willingness To Pay for the Royal Theatre in Copenhagen as a Public Good". *Journal of Cultural Economics*, 21, 1-28

Harris, C. C., B. L. Driver, and W. J. McLaughlin. (1989). "Improving the Contingent Valuation Method: A Psychological Perspective". *Journal of Environmental Economics and Management*, 17, 213-229

Hausman, J. A. (1993). *Contingent Valuation: A Critical Assessment*. Amsterdam: North Holland Press

Heberlein, T. A. (1988). "Economics and Social Psychology in Amenity Valuation". in *Amenity Resource Valuation: Integrating Economics with Other Disciplines*, edited by G. L. Peterson, B. L. Driver, and R. Gregory. State College, PA: Venture Publishing, Inc.

Heimer, C. A. (1988). "Social Structure, Psychology, and the Estimation of Risk". *Annual Review of Sociology*, 14, 491-519

Herek, G. M. (1986). "The Instrumentality of Attitudes: Toward a Neofunctional Theory". *Journal of Social Issues*, 42, 99-114

Himmelweit, H. T. (1990). "The Dynamics of Public Opinion". in *The Social Psychological Study of Widespread Beliefs*, edited by C. Fraser and G. Gaskell. Oxford: Clarendon Press

Hoevenagel, R. (1996). "The Validity of the Contingent Valuation Method: Perfect and Regular Embedding". *Environmental and Resource Economics*, 7, 57-78

Hollis, M., and E. J. Nell. (1975). *Rational Economic Man: A Philosophical Critique of Neo-Classical Economics*. Cambridge: Cambridge University Press

Hutchinson, W. G., S. M. Chilton, and J. Davis. (1995). "Measuring Non-Use Value of Environmental Goods using the Contingent Valuation Method: Problems of Information and Cognition and the Application of Cognitive Questionnaire Design Methods". *Journal of Agricultural Economics*, 46, 97-112

Irwin, J. R., G. H. McClelland, and W. D. Schulze. (1992). "Hypothetical and Real Consequences in Experimental Auctions for Insurance Against Low-Probability Risks". *Journal of Behavioral Decision Making*, 5, 107-116

Janis, I. L., and L. Mann. (1977). *Decisionmaking: A Psychological Analysis of Conflict, Choice, and Commitment*. New York: The Free Press

Jaspars, J., and C. Fraser. (1984). "Attitudes and Social Representations". in *Social Representations*, edited by R. M. Farr and S. Moscovici. Cambridge: Cambridge University Press

Johansson-Stenman, O. (1998). "The Importance of Ethics in Environmental Economics with a Focus on Existence Values". *Environmental and Resource Economics*, 11, 429-442

Judd, C. M., J. A. Krosnick, and M. A. Milburn. (1981). "Political Involvement and Attitude Structure in the General Public". *American Sociological Review*, 46, 660-669

Kahneman, D., and J. L. Knetsch. (1992). "Valuing Public Goods: The Purchase of Moral Satisfaction". *Journal of Environmental Economics and Management*, 22, 57-70

Kahneman, D., J. L. Knetsch, and R. H. Thaler. (1990). "Experimental Tests of the Endowment Effect and the Coase Theorem". *Journal of Political Economy*, 98, 1325-1348

Kahneman, D., and I. Ritov. (1994). "Determinants of Willingness to Pay for Public Goods: A Study in the Headline Method". *Journal of Risk and Uncertainty*, 9, 5-38

Kahneman, D., I. Ritov, and D. Schkade. (1999). "Economic Preferences or Attitude Expressions?: An Analysis of Dollar Responses to Public Issues". *Journal of Risk and Uncertainty*, 19, 203-235

Kahneman, D., P. Slovic, and A. Tversky. (1982). *Judgement Under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press

Kahneman, D., and A. Tversky. (1979). "Prospect Theory: An Analysis of Decision Under Risk". *Econometrica*, 47, 263-291

Katz, D. (1960). "The Functional Approach to the Study of Attitudes". *Public Opinion Quarterly*, 24, 163-204

Keat, R. (1997). "Values and Preferences in Neo-Classical Environmental Economics". in *Valuing Nature? Ethics, Economics and the Environment*, edited by J. Foster. London: Routledge

Keeney, R. L., and H. Raiffa (Eds.). 1976. *Decisions with Multiple Value Objectives: Preferences and Value Tradeoffs*. New York: John Wiley and Sons

Kelman, H. C. (1958). "Compliance, Identification, and Internalization: Three Processes of Attitude Change". *Journal of Conflict Resolution*, 2, 51-60

Kleindorfer, P. R., H. C. Kunreuther, and P. J. H. Schoemaker. (1993). *Decision Sciences: An Integrative Perspective*. New York: Cambridge University Press

Kocher, M. G., and M. Sutter. (2000). "When the 'Decision Maker' Matters: Individual versus Team Behavior in Experimental Beauty-Contest Games". in *The 20th Arne Ryde Symposium on Experimental Economics*. Lund

Kokkinaki, F., and P. Lunt. (1997). "The Relationship between Involvement, Attitude Accessibility, and Attitude-Behaviour Consistency". *British Journal of Social Psychology*, 36, 497-509

Kopp, R. J. (1992). "Why Existence Values Should be Used in Cost-Benefit Analysis". *Journal of Policy Analysis and Management*, 11, 123-130

Kramer, R. A., and D. E. Mercer. (1992). "Valuing a Global Environmental Good: U.S. Residents' Willingness to Pay to Protect Tropical Rain Forests". *Land Economics*, 73, 196-210

Krosnick, J. A. (1986). "Attitude Importance and Attitude Change". *Journal of Experimental Social Psychology*, 24, 240-255

Kruglanski, A. W., and O. Mayseless. (1987). "Motivational Effects in the Social Comparison of Opinions". *Journal of Personality and Social Psychology*, 53, 834-842

Krutilla, J. V. (1967). "Conservation Reconsidered". *American Economic Review*, 57, 777-786

Ladd, E. C., and K. Bowman. (1996). "Public Opinion on the Environment". Pp. 5-7 : Resources for the Future

Laibson, D., and R. Zeckhauser. (1998). "Amos Tversky and the Ascent of Behavioral Economics". *Journal of Risk and Uncertainty*, 16, 7-47

LaPiere, R. T. (1934). "Attitudes versus Actions". *Social Forces*, 13, 230-237

Latané, B. (1981). "The Psychology of Social Impact". *American Psychologist*, 36, 343-356

Lewis, A. (1990). "Shared Economic Beliefs". in *The Social Psychological Study of Widespread Beliefs*, edited by C. Fraser and G. Gaskell. Oxford: Clarendon Press

Liska, A. E. (1984). "A Critical Examination of the Causal Structure of the Fishbein / Ajzen Attitude-Behavior Model". *Social Psychology Quarterly*, 47, 61-74

Long, J. S. (1997). *Regression Models for Categorical and Limited Dependent Variables*. London: Sage Publications, Ltd.

Loomis, J., T. Brown, B. Lucero, and G. Peterson. (1996). "Improving Validity Experiments of Contingent Valuation Methods: Results of Efforts to Reduce the Disparity of Hypothetical and Actual Willingness to Pay". *Land Economics*, 72, 450-461

Loomis, J., M. Lockwood, and T. DeLacy. (1993). "Some Empirical Evidence of Embedding Effects in Contingent Valuation of Forest Protection". *Journal of Environmental Economics and Management*, 25, 45-55

Loomis, J. B. (1990). "Comparative Reliability of the Dichotomous Choice and Open-Ended Contingent Valuation Techniques". *Journal of Environmental Economics and Management*, 18, 78-85

Lowenstein, G. (1999). "Experimental Economics from the Vantage-Point of Behavioural Economics". *The Economic Journal*, 109, 25-34

Lunander, A. (1998). "Inducing Incentives to Understate and to Overstate Willingness to Pay within the Open-Ended and Dichotomous Choice Elicitation Formats: An Experimental Study". *Journal of Environmental Economics and Management*, 35, 88-102

Macnaghten, P., and M. Jacobs. (1997). "Public Identification with Sustainable Development: Investigating Cultural Barriers to Participation". *Global Environmental Change*, 7, 5-24

Mazur, A., and J. Lee. (1993). "Sounding the Global Alarm: Environmental Issues in the US National News". *Social Studies of Science*, 23, 681-720

McClelland, G. H., W. D. Schulze, and D. L. Coursey. (1993). "Insurance for Low-Probability Hazards: A Biomodal Response to Unlikely Events". *Journal of Risk and Uncertainty*, 7, 95-116

McConnell, K. E. (1997). "Does Altruism Undermine Existence Values?". *Journal of Environmental Economics and Management*, 32, 22-37

McFadden, D. (1974). "Conditional Logit Analysis of Qualitative Choice Behavior". in *Frontiers in Econometrics*, edited by P. Zarembka. New York: Academic Press

Mead, W. J. (1993). "Review and Analysis of State-of-the-Art Contingent Valuation Studies". in *Contingent Valuation: A Critical Assessment*, edited by J. A. Hausman. Amsterdam: North Holland Press

Messick, D. M. (1999). "Alternative Logics for Decision Making in Social Settings". *Journal of Economic Behavior and Organisation*, 39, 11-28

Milgram, S. (1974). *Obedience to Authority*. New York: Harper and Row

Milgrom, P. (1993). "Is Sympathy an Economic Value? Philosophy, Economics, and the Contingent Valuation Method". in *Contingent Valuation: A Critical Assessment*, edited by J. A. Hausman. Amsterdam: North Holland Press

Mitchell, R. C., and R. T. Carson. (1989). *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington D. C.: Resources for the Future

Morgan, D. L., and M. L. Schwalbe. (1990). "Mind and Self in Society: Linking Social Structure and Social Cognition". *Social Psychology Quarterly*, 53, 148-164

Morgan, G., P. J. Frost, and L. R. Pondy. (1983). "Organizational Symbolism". in *Organisational Symbolism*, edited by L. R. Pondy, G. Morgan, P. J. Frost, and T. C. Dandridge: JAI Press

Moscovici, S. (1984). "The Phenomenon of Social Representations". in *Social Representations*, edited by R. M. Farr and S. Moscovici. Cambridge: Cambridge University Press

Mulberg, J. (1995). *Social Limits to Economic Theory*. London: Routledge

Nadeau, R., and R. G. Niemi. (1995). "Educated Guesses: The Process of Answering Factual Knowledge Questions in Surveys". *Public Opinion Quarterly*, 59, 323-346

Navrud, S. (1992). "Willingness to Pay for Preservation of Species - An Experiment with Actual Payments". in *Pricing the European Environment*, edited by S. Navrud. Oslo: University Press

Neill, H. R., R. G. Cummings, P. T. Ganderton, G. W. Harrison, and T. McGuckin. (1994). "Hypothetical Surveys and Real Economic Commitments". *Land Economics*, 70, 145-154

Nowak, A., J. Szamrej, and B. Latané. (1990). "From Private Attitude to Public Opinion: A Dynamic Theory of Social Impact". *Psychological Review*, 97, 362-376

Nyborg, K. (2000). "Homo-Economicus and Homo Politicus: Interpretation and Aggregation of Environmental Values". Journal of Economic Behavior and Organization, 42, 305-322

Office for National Statistics, U. K. (1998). "Social Trends 28". . London: Government Statistical Service

Pearce, D. W., and R. K. Turner. (1990). *Economics of Natural Resources and the Environment*. New York: Harvester Wheatsheaf

Pennington, N., and R. Hastie. (1993). "Reasoning in Explanation-Based Decision Making". *Cognition*, 49, 123-163

Peterson, G. L., B. L. Driver, and R. Gregory. (1988). *Amenity Resource Valuation: Integrating Economics with other Disciplines*. State College, PA: Venture Publishing, Inc.

Petty, R. E., and J. T. Cacioppo (Eds.). 1986. *The Elaboration Likelihood Model of Persuasion*. San Diego: Academic Press

Plous, S. (1993). *The Psychology of Judgment and Decision Making*. New York: McGraw-Hill, Inc.

Portney, P. R. (1994). "The Contingent Valuation Debate: Why Economists Should Care". *Journal of Economic Perspectives*, 8, 3-17

Posavac, S. S. (1998). "Strategic Overbidding in Contingent Valuation: Stated Economic Value of Public Goods Varies According to Consumers Expectations of Funding Source". *Journal of Economic Psychology*, 19, 205-214

Propper, C. (1990). "Contingent Valuation of Time Spent on NHS Waiting Lists". *The Economic Journal*, 100, 193-199

Quattrone, G. A. (1982). "Overattribution and Unit Formation: When Behaviour Engulfs the Person". *Journal of Personality and Social Psychology*, 42, 593-607

Rabin, M. (1993). "Incorporating Fairness into Game Theory and Economics". *American Economic Review*, 83, 1281-1302

Randall, A., and J. P. Hoehn. (1996). "Embedding in Market Damand Systems". *Journal of Environmental Economics and Management*, 30, 369-380

Raz, J. (1986). *The Morality of Freedom*. Oxford: Clarendon Press

Read, D., G. Lowenstein, and M. Rabin. (1999). "Choice Bracketing". *Journal of Risk and Uncertainty*, 19, 171-197

Ready, R. C., S. Navrud, and W. R. Dubourg. (1999). "How do Respondents with Uncertain Willingness to Pay Answer Contingent Valuation Questions?". in *EAERE Annual Conference*. Oslo

Ready, R. C., J. C. Whitehead, and G. C. Blomquist. (1995). "Contingent Valuation When Respondents Are Ambivalent". *Journal of Environmental Economics and Management*, 29, 181-196

Ritov, I., and D. Kahneman. (1997). "How People Value the Environment". in *Environment, Ethics, and Behavior*, edited by M. H. Bazerman, D. M. Messick, A. E. Tenbrunsel, and K. A. Wade-Benzoni. San Francisco: The new Lexington Press

Rosenberg, M. J., and C. I. Hovland. (1960). "Cognitive, Affective, and Behavioral Components of Attitudes". in *Attitude Organization and Change*, edited by M. J. Rosenberg and C. I. Hovland. New Haven, CT: Yale University Press

Rosenthal, D. H., and R. H. Nelson. (1992). "Why Existence Values Should Not be Used in Cost-Benefit Analysis". *Journal of Policy Analysis and Management*, 11, 116-122

Rosenthal, R. (1966). *Experimenter Effects in Behavioral Research.* New York: Meredith Publishing Company

Ross, L., and A. Ward. (1996). "Naive Realism: Implications for Social Conflict and Misunderstanding". in *Values and Knowledge*, edited by E. S. Reed, E. Turiel, and T. Brown. Mahwah, NJ: Lawrence Erlbaum Associates

Rowe, R. D., R. C. d'Arge, and D. S. Brookshire. (1980). "An Experiment on the Economic Value of Visibility". *Journal of Environmental Economics and Management*, 7, 1-19

Sagoff, M. (1994). "Four Dogmas of Environmental Economics". *Environmental Values*, 3, 285-310

Samuelson, P. A. (1954). "The Pure Theory of Public Expenditure". *The Review of Economics and Statistics*, 36, 387-389

Scheier, M. F., and C. S. Carver. (1980). "Private and Public Self-Attention, Resistance to Change, and Dissonance Reduction". *Journal of Personality and Social Psychology*, 39, 390-405

Schkade, D. A., and J. W. Payne. (1994). "How People Respond to Contingent Valuation Questions: A Verbal Protocol Analysis of Willingness to Pay for an Environmental Regulation". *Journal of Environmental Economics and Management*, 26, 88-109

Schroeder, H. W., and J. F. Dwyer. (1988). "Gains, Losses, and Contingent Valuation". in *Amenity Resource Valuation: Integrating Economics with Other Disciplines*, edited by G. L. Peterson, B. L. Driver, and R. Gregory. State College, PA: Venture Publishing, Inc.

Schulze, W., G. McClelland, D. Waldman, and J. Lazo. (1996). "Sources of Bias in Contingent Valuation". in *The Contingent Valuation of Environmental Resources: Methodological Issues and Research Needs*, edited by D. J. Bjornstad and J. R. Kahn. Cheltenham, UK: Edward Elgar

Schuman, H. (1996). "The Sensitivity of CV Outcomes to CV Survey Methods". in *The Contingent Valuation of Environmental Resources: Methodological Issues and Research Needs*, edited by D. J. Bjornstad and J. R. Kahn. Cheltenham, UK: Edward Elgar

Schuman, H., and S. Presser. (1981). *Questions and Answers in Attitude Surveys: Experiments on Question Form, Wording, and Context.* New York: Academic Press

Schwartz, S. H., and W. Bilsky. (1987). "Toward a Universal Psychological Structure of Human Values". *Journal of Personality and Social Psychology*, 53, 550-562

Schwarz, N. (1994). "Judgment in a Social Context: Biases, Shortcomings, and the Logic of Conversation". *Advances in Experimental Social Psychology*, 26, 123-162

Schwarz, N. (1997). "Cognition, Communication, and Survey Measurement: Some Implications for Contingent Valuation Surveys". in *Determining the Value of Non-Marketed Goods: Economic, Psychological, and Policy Relevant Aspects of Contingent Valuation Methods*, edited by R. J. Kopp, W. W. Pommerhene, and N. Schwarz. Boston: Kluwer Academic Press

Schwarz, N., H. J. Hippler, B. Deutsch, and F. Strack. (1985). "Response Scales: Effects of Category Range on Reported Behavior and Comparative Judgments". *Public Opinion Quarterly*, 49, 388-395

Schwarz, N., F. Strack, H. J. Hippler, and G. Bishop. (1991). "The Impact of Administration Mode on Response Effects in Survey Measurement". *Applied Cognitive Psychology*, 5, 193-212

Seip, K., and J. Strand. (1992). "Willingness to Pay for Environmental Goods in Norway: A Contingent Valuation Study with Real Payment". *Environmental and Resource Economics*, 2, 91-106

Sen, A. K. (1977). "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory". *Philosophy and Public Affairs*, 6, 317-344

Sen, A. K. (1987). *On Ethics and Economics.* Malden, MA: Blackwell Publishers

Shiller, R. J. (1990). "Market Volatility and Investor Behavior". *American Economic Review*, 80, 58-62

Shogren, J. F., S. Y. Shin, D. J. Hayes, and J. B. Kliebenstein. (1994). "Resolving Differences in Willingness to Pay and Willingness to Accept". *American Economic Review*, 84, 255-270

Simon, H. A. (1955). "A Behavioral Model of Rational Choice". *The Quarterly Journal of Economics*, 69, 99-118

Simon, H. A. (1986). "Alternative Visions of Rationality". in *Judgment and Decision Making*, edited by H. Arkes and K. Hammond. Cambridge: Cambridge University Press

Slovic, P. (1969). "Differential Effects of Real versus Hypothetical Payoffs on Choices among Gambles". *Journal of Experimental Psychology*, 80, 434-437

Slovic, P. (1997). "Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield". in *Environment, Ethics, and Behavior*, edited by M. H. Bazerman, D. M. Messick, A. E. Tenbrunsel, and K. A. Wade-Benzoni. San Francisco: The New Lexington Press

Smith, V. K. (1992). "Arbitrary Values, Good Causes, and Premature Verdicts: Comment". *Journal of Environmental Economics and Management*, 22, 71-89

Smith, V. K., and L. L. Osborne. (1996). "Do Contingent Valuation Estimates Pass a "Scope" Test? A Meta-analysis". *Journal of Environmental Economics and Management*, 31, 287-301

Sperber, D., and D. Wilson. (1986). *Relevance: Communication and Cognition.* Cambridge, MA: Harvard University Press

Steele, C. M., S. J. Spencer, and M. Lynch. (1993). "Self-Image, Resiliance and Dissonance: The Role of Affirmational Resources". *Journal of Personality and Social Psychology*, 64, 885-896

Strand, J., and A. Taraldset. (1991). "The Valuation of Environmental Goods in Norway: A Contingent Valuation Study with Multiple Bias Testing". . Oslo: Department of Economics, University of Oslo

Sugden, R. (1996). "Public Goods and Contingent Valuation". in *Identifying and Correcting for Biases in the Contingent Valuation Method.* Norwich: Department of Economics, University of East Anglia

Svedsäter, H. (1996). "Willingness to Pay for an Environmentally Protective Engine". . Gothenburg: Department of Economics, Gothenburg University

Tedeshi, J. T., B. R. Schlenker, and T. V. Bonoma. (1971). "Cognitive Dissonance: Private Ratiocination or Public Spectacle?". *American Psychologist*, 26, 680-695

Thaler, R. H. (1980). "Toward a Positive Theory of Consumer Choice". *Journal of Economic Behavior and Organisation*, 1, 39-60

Thaler, R. H. (1990). "Saving, Fungibility and Mental Accounts". *Journal of Economic Perspectives*, 4, 193-205

Todd, P. M., and G. Gigerenzer. (1999). *Simple Heuristics that Make Us Smart*. Oxford: Oxford University Press

Tversky, A. (1969). "Intransitivity of Preferences". *Psychological Review*, 76, 31-48

Tversky, A., and D. Kahneman. (1974). "Judgment under Uncertainty: Heuristics and Biases". *Science*, 185, 1124-1131

Tversky, A., and D. Kahneman. (1988). "Rational Choice and the Framing of Decisions". in *Decision Making: Descriptive, Normative, and Prescriptive Interactions*, edited by D. E. Bell, H. Raiffa, and A. Tversky. New York: Cambridge University Press

Tversky, A., S. Sattath, and P. Slovic. (1988). "Contingent Weighting in Judgment and Choice". *Psychological Review*, 95, 371-384

Vadnjal, D., and M. O'Connor. (1994). "What is the Value of Rangitoto Island?". *Environmental Values*, 3, 369-380

Walker, M. E., O. F. Morera, J. Vining, and B. Orland. (1999). "Disparate WTA-WTP Disparities: The Influence of Human versus Natural Causes". *Journal of Behavioral Decision Making*, 12, 219-232

Wardman, M. (1988). "A Comparison of Revealed and Stated Preferences Models for Travel Behaviour". *Journal of Transport Economics and Policy*, 22, 71-91

Varian, H. R. (1992). *Microeconomic Analysis*. New York: W. W. Norton & Company, Inc.

Vatn, A. (1999). "Rationality - What Does Environmental Valuation Say?". in *EAERE Annual Conference*. Oslo

Vatn, A., and D. W. Bromley. (1994). "Choices Without Prices Without Apologies". *Journal of Environmental Economics and Management*, 26, 129-148

Welsh, M. P., and G. L. Poe. (1998). "Elicitation Effects in Contingent Valuation: Comparisons to a Multiple Bounded Discrete Choice Approach". *Journal of Environmental Economics and Management*, 36, 170-185

Whitehead, J. C. (1992). "Ex-ante Willingness to Pay with Supply and Demand Uncertainty: Implications for Valuing a Sea Turtle Protection Programme". *Applied Economics*, 24, 981-988

Whitehead, J. C., G. C. Blomquist, T. J. Hoban, and W. B. Clifford. (1995). "Assessing the Validity and Reliability of Contingent Values: A Comparison of On-Site

Users, Off-Site Users, and Non-Users". *Journal of Environmental Economics and Management*, 29, 238-251§

Whittington, D., V. K. Smith, A. Okorafor, A. Okore, J. Long Liu, and A. McPhail. (1992). "Giving Respondents Time to Think in Contingent Valuation Studies: A Developing Country Application". *Journal of Environmental Economics and Management*, 22, 205-225

Willig, R. D. (1976). "Consumer Surplus Without Apology". *American Economic Review*, 66, 589-597

Winpenny, J. T. (1991). *Values for the Environment: A Guide to Economic Appraisal.* London: Overeseas Development Institute (OECD)

von Neumann, J., and O. Morgenstern. (1944). *Theory of Games and Economic Behavior.* Princeton: Princeton University Press

Wood, W., C. A. Kallgren, and R. M. Preisler. (1985). "Access to Attitude-Relevant Information in Memory as a Determinant of Persuasion: The Role of Message Attributes". *Journal of Experimental Social Psychology*, 21, 73-85

Zaller, J., and S. Feldman. (1992). "A Simple Theory of the Survey Response: Answering Questions versus Revealing Preferences". *American Journal of Political Science*, 36, 579-616

Zimbardo, P. G., and M. R. Leippe. (1991). *The Psychology of Attitude Change and Social Influence.* New York: McGraw-Hill, Inc.

Zimbardo, P. G., M. Weisenberg, and I. Firestone. (1965). "Communicator Effectiveness in Producing Public Conformity and Private Attitude Change". *Journal of Personality*, 33, 233-255

Zwerina, K., J. Huber, and W. K. Kuhfeld. (1996). "A General Method for Constructing Efficient Choice Designs". Fuqua School of Business, Duke University