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ANALYSIS

Theoretical incentive properties of contingent valuation questions: Do they matter in the field?

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ABSTRACT

Green et al. (1998) [Green, D., Jacowitz, K.E., Kahneman, D., McFadden, D., 1998. Referendum contingent valuation, anchoring, and willingness to pay for public goods. Resource and Energy Economics 20 (2), 85–116] 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. One key element of such a theoretically incentive–compatible framing is that the (hypothetical) decision rule specified in the survey instrument is understood to be a majority rule rather than the efficiency rule typically used in cost–benefit analysis. We conducted field experiments in Germany and Switzerland to test if a referendum framing as suggested by Green et al. is effective in reducing strategic misrepresentation in a contingent valuation setting. We did not find the expected effects of the framing treatments on stated willingness to pay or on individuals' (stated) beliefs about the social choice context. The results do not support hopes that a theoretically incentive compatible framing could be purposefully used to invoke the specific beliefs about the linkage between responses and policy implementation that would make stated preference questions incentive compatible.

1. Introduction

Unresolved incentive compatibility issues are an important weakness in the theoretical underpinnings of the contingent valuation method. In 1993, the NOAA Panel on Contingent Valuation recommended the use of a hypothetical referendum question format in surveys designed to estimate losses associated with natural resource damage (Arrow et al., 1993). A hypothetical referendum question asks, for example, "If your personal tax cost for program A were $D per year, would you vote for the program?" The panel recommended the hypothetical referendum format, because, "[…] as far as strategic reasons go, a respondent who would not be willing to pay D dollars has no reason to answer 'Yes', and a respondent who would be

willing to pay D dollars has no reason to answer 'No'" (p. 4606). Contingent valuation (CV) questions posed in a referendum format with a tax as the (hypothetical) payment mechanism are widely perceived as incentive compatible by CV researchers today (Hoehn and Randall, 1987; Mitchell and Carson, 1989; Arrow et al., 1993; Hanemann, 1994; Carson et al., 2000; Taylor et al., 2001; Champ et al., 2002; Horowitz and McConnell, 2002). Only few authors have noted the panel's mistake (e.g. Diamond and Hausman, 1994; Fisher, 1996; Green et al., 1998; Posovac, 1998; Burton et al., 2003). Fisher (1996), for instance, notes that "[…] the case for closed–ended CV responses being free of strategic bias has not been made either in theory or by empirical findings" (p.26). Green et al. (1998) find "[…] that patterns of response to open–ended and referendum questions that are

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often taken as evidence of incentive–induced misrepresentation are in fact present in situations where there are no economic incentives" (p. 95). Unfortunately, the CV studies comparing responses to open–ended *vs.* dichotomous choice questions do not directly address the incentive compatibility issue, since potential effects of the question format on incentives cannot be distinguished from other potential effects of the question format (e.g. Brown et al., 1998).

Previous designed experiments on public good provision and incentives have been conducted in laboratory settings (Andreoni, 1988; Andreoni and McGuire, 1993; Cummings et al., 1995; Burton et al., 2003). Experiments have demonstrated that in early rounds, subjects do not free–ride to the extent predicted by theory. In later rounds, free–riding becomes prevalent. These laboratory studies used private goods or (group) donations and, therefore, did not need to worry about the issues that come into play when stated preferences for collectively provided public services are concerned. The incentive properties in private good choices and also in group donation decisions (Cummings et al., 1997) do not depend on the complex linkages between the responses, outcomes and division of costs which complicate individual decision making in a social choice context. In particular, stated preference elicitation in a social choice context must take into account that respondents may not always accept (believe) the social choice framework as posited in a survey.

Green et al. (1998) find that – if a CV experiment can be set up in such ways that an economically rational subject believes there is a positive probability of being decisive – it is possible to frame the elicitation such that *if* the subject accepts the frame the pay–off maximizing response will be to answer truthfully. However, the authors emphasize that subjects may hold beliefs about the social choice context that induce misrepresentation, *because* of a particular framing or in spite of it. The paper by Green et al. (1998) is to our knowledge the first to fully identify the elements of the posited social choice framework – or more precisely, the respondent *beliefs* concerning these elements – which jointly determine the incentive properties of preference elicitation for collectively provided public services[1]. These elements concern the *decisiveness of the response*, the *decision rule*, the *payment vehicle* and the *uncertainty about actual costs*, as detailed in the following section. The aim of the present study is to test the empirical relevance of Green et al.'s theoretical results regarding the role of these elements for the incentive properties of preference elicitation in a field setting. Our strategy is to design a field experiment in which the important elements of the survey frame identified by Green et al. (1998) can be manipulated individually. We then test how these manipulations affect both stated beliefs and willingness–to–pay (WTP) responses.

We asked the following specific questions: (1) How do specifications of the survey frame concerning (i) majority *vs.* mean rule, (ii) cost uncertainty, and (iii) decisiveness of the survey affect (a) beliefs about the social choice context and (b) stated WTP. Since cultural differences may affect the attitudes to valuation surveys (e.g. Loomis et al., 2002) we conducted these tests in two locations with different political institutions and cultures.

The remaining paper proceeds as follows: Section 2 presents the conceptual framework. Sections 3 and 4 contain the method and results. Sections 5 and 6 present the discussion and conclusions.

2.   Conceptual framework

Whether CV respondents think and act strategically is an empirical question (Cummings et al., 1995, 1997). There are several reasons why strategic misrepresentation could be quantitatively unimportant in standard referendum CV surveys applied to collectively provided public goods (Smith, 1979). First, subjects confronted with referendum–format questions may not perceive their strategic opportunities. Second, subjects may be influenced by norms that prevent them from misrepresentation (Green et al., 1998, p. 91). Third, individuals may simply believe that their response is inconsequential. However, based on theoretical grounds, more general claims that the CV referendum protocol is incentive compatible are misleading (Green et al., 1998; Riera, 2003; Burton et al., 2003).

In the following, we will call a social choice framework posited in the survey protocol (hereafter for simplicity also called the "frame") "theoretically incentive compatible" (TIC) if the payoff–maximizing response of a rational respondent who *accepts* this frame is to answer truthfully.[2] Following Green et al. (1998, p. 92) a TIC frame would comprise the following elements:

(1) *decisiveness*: the response affects the probability of implementation;
(2) *decision rule*: the probability of implementation is proportional to the survey plurality for the policy, given a pre–specified distribution of the costs;
(3) *payment vehicle*: the payment vehicle is 'decoupled' implying that the costs will be distributed across tax payers by a formula that does not depend on the response;
(4) *cost uncertainty*: the actual individual costs burden if the policy is implemented could be above *or* below their true WTP for the policy.

Concerning element (2), Baron (1996, p. 153) suggests how this can be implemented in a survey: "Specifically, we can tell [the respondents] that their WTP will be compared to their fair share of the cost of the good. If more than half of the

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[1] Riera (2003), in turn, is the first to present a systematic theoretical treatment of incentive properties of various stated preference methods and question formats, although (as Riera admits) the study does not consider important issues concerning respondents' perception of the relevant social choice framework. Riera's perhaps most important theoretical result is that, if a set of general assumptions about the social choice framework hold, the median–rule open–ended CV format is incentive compatible. This result is consistent with the conclusions of Green et al. (1998).

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[2] One could also use the term theoretically demand revealing". We use TIC to remain close to the terminology used by Green et al.