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**Working Paper**

## Contingent valuation: A new perspective

Working Paper, No. 0715

**Provided in Cooperation with:**

Socioeconomic Institute (SOI), University of Zurich

*Suggested Citation:* Schläpfer, Felix (2007) : Contingent valuation: A new perspective, Working Paper, No. 0715, University of Zurich, Socioeconomic Institute, Zurich

This Version is available at:

<https://hdl.handle.net/10419/76194>

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Publisher Sozialökonomisches Institut  
Bibliothek (Working Paper)  
Rämistrasse 71  
CH-8006 Zürich  
Phone: +41-44-634 21 37  
Fax: +41-44-634 49 82  
URL: [www.soi.uzh.ch](http://www.soi.uzh.ch)  
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# Contingent valuation: a new perspective

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## Abstract

After several decades of academic research on the contingent valuation (CV) method a consistent behavioral explanation of ‘hypothetical bias’ is still lacking. Based on evidence from economics, economic psychology and the political sciences, I propose an explanation that is based on two simple working hypotheses about respondent behaviour in contingent valuation surveys. The first hypothesis is that survey respondents are unable to form consistent preferences about unfamiliar goods unless the choice context offers reliable, informative cues that can be rationally exploited in simplified heuristics. The second hypothesis is that the probability and impact of strategic responses in dichotomous-choice questions about public goods depends on the extent to which the presented hypothetical costs differ from the actual costs. The literature on hypothetical bias is revisited in the light of these behavioral hypotheses. I find that the hypotheses are generally supported by the empirical data. Moreover, the hypotheses are able to explain several important empirical phenomena that previous research has not been able to explain. In particular, they solve the puzzle that pre-election polls, but not CV surveys, are able to predict actual referendum outcomes, and they explain why income effects on willingness to pay are lower in CV responses than in actual votes. If confirmed by further studies, the hypotheses will have important implications for future research and practice. First, the hypothetical costs presented in the dichotomous choice question should be close enough to the actual costs to be credible to all respondents. This can be achieved by specifying the costs as a *percentage* (rather than absolute) change in taxes. Second, the respondents should be given the option to answer based on information about the positions of large parties and interest groups with known political orientation rather than based on the raw policy information. Theory and evidence suggest that this new survey paradigm largely eliminates the fundamental problems of the conventional stated preference methods.

*Keywords:* Behaviour, field experiments, hypothetical bias, incentive compatibility, information, preference formation, referendum, stated preferences, survey methodology, validity, voting behavior.

## 1. Introduction

In an article on the economic analysis of social interactions, Manski (2000) states:

“Economists have traditionally asserted that respondents in surveys about public goods have no incentive to answer questions about their preferences carefully or honestly. Hence, there is no reason to believe that subjective responses reliably reflect respondents’ behaviour in actual choice contexts. As a result, the profession has enforced something of a prohibition on the collection of subjective data”.

Some forty years ago, early environmental economists decided to break with the self-imposed rule. Krutilla (1967) argued convincingly that there exist preferences for public goods which do not leave a behavioural trail. Hence, revealed-preference techniques may not be sufficient to accurately measure societal values for public goods. The stated preference elicitation approach which became most established and most popular among environmental economists is known as ‘contingent valuation’. In the dichotomous-choice variant of this approach, a proposed public good or policy is described to a sample of respondents that is representative of a relevant population. Typically, the specific good or policy in question has not been the subject of public debate before the survey. The respondents are then confronted with a hypothetical (randomly assigned) dollar price and asked if they would be willing to pay this amount if the proposed public good was actually provided. The blueprint for this survey design, according to the proponents of the method, is a popular vote in which citizens decide whether they should tax themselves to provide a specific public good at specified costs (see Mitchell and Carson, 1989; Arrow et al., 1993; Hanemann 1994).

Landmark contributions to this literature are the proceedings of a workshop sponsored by the U.S. Environmental Protection Agency (Cummings et al., 1986) and a book by Mitchell and Carson (1989) which was quite favorably discussed in the *Journal of Economic Literature* (Bergstrom, 1990). In the environmental economics literature, the received scepticism resounding in the earlier “reference operating conditions” (Cummings et al., 1986, p. 104) gave way to a vague optimism and claims “that CV findings can be meaningful” (Mitchell and Carson, 1989, p. 171) and that “CV studies convey useful information” (Arrow et al., 1993, p. 4610). The Exxon Valdez oil spill in 1989 highlighted the potential relevance of the method for litigation and public policy and triggered the phase of intensive research on stated preference methods which continues to this day.

Naturally, the academic research on the contingent valuation method has been mainly interested in assessing survey ‘validity’, i.e., whether the responses in the hypothetical choice situations reflect the preferences observed in actual choice situations. Accordingly, the

research focus has been on comparing hypothetical and actual choices in such settings where actual choices are observable, and any disparity between actual and hypothetical choice has been broadly referred to as „hypothetical bias“. The proximate explanation of any rejection of the null hypothesis of „no disparity” has thus been the hypothetical or non-consequential nature of the decision. Ultimate explanations for observed hypothetical bias have been sought in the lack of various aspects of „survey quality“ (e.g. Arrow et al., 1993), and particularly of incentive compatibility (e.g. Cummings et al., 1997). Regarding the latter, the hypothesis has been that bias may arise from strategic answering in other than one-shot dichotomous-choice questions or from a lack of motivation for serious answers if the probability of affecting the outcome is (nearly) zero (see e.g. Carson et al., 1999).

However, these previous explanations of „hypothetical bias” are unable to account for important empirical regularities. For instance, ‘hypothetical bias’ in one-shot dichotomous-choice questions has been found to be lower than in open-ended questions (McFadden, 1994) – and not higher as expected based on received assumptions about the incentive compatibility of one-shot dichotomous-choice questions (Arrow et al. 1993). Furthermore, as political scientists have long shown, pre-election polls consistently produce responses that are very close to the actual voting decisions despite their non-consequential nature.

Here, I propose an explanation of hypothetical bias in contingent valuation surveys that is based on two simple working hypotheses about respondent behavior, one related to the issue of incentives and one related to the issue of information provision and cognitive limitation.

The first working hypothesis is:

*Hypothesis 1: Survey respondents are unable to form consistent preferences about unfamiliar goods from the raw product or policy information unless the choice context offers reliable, informative contextual cues that can be rationally exploited in simplified heuristics.*

Such cues can for instance be product acceptance by other individuals with similar tastes, or credible information about the positions of parties with known ideological orientation. This hypothesis strongly contrasts to the standard perspective according to which isolated individuals know (or are able to construct) their preferences based on the raw policy information provided in stated preference surveys. As will be shown later on, this hypothesis receives overwhelming support from the voting literature in the political sciences.

The second working hypothesis, which concerns only choices about public goods and policies, is:

*Hypothesis 2: The probability and impact (influence on sample estimates of willingness to pay) of a strategic answer by a respondent  $i$  depends on the extent to which the hypothetical costs presented in the dichotomous-choice question deviate from  $i$ 's actual costs if the policy is implemented.*

Hence, the larger the difference between hypothetical and actual costs, the more likely will a „sophisticated” respondent perceive the hypothetical nature of the costs and hence his or her strategic opportunity, and the larger will be the effect of a strategic response on the survey results.

Together, these behavioral hypotheses imply testable predictions of hypothetical bias in stated preference surveys (Table 1). They imply that hypothetical bias in surveys about unfamiliar public goods will be lowest if reliable, informative cues are available and if the hypothetical costs presented in the survey correspond to the actual costs if the policy is implemented (lower-right cell in Table 1). Surveys following the existing paradigm in contingent valuation are concentrated in the upper-left cell of the table for which the working hypotheses predict the largest hypothetical bias.

The objectives of this paper are (1) to review key evidence – from economic psychology, the political sciences and economics – related to each of the two working hypotheses; (2) to review the empirical evidence on hypothetical bias in light of the predictions of the working hypotheses; and (3) to discuss implications of the alternative behavioral explanation of hypothetical bias for stated preference survey research and practice.

The study finds that the working hypotheses are supported by a wide range of data. The hypotheses are able to explain several important empirical patterns which had remained unexplained in the original survey studies, and they suggest a new survey paradigm that is compatible with a realistic model of preference formation in choices about public goods.

The remainder of the paper is organized as follows: Sections 2 and 3 briefly review literature related to the two working hypotheses. Sections 4 and 5 revisit key empirical evidence on hypothetical bias from ‘external’ and ‘internal’ validity tests. Section 6 presents implications for future research and practice, followed by conclusions.

## **2. Evidence on hypothesis 1: preference formation**

Much research has demonstrated that stated preferences for public goods depend in various ways on the context in which they are elicited, suggesting that preferences are ‘constructed’

during the elicitation process (Payne et al., 1999; Swait et al., 2002). Research on preference formation in economic psychology, the political sciences and economics can provide indications if and under what conditions survey respondents are able construct stated preferences that are consistent with the theoretical requirements of economic analysis and with observed choice behaviour.

### *2.1 Evidence from economic psychology*

Experiments by psychologists have provided many examples showing that the context and ‘framing’ can have strong effects on various individual judgements including responses to preference questions about private and public goods (e.g. Green et al., 1994; Ariely et al, 2003). For instance, in a much-cited experiment by Kahneman and Tversky, subjects were told that a new disease is expected to kill 600 people, and then given the choice between alternatives A and B, or in a second experiment, between alternatives C and D (Kahneman and Tversky, 1984) (Table 2). The alternatives A and C have identical outcomes, as do the alternatives B and D. Nevertheless, changing the frame from “lives saved” to “lives lost” significantly altered choice. The authors’ conclusion, in this case, is that humans think differently about gains and losses from the status quo, and if one frames a decision task in a way that alters the perceived status quo, then one can alter choice behavior (see also Kahneman et al. 1999; McFadden 1999).

A second straightforward way to examine if preferences are constructed during the survey elicitation and if preferences may be sensitive to context is to explore the thought processes of respondents while they complete a questionnaire. The studies asking survey respondents about how they constructed their responses report striking results. In a study by Schkade and Payne (1994), 41% of the respondents tried to decide how much would be needed if every household contributed; 17% saw their willingness to pay (WTP) as a contribution to charity; and 23% were concerned about broader environmental issues and wanted to signal that, which they did in terms of WTP responses significantly higher than the mean for the study; finally, 20% just made a number up. Similar results were obtained by Clark et al. (2000). Clearly, a large fraction of respondents are not thinking as economists assume they should when responding to a WTP question.

In sum, the psychological evidence strongly suggests that preferences for unfamiliar goods are sensitive to contextual factors. Payne et al. (1999) thus conclude that consistent



prediction based on survey responses requires that the task environment in a survey should be matched to the task environment of the actual decision that the survey intends to predict.

## 2.2 Evidence from the political sciences

While psychologists have laid bare the failures of human judgement, political scientists have shown which contextual factors are able to restore consistent choices in actual (political) decision environments. In particular, research in the political sciences has demonstrated how voters make use of contextual cues in order to cast votes in line with their interests and values. For a series of complex auto insurance reform ballots in California, for instance, Lupia (1994) showed that voters who had little factual knowledge but knew the position of the auto insurance industry voted as if they were well informed (Table 3). Similar findings are reported by other studies (e.g. Bowler and Donovan, 1998; Lupia and McCubbins, 1998).<sup>1</sup> Hence, the political science research provides some of the most compelling evidence for hypothesis 1: Voters in elections appear to be unable to “vote their interests” without access to *reliable, informative* contextual information.

Druckman (2004) examines how factors of the political context affect framing effects, i.e. effects of different, but logically equivalent, phrases on (policy) preference responses, as illustrated in Table 2. He experimentally shows that elite competition and heterogeneous discussion may limit and even eliminate framing effects on policy choices. The general lesson seems to be that in a well-chosen institutional context framing effects may not violate citizen competence as much as could be expected from psychological experiments (Druckman, 2001; Chong and Druckman, 2006).

## 2.3 Evidence from stated preference research in economics

Economists have replicated much of the psychologists’ evidence on preference formation for the specific context of stated preference surveys. They have shown that theoretically irrelevant contextual information in stated preference surveys can have substantial impacts on

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<sup>1</sup> Hanemann (1994), in defending the rationality of stated preferences for public goods, mentions that voters use ‘signals’ (Fiorina, 1981; McKelvey and Ordeshook, 1986) or ‘short cuts’ (Lupia, 1994) to act as though they were well informed. Similarly, Carson et al. (2001), in arguing that lack of familiarity of goods is not a prerequisite to providing meaningful responses, remind us that consumers (of private goods) “make use of information from reviews, advertising, and so forth”. What seems to have escaped Hanemann’s (1994) and Carson et al’s (2001) attention is that survey respondent precisely *lack* those types of *informative* cues or short cuts (such as market prices or party positions) which may help voters and consumers to emulate rational behaviour in choices about unfamiliar goods.

stated willingness to pay. A well-known instance of this are the effects of the ‘bid’ (hypothetical costs) presented in dichotomous choice surveys (see Section 5.1). Other examples include effects of the ‘amount’ of information (Bergstrom et al., 1989), effects of whether the additional information is ‘positive’ (Samples et al., 1986), or the effects of survey modes such as face-to-face, telephone or mail surveys (Ethier et al., 2000).

Macmillan et al. (2002), Christie et al. (2006), Alvarez-Farizo and Hanley (2006) and Alvarez-Farizo et al. (2007) compare the responses obtained using standard interviews with an elicitation in which respondents were allowed to discuss the issue with other individuals. All of these studies find significant effects of discussion and thus support the notion that the preference elicitation context matters for preference formation.

Following the work of political scientists described above, Schläpfer and Schmitt (2007) and Schläpfer et al. (in press) report survey experiments in which they simulated the preference-formation process of an actual referendum by offering (actual) party and interest group positions on their valuation questions to subsamples of the survey respondents. Schläpfer and Schmitt (2007) combined the information treatment with a treatment to examine anchoring effects. Their results show that reliable, informative cues may crowd out anchoring on uninformative hypothetical cost. Schläpfer et al. (in press) applied the party positions treatment in an attribute-based choice experiment and found that stated preferences for environmental policy attributes were up to ten times lower when the survey respondents had access to the party positions (compared with the control in which respondents did not have access to the additional information). Finally, Schläpfer and Soliva (2007) examined how the same type of information treatment affected different voter groups. They found that the support of an environmental policy proposal by right-wing and left-wing/green voter groups was identical when the respondents had to answer based on the raw policy information (Table 4, left column). However, when the respondents knew the party positions, the typical pattern known from actual elections re-surfaced (Table 4, right column). It appears that in these surveys, as in actual elections, political competition and reputation effects induced the parties to provide credible “signals”, which voters/respondents in turn used to cast votes in line with their perceived interests and values.

In sum, this evidence indicates that preferences stated in surveys are sensitive to contextual factors and that respondents exploit simplified heuristics based on available cues – which can be arbitrary anchors, as in the case of randomly assigned costs, or informative cues as in the case of party and interest group positions (Schläpfer and Schmitt, 2007). The correlative studies by political scientists like Lupia (1994) and the field experiments with

party positions in contingent valuation settings, notably Schläpfer and Soliva (2007), thus strongly suggest that *consistent* voter/respondent preferences for unfamiliar public goods hinge on the availability of reliable, informative contextual cues which can be rationally exploited in simplified heuristics.

### **3. Evidence on hypothesis 2: strategic incentives**

Unresolved incentive compatibility issues are an important weakness in the theoretical underpinnings of the contingent valuation method. Previous research on this issue, in particular Carson et al. (1999) and Carson and Groves (2007) has not pursued the empirically most relevant case where the costs presented in dichotomous-choice valuation questions does not correspond to the costs if the policy is actually provided. Consider a student (or other person that does not pay taxes) with a “green” political orientation who is asked if she would vote in favor of a proposition to establish a new national park from income tax revenues. Assume the hypothetical cost presented in the dichotomous-choice question is a one-time income tax surcharge of \$500. Clearly, such a question is not incentive compatible because the student’s pay-off maximizing response may not be to state her true value. Curiously, this simple fact has been overlooked by the most important authorities on CV (see also Flores and Strong, 2007; Schläpfer and Bräuer, 2007).<sup>2</sup>

When hypothetical costs are randomly assigned, as is typically the case in dichotomous-choice surveys, then disparities between hypothetical and actual costs are inevitable. The magnitude of the disparities depends on the distribution of the costs if the policy is actually implemented and on the ‘bid design’ in the survey. The larger the range of the randomly hypothetical costs and the systematic variation (as by income) of the actual individual tax payments, the larger will (on average) be the difference between hypothetical and actual costs faced by an individual. However, if dichotomous-choice questions involve hypothetical costs that are very different from the actual costs, the elicitation of valid stated preferences requires that the respondents either do not perceive the difference or that they refrain from answering strategically for other reasons. Regarding the perception of differences between hypothetical and actual costs Champ et al. (2002) found that the assigned hypothetical costs in their survey were not credible to about fifty percent of their respondents.

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<sup>2</sup> Carson and Groves (2007) recently acknowledge the problem in passing. However, they then go on to present a typology of stated preference questions which again ignores this empirically most relevant case.

Remains the empirical question if those respondents who do not find the hypothetical costs credible actually do exploit the strategic opportunity (Cummings et al., 1997; Cummings et al., 1995). Unfortunately, empirical work on the demand revealing properties of stated preference questions about collectively provided public goods, which are typically the subject of contingent valuation surveys, is virtually absent. Green et al. (1998) show theoretically that stated preference questions about public services can be framed in such ways that *if* the subjects accept the frame the payoff-maximizing behavior will be to answer truthfully. Schlöpfer and Bräuer (2007) conducted field experiments to test if a “potentially” incentive compatible framing as suggested by Green et al. (1998) is effective in reducing stated willingness to pay. Their negative results suggest that the scope for purposeful manipulation of respondents’ perception of the social choice context through framing (and hence of the potential for strategic answering) may be very limited.

In sum, there is clear evidence that many respondents do not believe the hypothetical costs presented in dichotomous-choice questions. As single-shot dichotomous-choice questions with hypothetical cost figures are not incentive compatible, the working hypothesis 2 is at least theoretically plausible. Unfortunately, there is virtually no evidence available on how the difference between hypothetical and actual costs actually relates to the frequency of strategic responses and their impact on the estimated mean of the distribution of stated willingness to pay.

#### **4. External validity revisited**

##### *4.1 Review of the literature*

By what “calibration” factor do WTP estimates from contingent valuation (CV) studies differ from measures of revealed WTP?; what is the standard deviation of this factor?; and how do characteristics of the survey instrument, of the concerned public good and of the respondent sample affect the mean and standard deviation of this factor? These are the main questions on which one would like to have an answer before accepting or dismissing stated preference applications to public goods. Empirical tests of ‘external validity’ are needed to provide the (direct) answers.

Using the terms of Carmines and Zeller (1979), tests of external validity require that the ‘content’ of a survey question covers the public good to be valued and that information about real choices about the same good are available as a ‘criterion’ with which values

obtained from a hypothetical market good can be compared. This raises the question about the appropriate model for testing the validity of stated preferences for public goods. Mitchell and Carson (1989, p. 97) write:

“The choice of which [model] to use depends upon the nature of the good and the type of benefits that the study intends to measure. The private goods market model is appropriate for certain types of quasi-private goods which can potentially be provided to consumers for a price, such as access to parklands and game species for recreational purposes. These are situations where user values predominate and where the imposition of a permit or access fee is plausible. In the case of public goods, however, the referendum model may be preferred as it invokes the correct payment context and the full range of values appropriate to public goods.”

For the case of public goods, Mitchell and Carson specify (p. 94): “Here the behavior to be predicted by a CV study is how informed voters would actually vote if a proposition to provide an amenity was in fact on the ballot.” This understanding has never been challenged – but frequently endorsed – in the literature (e.g. Arrow et al., 1993; Hanemann, 1994). The question if voting behavior itself is an adequate basis for ‘good’ policy does not need to be answered (Diamond and Hausman, 1994). As long as a survey asks: “How would you vote?”, actual votes are the appropriate criterion for CV validation.

External validation can proceed by conducting self-contained CV surveys at sufficient intervals before a real public finance proposition is put on the ballot, e.g. in U.S. states (Arrow et al., 1993). It is surprising that contingent valuation researchers have not made more systematic use of such opportunities. The only such study to date is based on the fortunate coincidence of a contingent valuation survey conducted a few month prior to an actual referendum on a very similar public financing issue in Switzerland (Roschewitz, 1999; Schlöpfer and Hanley, 2006; Schlöpfer et al., 2004). The point estimates for the “calibration factor” from this comparison were in the range of 20 to 50, with a conservative lower bound estimate of about 6 (Schlöpfer and Hanley, 2006). Since this is the only such study so far, it is difficult to say how characteristics of the survey instrument and the concerned public goods contributed to the overall result.

A number of studies have compared votes in referenda with responses to “CV-like” pre-election polls conducted only days before actual ballots (see references in Schlöpfer and Hanley, 2006; Schlöpfer et al., 2004). All of these studies found that the survey responses were very similar to the actual votes. Similarly, a recent study by Johnston (2006) compared the responses to a survey with dichotomous choice questions involving the *actual costs* of the policy with the actual votes in a subsequent referendum. However, the respondents had the opportunity to discuss the issue with friends or even with policy experts, as the survey was

conducted on a real policy issue in a small community, and respondents had several weeks time to respond. Again, the survey votes agreed well with the actual votes.

In light of the scarce evidence from voting-based studies, there has been considerable interest in criterion validity tests involving private goods and donations for public goods. It is important to note, however, that the choice context in these studies is very distinct from the social choice context relevant to collectively provided public goods (see Cameron et al., 2002, p.106; Champ et al., 2002; Cummings et al., 1986; Ethier et al., 2000; Mitchell and Carson, 1989, p. 208).

For *private goods* experiments have shown that people tend to only moderately overstate their actual values in hypothetical choices about goods such as paintings, a sneak preview of a Swedish television show (Bohm, 1972), sportscards (List and Shogren, 1998) or irradiated/non-irradiated porch sandwiches (Fox et al., 1998). For well-defined consumer goods such as strawberries, a systematic bias may even be absent (Dickie et al., 1987). List and Gallet (2001) report a mean calibration factor of 1.28 for median WTP estimates obtained in the laboratory using the standard dichotomous choice question format. Some effort has also been invested in ‘convergent’ validity approaches. These studies try to test stated willingness to pay for public goods based on what are essentially private-good choices involving public goods such as housing choices involving differences in air quality. In a meta-analysis of such studies (Carson et al., 1996) find that stated willingness to pay was on average about 10 percent lower than actual willingness to pay.<sup>3</sup>

#### *4.2 Consistency with the working hypotheses*

Previous research has not been able to explain this pattern of results found in external validity tests. In particular, it has not been able to explain why responses to inconsequential questions are sometimes successful (as in pre-election polls) and sometimes unsuccessful in predicting responses to consequential questions. The working hypotheses 1 and 2 provide the following explanations of the empirical pattern (Table 5). The large bias observed in Schläpfer and Hanley (2006) is consistent with hypotheses 1 and 2. The question involved an unfamiliar public good where the respondents did not have access to informative contextual cues to be

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<sup>3</sup> Experiments involving *donations for public goods* are strictly speaking not measuring economic preferences. Results in this category range from studies which find no significant hypothetical bias (Carlsson and Martinsson, 2001) to others which find that charitable donations stated in a CV context were at least four times as high as the real payments (Foster et al., 1997). Experiment involving group donation-funded public goods have found about 20% higher approval when the question was merely hypothetical (Cummings and Taylor, 1999) and median stated values which were up to about twice the actual values (Cameron et al., 2002).

used in simplified heuristics. Furthermore, the randomly assigned cost figures in the dichotomous questions offered the opportunity for strategic responses. In contrast, all comparisons of pre-election polls and voting within the CV literature (cited in Schläpfer and Hanley 2006) are based on responses to questions involving the actual costs of the policy. Moreover, the respondents had access to external cues of the type related to in hypothesis 1 which could potentially be used in simplified heuristics.

The observed difference in hypothetical bias between familiar and unfamiliar private goods is reconciled by hypothesis 1: in choices about familiar private goods the respondents have experience from (or at least knowledge about) actual markets transactions. In choices about unfamiliar private goods, in contrast, respondents do not always have access to reliable cues such as competitive market prices.<sup>4</sup>

## **5. Internal validity revisited**

### *5.1 Review of the literature*

Theoretical (or internal) validity involves assessing the degree to which the findings of a study are consistent with theoretical expectations (Mitchell and Carson, 1989).<sup>5</sup> While tests of internal validity cannot provide direct answers to questions about the magnitude of hypothetical bias as posed in the previous section, they may help to disentangle the factors affecting hypothetical bias in stated preferences for public goods. In the following, results from the most important approaches to internal validity are reviewed in turn.

*Income effects.* — Mitchell and Carson (1989) write:

“Theoretical validity is most commonly measured by regressing some form of the WTP amount on a group of independent variables believed to be theoretical determinants of people’s willingness to pay from the good being valued. The size and sign of the estimated coefficients are then examined and judged to be consistent or inconsistent with theory.”

The most common explanatory variable in these regressions is respondent income. McFadden and Leonard (1993, p. 185) suggest that an income elasticity of willingness to pay less than

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<sup>4</sup> Hypothetical bias in voluntary contributions (see preceding footnote) cannot be directly explained with working hypotheses 1 and 2. However, there is evidence suggesting that access to informative cues – about the donation behaviour of other individuals – play an important role also in choices about voluntary contributions (Frey and Meier, 2004).

<sup>5</sup> A notable peculiarity of the CV literature is that it does not distinguish between theoretical expectations regarding stated choices involving hypothetical cost figures and theoretical expectations regarding actual choices involving actual cost figures.

unity constitutes grounds for doubting the validity of contingent valuation surveys. Studies compiling income effects or income elasticities of WTP reported in stated preference surveys typically find surprisingly low values. Kriström and Riera (1996) who analyse six European CV datasets and Horowitz and McConnell (2003) who report elasticities for twelve datasets each find income elasticities of WTP in CV surveys to be around 0.1–0.4, if statistically significant at all. Hökby and Söderqvist (2003) compile twenty-one elasticity estimates from CV studies in Sweden and find values generally much below one. However, the voting-based studies by Schläpfer and Hanley (2003) and Schläpfer and Witzig (2006) find that income elasticity of WTP for environmental public goods is greater than one, since voter support for public financing propositions did not decrease with increasing income in spite of a progressive relevant tax schedule. Their elasticities are comparable in magnitude to the demand elasticities found in the median voter studies by Borchering and Deacon (1972) and Bergstrom and Goodman (1973) and much higher than those typically found in CV surveys (Schläpfer, 2006).

*Sensitivity to scope.* — Theory is often silent about the appropriate value of the coefficients on explanatory variables in regressions of WTP. This is unfortunate in the case of the income effects discussed above, but it seems to be even more problematic in studies of ‘scope sensitivity’, or ‘part-whole bias’, as comparable estimates of scope effects from actual choices about public goods are not available. Hanemann (1994) reports that a large majority of stated preference studies testing the effects of the scope, or amount, of the proposed good found significant effects. However, there are also notable exceptions (Boyle et al., 1994; Dubourg et al., 1997; McFadden, 1994). McFadden (1994), for instance, reports on a split-sample comparison where WTP for preserving 57 wilderness areas was only about 50% higher than for a single wilderness area. Similar sub-additivity is also found in within-sample comparisons (Hanley et al., 2003). However, very low sensitivity to scope could still be tentatively accommodated with “extraordinarily strong diminishing returns” (McFadden 1994, p. 702; Hanemann 1994, p. 35). Hence, in terms of theoretical validity, rather limited insights have been gained from these studies.

*Anchoring.* — The standard use of dichotomous-choice questions in stated preference surveys is based on the assumption that the hypothetical costs which survey participants are asked to consider should have neutral effects on the welfare estimates derived from the responses (Boyle et al., 1997). However, empirical evidence suggests that responses may be systematically influenced by the magnitude of the cost figures. This phenomenon has become known as ‘anchoring’. Current evidence suggests that anchoring effects are pervasive in



contingent valuation studies (Green et al., 1998; Green et al., 1994; Gregory et al., 1993; McFadden, 1994, 2001). For instance, McFadden (2001) reports that, when the bid levels were increased by 1\$, mean stated willingness to pay increased by 19 cents. As a theoretical explanation, Boyle et al. suggest a mechanism in which respondents adjust a prior value – the value they would state in an open-ended question – on the basis of the presented costs (Boyle et al., 1997; Herriges and Shogren, 1996). This explanation is compatible with verbal protocol studies which suggest that respondents take the presented hypothetical costs as an indication of the actual costs (and thus perhaps quantity or quality) of the described good (Chilton and Hutchinson, 2003; Clark et al., 2000; Green et al., 1998; Schkade and Payne, 1994) or the size of a ‘fair share’ contribution (Green et al., 1994; Schkade and Payne, 1994).

### *5.2 Consistency with the working hypotheses*

Working hypothesis 1 states that survey respondents are unable to form consistent preferences about unfamiliar goods from the raw product or policy information, unless the choice context offers reliable, informative cues that can be rationally exploited in simplified heuristics. Exceedingly low income effects, anchoring effects, and scope insensitivity in survey responses about unfamiliar public goods can all be at least partly explained by working hypothesis 1. As the respondents in surveys about unfamiliar public goods do not have access to reliable, informative contextual cues that could be rationally exploited in simplified heuristics they may resort to heuristics based on other available cues, such as the presented arbitrary cost figures. Hence, sensitivity to relevant factors such as the amount of the good may be too low while irrelevant factors may affect the responses.

The explanation of exceedingly low income effects, in the context of working hypothesis 2, is more complicated. The mechanism causing the effect may involve anchoring effects (and/or mental adjustments on incredible costs) that are different across income levels (see Schläpfer, 2006; Flores and Strong, 2007; Schläpfer and Bräuer, 2007). Since anchors in the form of hypothetical cost figures in standard surveys are the same for high and low incomes, the anchoring causes willingness-to-pay values of high and low incomes to converge. This naturally results in the artefact of (too) low income effects. A similar effect results from updating behavior by respondents with different incomes. High (low) incomes with their high (low) expected tax bills will update the hypothetical cost figures upward (downward) and essentially answer different questions than those posed by the survey researcher.

## 6. Implications

To sum up, these findings suggest a consistent explanation of hypothetical bias in the contingent valuation of public goods: As Lupia (1994) and other political scientists concluded from their correlative evidence, voters use simplified heuristics based on informative contextual cues provided by reputable information providers to make choices that are in line with their interests and values. Left to their own devices, i.e. in self-contained surveys, many respondents “do not know their preferences” which explains the well known empirical phenomena such as inflated willingness to pay values (Schlöpfer and Hanley 2006) and “insensitivity to scope” or “part-whole bias” (Boyle et al.; 1994, Hanley et al., 2003). Many respondents “anchor” their choices on non-informative cues such as the hypothetical costs presented in surveys (e.g. McFadden, 1994; Schlöpfer and Schmitt, 2007). And many do not believe that the presented cost figures correspond to the costs if the policy is implemented (Champ et al., 2002) and may update these figures based on knowledge of their true annual tax bill (Flores and Strong 2007). Naturally, the direction of the anchoring or updating is then systematically correlated with respondent income and produces those exceedingly low income effects observed in stated preference surveys (see Schlöpfer, 2006; Schlöpfer and Bräuer, 2007). Hence, all of the major inconsistencies observed in the contingent valuation of public goods can be traced back to the random-cost design and/or the lack of reliable, informative cues which could be used for reasoned decisions based on simplified heuristics.

In the following, implications of the hypotheses for information provision and bid design will be discussed.

### *6.1 Implications of hypothesis 1: information provision*

In contrast to direct-legislation decisions, stated preference surveys about public policies do not trigger a public debate in a well-defined social choice context. They do not generate an open competition of arguments among policy experts representing different interests. As a consequence, survey respondents do not have access to credible expert information about the likely personal consequences of complex policies proposed in a survey. This has two important implications.

First, without the advice from policy experts with known political orientation, even relatively well-informed citizens may simply have too little information about the likely consequences of the offered alternatives in order to make an informed decision. This alone would not be a severe problem if the resulting response distribution would be centered on the true value. However, the psychological evidence on the use of heuristics by uncertain respondents strongly suggests that these responses are unlikely to be centered on the true value. Hence, the data cannot be properly interpreted unless the proportion of insufficiently informed respondents is very small. Evidence from the verbal protocols and from surveys by political scientists suggests that this proportion can be large.

Second, transparency is greatly diminished compared with an actual referendum. Respondents have no opportunity to check whether the survey contains a balanced presentation of the issue. If the level and type of information provided has an influence on survey results, as the empirical evidence shows, then the information monopoly of the survey researcher greatly undermines the credibility of the survey results. The situation is quite different in actual referenda in modern democracies, where information context is generated through a free competition of arguments.

These issues suggest that surveys about unfamiliar public goods should offer the respondents reliable contextual cues such as positions or arguments provided by reputable experts with known ideological orientation.

## *6.2 Implications of hypothesis 2: bid design and incentives*

In dichotomous-choice contingent valuation questions with costs ranging typically from about \$1 to \$500, the difference between the presented costs and the actual individual costs of the policy can be so substantial that respondents may realize their strategic opportunities.

Moreover, even respondents without strategic intentions may ‘update’ these costs based on their expectations of actual costs and, effectively, answer different questions than those posed by the survey researcher (Champ et al., 2002; Flores and Strong, 2007). There are indications that many survey respondents do not realize strategic opportunities, even if such opportunities exist (Green et al., 1998; Smith, 1979). However, it is not sufficient in this case if “most” respondents obey certain behavioral assumptions. The challenge is thus to strike the proper balance – in experimental designs – between probing a sufficiently wide range of cost figures and keeping these cost figures within a credible range.

A promising way to reduce or eliminate strategic answering is thus to keep the presented costs close to the individuals' *actual* costs if the policy is implemented (Schlöpfer, 2006; Schlöpfer and Bräuer, 2007). Given respondents with widely different tax bills, this can be achieved by specifying the costs as a *percentage* (rather than absolute) increase in taxes.<sup>6</sup> The percentage formulation allows the researcher to use a relatively narrow, credible range of costs which nevertheless fully covers the relevant range of costs for respondents of all levels of income. This is implemented in Schlöpfer and Schmitt (2007), Schlöpfer and Soliva (2007) and Schlöpfer et al. (in press). To facilitate the task of the respondents, Schlöpfer and Schmitt (2007) and Schlöpfer and Soliva (2007) included a table showing, for different levels of the annual tax bill, the absolute money amount corresponding to the presented percentage tax change. Willingness to pay can then be identified based on the binary choices and standard information about the respondents' income or tax payments. As a further consequence, the artefact of extremely low income effects (see Sections 5.1 and 5.2) should disappear.<sup>7</sup>

Finally, how respondents are motivated to participate in a survey should be carefully considered. For many survey respondents – as also for voters – norms of civic duty and reciprocity towards the surveyors may be as important for carefully considered answers as narrow economic incentives (Hidano et al., 2005; Jones and Hudson, 2000; Stutzer and Frey, 2006).

### *6.3 Supplementary guidelines for an alternative survey methodology*

The conventional stated preference approach is based on a problematic behavioral model. In essence, the approach requires respondents who are unboundedly rational in terms of information processing while acting as fools in the face of opportunities for responding strategically. Fortunately, preference elicitation procedures can take forms that are fundamentally different from those currently established.

Based on the perception that the current empirical evidence on hypothetical bias supports the working hypotheses, I here present a set of recommendations which constitute an alternative survey approach. In these recommendations, which can be seen as amendments to those of the NOAA panel, the cognitive limitations and strategic and motivational incentives are taken into account in much the same way as in actual voting decisions (see Section 2.2).

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<sup>6</sup> An alternative approach, involving alternative cost shares of local government, is proposed by Strong and Flores (in press).

<sup>7</sup> This prediction is empirically confirmed in Schlöpfer et al. (in press) where willingness to pay expressed in tax percentages is similar for low and high income respondents.

The proposed approach is thus also consonant with the conclusion by Payne et al. (1999) who suggest “context matching” as a guiding principle for achieving correspondence between stated preferences and the preferential behavior of interest (see Section 2.1).

(1) For tax-financed public goods the costs in the dichotomous questions should be specified as a credible *percentage* change in taxes. Credibility of the costs should be checked and demonstrated in pre-test surveys.<sup>8</sup>

(2) The questions should be formulated as a policy referendum. The respondents (or at least a subsample of the respondents) should be offered access to information about the positions of reputed policy experts from a wide range of political parties and interest groups with known political orientation. This information must be solicited based on the original, final questionnaire. Organizations refusing to provide their positions should also be mentioned in the information supplied to the respondents. (The comparison of survey responses with and without the party information then provides a check of how well the isolated choices predict the decisions in a vote with competing information providers.)

(3) The respondents should not be urged to answer immediately, and the no-vote option should be salient. Due to the special legitimacy of public votes, response rates higher than typical turnouts in actual votes are unlikely to improve the political legitimacy or legal standing of the survey results. Participation rates and self-selection bias should be demonstrated to be similar to the situation in comparable actual voting decisions (cf. Jakee and Guang-Zhen, 2006).

This new survey paradigm promises to solve the major problems of the conventional contingent valuation approach. At least partly, it eliminates the severe restriction on the sources of information available to the respondents; it breaks up the information monopoly of the researcher; it presents the costs of the good as a credible change in taxes or other payments rather than as often incredible absolute amounts; it thereby greatly reduces the possibility that respondents do not believe the costs presented in the survey and hence the likelihood and leverage of strategic responses; and the increased publicity of the survey process provides incentives for a careful survey design and administration.

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<sup>8</sup> There is no doubt that recommendation (1) places some restrictions on the survey researcher’s ability to elicit willingness to pay distributions. However, to recall, such restrictions appear to be inevitable because they are inextricably connected with the objective of credible questions and reduced opportunities for strategic answers.

## 7. Conclusions

The NOAA panel report on contingent valuation suggests the public voting decision as a “blueprint” for survey design (Arrow et al., 1993). Ironically, the panel failed to note two central implications of the voting analogy. With regard to the issue of information provision and processing, the implication is to give the survey respondents access to the same type of competitive political information environment to which voters are exposed in actual elections. With regard to the incentive issue, the implication is to use referendum questions involving *credible* costs – and thus minimal opportunities for strategic answering.

Surprisingly, in light of the introductory quote by Manski, the standard explanation of “hypothetical bias” in stated preferences for public goods – the non-binding nature of survey responses – appears to be misleading. This is evident from the simple fact that voter polls conducted shortly before ballot decisions reliably predict the actual decisions despite their non-binding nature. The failure of the conventional stated preference approach to predict actual votes can instead be explained by two other problems: (i) the cognitive limitation of the respondents who do not have access to reliable, informative contextual cues and (ii) the presentation of (hypothetical) policy costs that differ from the expected costs if the policy is actually implemented.

The important conclusion from this new perspective is that the problems of conventional stated preference approaches can be largely resolved, as explained in the preceding section. Challenges for future research are (i) to find the proper balance between keeping the range of (hypothetical) costs in the referendum questions sufficiently wide to identify willingness to pay, while also assuring that these costs remain credible, (ii) to precisely investigate the conditions under which competing parties and interest groups provide reliable contextual cues (see e.g. Lupia and Matsusaka, 2004) and hence establish accepted standards for generating and presenting party and interest group positions, and (iii) to develop the statistical methods for estimating willingness to pay from income/tax heterogeneity and responses to proposals involving a percentage change in taxes.

The conventional contingent valuation method has failed to account for the cognitive limitation of isolated respondents and the resulting importance of simplified heuristics and social interactions in the formation of preferences for public goods (Ascher and Steelman, 2006; Gowan et al., 2006; Gowdy, 2004 and 2007; Green et al., 1994; Kahneman and Knetsch, 1992; Morgan, 1978; Shabman and Stephenson, 1996; Soderholm, 2001; Spash, 2002; Spash and Hanley, 1995; Vatn, 2004). The proposed new survey paradigm, in contrast,

is based on a behavioral model that is compatible with a wealth of positive empirical research on human decision making in economics, economic psychology and the political sciences. Compared with other deliberative approaches to environmental valuation (see e.g. MacMillan et al., 2002; Spash, 2007) the proposed survey process may have the advantage of an increased public acceptance due to its similarity with democratically established institutions for opinion formation and decision-making in the political domain.

### **Acknowledgements**

I thank the participants of many seminars and conferences and particularly Nick Hanley, Jason Shogren, Noboru Hidano, Sue Chilton, George Hutchinson, Nick Flores, John Loomis, Patty Champ and Ingo Bräuer for discussions that helped me develop the ideas presented in this paper. Jürgen Meyerhoff and two anonymous reviewers provided very valuable comments.

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Table 1. Predictions about hypothetical bias in preference surveys

Hypothesis 2	Hypothesis 1	
	<i>No</i> informative cues available	Informative cues available
Large disparity of presented and actual costs	large bias	medium bias
No disparity of presented and actual costs	medium bias	small bias

Table 2. Effects of framing (Kahneman and Tversky 1984)

Experiment 1	Choice	Experiment 2	Choice
A:		C:	
200 people saved	72%	400 people die	22%
B:		D:	
600 saved with probability 1/3		0 die with probability 1/3	
0 saved with probability 2/3	28%	600 die with probability 2/3	78%



Table 3. Percent voting Yes in five auto insurance reform propositions in California (Lupia 1994)

Propo- sition no.	Respondent category		
	High-knowledge respondent with knowledge of insurance industry preferences	Low-knowledge respondent with knowledge of insurance industry preferences	Low-knowledge respondent without knowledge of insurance industry preferences
100	53	53	27
101	8	5	15
103	72	73	26
104	17	17	34
106	11	12	45

Table 4. Percentage of respondents voting Yes in a survey experiment on an environmental policy proposal (Schlöpfer and Soliva 2007)

Respondent group (party preference)	Information treatment	
	<i>Without</i> access to party and interest group positions	<i>With</i> access to party and interest group positions
Right-wing	75 (48)	34 (35)
Left-wing (including green)	75 (54)	90 (58)

*Note:* Numbers in parentheses are sample sizes.

Table 5. Empirical estimates of hypothetical bias (calibration factors) in preference surveys (cf. Table 1)

	No informative cues available	Informative cues available
Large disparity of presented and actual costs	<i>Standard CV applied to public goods:</i> -Schlöpfer and Hanley (2006): 6–50	<i>(no study so far)</i>
No (or minor) disparity of presented and actual costs	<i>CV with realistic percentage change in taxes:</i> <sup>a</sup> -Schlöpfer et al. (in press): 2–10	<i>Pre-election polls:</i> <sup>b</sup> -Johnston (2006): ~ 1.0  <i>CV applied to private goods:</i> <sup>c</sup> -Carson et al. (1996): 0.9 -List and Gallet (2001): 1.3

<sup>a</sup> Compared to a treatment in which respondents received information about party and interest group positions.

<sup>b</sup> Compared to the actual referendum outcome.

<sup>c</sup> Hypothetical vs. actual choices about private goods in which knowledge about market prices may act as contextual cues.

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