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Individual contributions, provision point mechanisms and project cost information effects on contingent values: Findings from a field validity test

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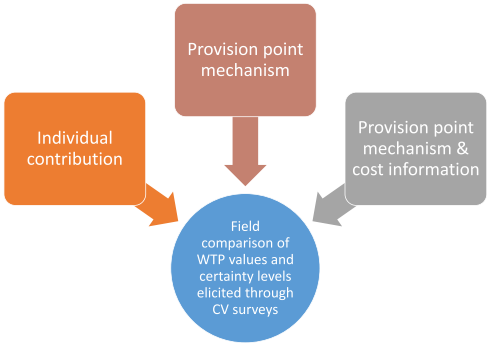
HIGHLIGHTS

- A three-way split sample CV survey examines three different donation mechanisms
- Individual contribution and PPM do not result in significantly different WTP values
- WTP values estimated through PPM are not affected by project cost information
- PPM has a positive effect on respondents' certainty level.
- The respondents' certainty level is not affected by project information cost

GRAPHICAL ABSTRACT



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ABSTRACT

In many instances, Contingent Valuation practitioners rely on voluntary monetary contributions, despite the fact that they are deemed to be neither incentive compatible in theory nor demand revealing in practice. The reason is that they are suitable for most field applications and offer benefits that may outweigh their drawbacks. This paper endeavors to contribute to the literature by exploring the effect of donation payments with differing incentive structures and information levels on contingent values and on respondents' uncertainty regarding the donations declared. To this end, a field survey was conducted using a sample of 332 respondents who were randomly assigned to one of three different mechanisms: (1) individual contribution (hereinafter CVM treatment); (2) individual contribution with provision point mechanism (PPM), where the total cost of the project is unknown (hereinafter PPM treatment); and (3) individual contribution with PPM, where the total cost of the project is known (hereinafter PPM-INF treatment). The results indicate that there are no statistically significant differences in willingness to pay (WTP) estimates between the CVM and PPM treatments nor between the PPM and the PPM-INF treatments. The results also indicate that the PPM has a positive effect on respondents' certainty level, but there is no evidence that the certainty level is affected by the project information cost. The results are mixed compared to previous research efforts. Thus, further tests are necessary in field comparisons and under different information environments before any definite recommendations can be made.

1. Introduction

Government decisions about the environment involve trade-offs between environmental, economic and social objectives. Weighing up

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these trade-offs is challenging, because environmental benefits - particularly those that are not reflected in market prices - are difficult to value. As environmental issues become more critical and detrimental, environmental economics is playing an increasingly central role in informing environmental policy around the world.

Over the past decades, the field of environmental economics has developed a rich and extensive literature that advances the theory and practice of non-market valuation. Among the existing methods, the Contingent Valuation (CV) has gained wide acceptance and has been used by government agencies and international organizations around the world, especially in the areas of environmental cost-benefit analysis for restoration activities, compensation projects, sustainability policies, etc. (Mitchell and Carson, 1989; Carson, 2004; Carson and Hanemann, 2005; Zhao et al., 2013; Boithias et al., 2015; Rupérez-Moreno et al., 2015). To wit, it is estimated that there are over 7500 papers and studies utilizing the CV method (Carson, 2011).

The CV approach is a survey-style technique that explores respondents' maximum willingness-to-pay (WTP) for preserving an environmental asset (or reverting its loss) or their minimum willingness to accept (WTA) for suffering the loss of that asset. It relies on a hypothetical market discussed through structured questionnaires, which contain issues about the investigated good, in relation to environmental and social conditions. The CV method holds certain advantages over market-based and revealed preference valuation approaches. It is capable of capturing non-use values, non-market use values or both; it is an inherently flexible technique and, thus, it can be used in estimating the economic value of variety of environmental and other non-market assets; and the elicited WTP values go directly to the theoretically corrected measures of utility changes (e.g. Walsh et al., 1984; Choe et al., 1996; Niklitschek and Leon, 1996; Perman et al., 2003).

Despite its strengths, the method is subject to criticism that evolves mainly around the validity, accuracy and reliability of the results (e.g. Diamond and Hausman, 1994; Navrud and Pruckner, 1997; Ajzen et al., 2004). This is on account of potential problems including information bias, design bias, hypothetical bias, yea-saying bias, strategic bias, embedding effects, etc. (Bateman et al., 2003; del Saz-Salazar et al., 2009 & 2015a). Relatively recently, Hausman (2012, p. 54) contended that "*despite all the positive-sounding talk about how great progress has been made in contingent valuation methods, recent studies by top experts continue to fail basic tests of plausibility*". Others, however, dispute negative criticisms, claiming that the method can provide a reliable basis for estimating the economic value of non-market goods, as the overall process has been improved thanks to the progress made in the field of experimental and behavioral economics (e.g. Carson, 2012; Kling et al., 2012). In consistency with this, Carson (2012) argues that "*the time has come to move beyond endless debates that seek to discredit contingent valuation and to focus instead on making it better*".

This paper endeavors to contribute to this body of literature by exploring the effect of donation payment mechanisms with differing incentive structures and program cost information on contingent values. Though the main focus lies on WTP values, debriefing questions were also used to investigate the effect of the elicitation mechanisms on respondents' uncertainty regarding the donations declared. The aim is not to examine if ex post calibration of contingent values results in approximation of actual donations, nor to suggest a calibration approach. Rather, the study in the light of the ongoing calibration debate wishes to examine whether or not different elicitation mechanisms are associated with differences in respondents' stated certainty levels.

For the purposes of the study, a field survey was conducted in Lavrion Municipality (Greece) by applying the CV method to elicit residents' WTP values for a Managed Aquifer Recharge (MAR) project. Three population subsamples were used to test three different voluntary contribution mechanisms, as follows: (1) individual contribution; (2) individual contribution with provision point mechanism (PPM), money back guarantee and proportional rebate rule, where the total cost of the project is unknown; and (3) individual contribution with PPM, money back guarantee and proportional rebate rule where the total cost of the project is known.

To the authors' knowledge, there are only two attempts where the relative performance of an individual contribution and a PPM has been investigated in a field setting (Champ et al., 2002; Walker, 2011). Furthermore, it is the first time that a field survey is implemented to examine whether these three different elicitation mechanisms affect respondents' self-reported certainty level of paying the stated WTP. To this end, it adds to the limited evidence that exists on the effect of information in PPM experiments (Marks and Croson, 1999).

The rest of the paper is structured, as follows. Section 2 discusses in brief the previous literature in the hypothetical and strategic biases in CV estimates, the role of information and the provision point mechanisms (PPM) and presents the hypotheses used to test the effect of donation payment mechanisms on WTP values and respondents' certainty levels. Section 3 outlines the experimental design and the statistical procedures used. Section 4 presents the results of the study regarding the effects of the elicitation strategies. Finally, Section 5 concludes with the main lessons learned and provides suggestions for future work.

2. Literature review and problem statement

2.1. Past literature

One of the more troubling empirical results in the CV method literature is the divergence between the real and hypothetical payments, known as hypothetical bias (Cummings et al., 1986). While the empirical evidence is not conclusive, the majority of experimental studies suggests that hypothetical WTP values overestimate real WTP values (e.g. Cummings et al., 1995; Cummings et al., 1997; Blumenschein et al., 1997; Blumenschein et al., 2008). This result has been also found in a variety of applications including private goods and public goods (e.g. List and Gallet, 2001; Lusk and Norwood, 2009; Caudill et al., 2011). The finding of hypothetical bias has motivated research to investigate study design factors affecting hypothetical bias (e.g. List and Gallet, 2001; Little and Berrens, 2003; Murphy et al., 2005a) and to develop techniques that either eliminate or adjust for hypothetical bias. Despite all of the empirical work done, there is still no widely accepted theory of hypothetical bias in stated preference surveys (Common et al., 1997; Rekola, 2003; Murphy et al., 2005a; Shogren, 2005; Harrison, 2006; Shaikh et al., 2007; Svedsater, 2007; Loomis, 2014). There are, however, several plausible hypotheses about how a person may respond when asked how much she would hypothetically pay for a particular public good. Including information about uncertainty into the welfare model was first proposed by Hanemann (1996). Since then, a variety of empirical measurement and treatment methods have been developed and applied both ex ante, e.g. cheap talk, incentive alignment, instrument calibration, and ex post, e.g. certainty scales or calibration of WTP responses (e.g. Carson and Groves, 2007; Loomis, 2014). The latter construct a numerical certainty scale (e.g. Champ and Bishop, 2001; Champ et al., 1997; Loomis and Ekstrand, 1998; Lyssenko and Martínez-Espiñeira, 2012) or a percentage certainty scale (e.g. Brouwer, 2012; Chang et al., 2007; Li and Mattsson, 1995; Li et al., 2009), using the information obtained from the answers to follow-up questions. These values are then used to recode the answers to the payment question or to weight the individual observations in the likelihood function. While each method springs from a different hypothesis, they are not necessarily inconsistent with one another. Indeed, some recent research efforts have combined different ex ante methods or ex ante and ex post methods (e.g. Whitehead and Cherry, 2007; Jacquemet et al., 2013; Vargas and Diaz, 2014).

The strategic bias arises when respondents intentionally misrepresent their preferences in order to influence a particular outcome. There are two forms of strategic behavior, namely, free-riding and overpledging (Mitchell and Carson, 1989). Free-riding (or cheap-riding) occurs when an individual understates her true WTP on the