



Real-payment choice experiments: Valuing forested wetlands and spatial attributes within a landscape context



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ABSTRACT

We consider the choice experiment approach to valuation, due to its focus on tradeoffs between alternatives. Our study is not hypothetical, but implements a real-payment choice experiment (CE) for a multi-attribute good. We use two real wetland parcels to create over 18 descriptions of parcels for conservation under a 10-year development-rights contract. Our payment protocol mitigates incentives to understate willingness to pay through a provision point with a rebate of excess funds. Real choice questions captured significant values for spatial attributes of wetland conservation. Average respondents positively valued 73-acre parcels surrounded by woodland, but required 100 acres for parcels surrounded by residential or farm land, and accepted a 19-acre smaller parcel in exchange for full public access.

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1. Introduction

The economics literature frequently shows a divergence between hypothetical willingness to pay in stated preference valuation and actual, voluntary payments from individuals (e.g., Adamowicz et al., 1994; Blumenschein et al., 1998; Brown et al., 1996; Champ and Bishop, 2001; Champ et al., 1997; Johannesson et al., 1998; List and Shogren, 2002; Loomis et al., 1996; Murphy et al., 2005; Neill et al., 1994; Spencer et al., 1998; Taylor, 1998). Of course, valuation can be a critical element of policy analysis, particularly when benefit–cost analysis involves the analyst's judgment within the state-of-the-art of empirical work (Krutilla, 1981; Portney, 2004). The controversies surrounding stated preference valuation (e.g., Arrow et al., 1993) might be mitigated if economists could produce estimates of Hicksian willingness to pay (WTP)² based on actual payment made for public goods.

We consider the choice experiment approach to valuation, due to its advantage in focusing participants' attention on attributes of and tradeoffs

between alternatives in a choice (Adamowicz et al., 1998; Bennett and Blamey, 2001). However, our study is not hypothetical. Rather, it is a proof-of-concept involving real choices and real payments. We demonstrate how a real-payment choice experiment (CE) could be used with a multi-attribute, complex good for which there might be very few deliverable units under the control of the analyst.

Our application concerns wetland valuation for the protection of forested parcels at risk of development in Rhode Island, USA. This application includes spatial attributes relevant to conservation of biodiversity, showing that people value attributes related to spatial connectivity. If the researcher can offer available units of a public good for actual delivery, and the units are sufficiently heterogeneous, then it is feasible to estimate attribute values through a controlled choice experiment.

Furthermore, we implement payment rules intended to mitigate the incentives for individuals to choose strategically in order to minimize personal cost. Since our payment mechanism is not incentive compatible,³ we will not claim here to estimate full Hicksian WTP. Yet, we derive our estimates from a real financial commitment by respondents,

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² Sir John Hicks (1943) established WTP as the maximum amount of money (disposable income) an individual would sacrifice in order to gain a desirable change or good (rather than foregoing the change). Throughout the paper, we use WTP to refer to this Hicksian concept of economic value. However, we note that the concept is easily adapted to "valuation" in non-monetary units if one considers an individual's willingness to sacrifice units of one desirable good in order to obtain a change.

³ Incentive compatibility refers to a choice situation in which individual's incentives are fully aligned with the choice to indicate which option they value most highly. For example, if an individual faces a choice to conserve (and pay costs toward) either wetland Parcel A or Parcel B or neither (a no-action alternative at no cost), and he or she most prefers Parcel A but chooses Parcel B due to a belief that choosing B substantially reduces the chance that a policy maker would take the no-action alternative that this individual prefers least, then the choice-context would not be considered incentive compatible: the individual might gain a better outcome by mis-representing his or her preferences than the outcome that could occur if the individual reveals his or her actual preferences.

so that it may be reasonable to interpret our estimates of value such that Hicksian WTP would equal or exceed our estimates: our respondents actually had to pay, and theoretically would not have paid more than full Hicksian WTP.⁴ In this sense, our study strives to estimate a credible value at or above which full Hicksian WTP resides.⁵

Our payment mechanism draws on the experimental economics literature. We solicited payment with the understanding that there is a “provision point,” or a binding funding target, that total contributions aggregated across survey respondents must meet in order to implement land protection through a development-rights contract with the landowner. Therefore, the survey gave respondents a money-back guarantee (MBG) in case total contributions fell short of the provision point. In addition, if total contributions exceeded the provision point, the payment mechanism would generate a rebate to respondent-contributors in proportion to their contribution; that is, the mechanism involved a proportional rebate of excess funds.

Poe et al. (2002) and Rose et al. (2002) review literature on provision point mechanisms, while Marks and Croson (1998), Rondeau et al. (1999, 2005), and Spencer et al. (2009) offer theoretical analyses and laboratory data illustrating that provision points and proportional rebates reduce incentives to free-ride⁶ and may lead contributions to converge toward full, Hicksian, willingness to pay. These studies tend to support the contention that our solicitation of real payment would capture a higher portion of Hicksian WTP than would prior solicitations for simple donations used in some studies on the validity of contingent valuation (not CE studies) (e.g., Alpizar et al., 2008; Brown et al., 1996; Champ and Bishop, 2001; Spencer et al., 1998). Nonetheless, our payment mechanism does not meet the criteria for incentive-compatibility, so that we do not claim the estimated model measures Hicksian value. Rather, we view the estimates as a lower bound for full WTP for forested wetland parcels and their attributes.⁷

Our estimated preference functions show a statistically significant effect on willingness to pay for conservation of a parcel, depending on spatial attributes, such as the forested, farmed, or residential nature of the surrounding landscape. This preference function allows an assessment of the influence of spatial attributes on the value of a given parcel or on the minimum size of a parcel for which typical respondents would be willing to pay positive amounts.

2. Experimental Procedures in Valuation: The Payment Protocol

Our CE survey instrument solicits actual payment using a protocol drawn from experimental economics studies to test mechanisms to reduce the incentives to free ride. Marks and Croson (1998; cf., Rondeau et al., 1999; Spencer et al., 2009) studied the effects of rebate

⁴ After our field experiment was implemented, Das (2007) developed criteria for a weakly incentive-compatible choice experiment. Replicating our study with her criteria might improve the estimation of Hicksian WTP, although the laboratory study of Kawagoe and Mori (2001) and additional field studies (e.g., Swallow et al., 2008) indicate that field applications may still fail to fulfill theoretical ideals.

⁵ A referee pointed out that if participants in our study had considerations of warm glow, other-regarding behavior, or sending a message to policy-makers for greater investment in wetlands by public funding, the participants may have been willing to pay above the Hicksian value for how wetlands benefit themselves. Based on our process of pre-testing the survey at the heart of this study, we believe such motivations were neither stimulated by the survey nor a dominant consideration of participants. Nevertheless, such concerns apply to nearly any survey-based study.

⁶ Here, free riding refers to the strategy available to individuals to understate their full WTP in an effort to obtain the good at a lower cost to themselves.

⁷ An anonymous referee pointed out that incentive compatibility would require the decision for wetland conservation to depend solely on the group of respondents. Taylor (1998) discusses this point relative to a closed referendum in which participants vote to require each other to donate to a particular charity; if individuals can donate outside of the voting results, the referendum would not be incentive compatible. While ours is not a binary referendum, and not incentive compatible (CE's are not incentive compatible in stated preferences either), our participants were solely responsible for the outcome for our wetland parcels. Our research grant allowed us to lower the provision point, as will be seen, but failure of respondents to achieve the provision point meant no provision and there was no outside group conveniently enabling free-riders.

rules on the contributions individuals made to a threshold public good, a threshold established by the provision point. Their rebate rules determine the disposition of any funds raised in excess of the provision point, including use to purchase additional units of the public good and rebates to contributors. They found contributions to be significantly higher under rules designating excess contributions to provide additional units of the public good, rather than designating the excess as rebates to contributors or rules giving no explicit disposition. Twilight (1993) used a ‘refundable trust’ mechanism to reduce the incentives to free ride by lowering the expected marginal cost to respondents, which brought about a more accurate revelation of the respondent's preferences. Cadsby and Maynes' (1999) study tested the money back guarantees (MBG), concluding that a high provision point discouraged contributions in the absence of a MBG, but not in the presence of a MBG. Spencer et al. (1998) used a provision point mechanism with a MBG, but no rebate, in a CE for a water-quality monitoring program, and found that hypothetical WTP was not statistically greater than WTP estimated from actual payments.⁸

The payment mechanism in the present study included a provision point (PP) linked to the cost of a contract to prohibit development of a wetland parcel for a ten-year period. Our survey did not state the provision point to respondents, but did state that it was fixed in advance, so that the outcome for any contract depended only on the respondents. Respondents were given a money back guarantee (MBG), meaning that if total contributions fell below the PP, thereby preventing execution of a contract, each person would receive a full refund. In addition, the survey described the proportional rebate mechanism, that excess contributions would be rebated to contributors in proportion to the amount each contributed. We chose this payment protocol (PP, MBG, with proportional rebate) because the studies reviewed above showed these elements reduce participants' incentives to free-ride.⁹ The survey implemented the PP, MBG, and rebate elements through the following language:

“The approach in this survey means that *if* you decide a wetland parcel is worth the requested cost for protection, and *if* you mail a check to URI (as directed in the second question), then we will either:

- (1) send you a letter indicating that we have signed a Land Conservation Contract to protect the wetland parcel you chose for 10 years, *and* we will refund your share of any left-over funds; or
- (2) send you a letter indicating that we *have not* signed a contract with the landowner, *and* we will refund your entire contribution.

The U.S. Postmaster can enforce the above promise to return excess money.”¹⁰

Our real-payment questions were presented in two treatments. One treatment provided respondents with a hypothetical question, for practice, where they could become familiar with the experience of answering a choice question before answering the real-money question. Here, we only use data from the real question in this “HR” treatment. For a separate sample of respondents, the survey presented a single real-money choice, omitting the hypothetical question; data from this treatment is designated as “RL.” We anticipate that the discipline generated by facing

⁸ In a different application-area, Messer et al. (2005) review studies using MBG mechanisms in relation to advertising and find that the relationship of the provision point to the effectiveness of advertising affects the success in raising funds.

⁹ Marks and Croson (1998) show proportional rebates lower the cost of contributing an excess dollar by the share that is rebated. We did not use “extended benefits” (which apply excess funds to providing additional units) because that approach would alter the respondent's expectations concerning the quantity to be delivered, and this study is one of valuation rather than of fund raising potential.

¹⁰ Emphasis was in the original. The parenthetical comment was removed from a survey treatment that only involved a single CE question, as described below.

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