



Are choice experiments reliable? Evidence from the lab



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HIGHLIGHTS

- We investigate if choice experiments reliably measure individuals' values.
- We measure reliability using an induced value experiment.
- Choice experiments do not reliably measure individuals' values.
- Neither task salience nor monetary incentives increase reliability.

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ABSTRACT

This study investigates whether a popular stated preference method, the choice experiment (CE), reliably measures individuals' values for a good. We address this question using an induced value experiment. Our results indicate that CEs fail to elicit payoff maximizing choices. We find little evidence that increasing the salience of the choices or adding monetary incentives increase the proportion of payoff maximizing choices. This questions the increasing use of CE to value non-market goods for policy making.

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1. Introduction

Choice Experiments (CEs) are a popular stated preference method that is applied in economics to value public or publicly-provided goods. CEs are based on Lancaster's theory of value and describe goods as a composite of several attributes or characteristics (Lancaster, 1966). For example, health care goods are described by their survival benefits, quality of life improvements or side-effects (de Bekker-Grob et al., 2012) or environmental policies by the land area protected, number of animals saved, etc. (Kanninen, 2006). CE practitioners infer respondents' value of attributes and calculate welfare estimates, such as willingness to pay (WTP) by observing choices between priced alternatives presented in questionnaires.

The methodological debate about CEs has focussed on the gap between choices with and without monetary incentives, i.e. hypothetical bias (Lusk and Schroeder, 2004; Johansson-Stenman and Svedsäter, 2008) and how to mitigate it (Carlsson et al., 2005), how to select the goods presented in the CE questionnaire (Carlsson and Martinsson, 2003), and the estimation of appropriate statistical models (see, e.g., Hole, 2011, in this journal). These studies use indirect tests because the researchers do not control for individuals' preferences, and therefore do not know how the attributes, and goods, are valued.

We provide a complementary, direct stress test of CE reliability. We bring CEs into the lab and use financial rewards to create individuals' preferences for the goods being evaluated instead of using homegrown preferences (Smith, 1976). We test the reliability of CEs when choices are hypothetical and real, i.e. rewarded with monetary incentives (see Harrison (2006) for a discussion of incentive compatibility in CEs). Our experimental results suggest that CEs fail to elicit individual's values in a simple induced value private good setting.

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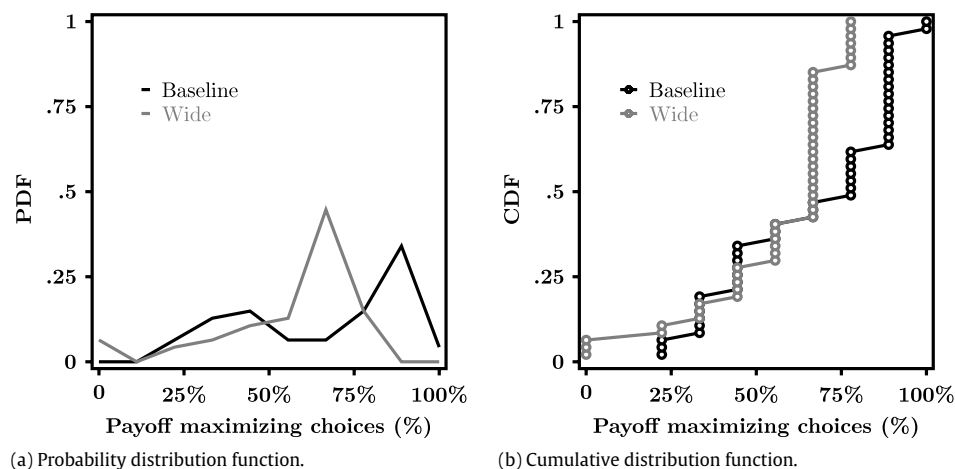


Fig. 1. Empirical distribution function of percentage of payoff maximizing choices in the BASELINE and WIDE treatments.

Table 1
Induced values for BASELINE and WIDE treatments.

Token attributes	Level	BASELINE (£)	WIDE (£)
Size	Small	1.00	0.50
	Medium	2.00	2.50
	Large	3.00	4.00
Colour	Red	0.50	1.00
	Yellow	1.00	1.50
	Blue	1.50	2.00
Shape	Circle	1.00	1.50
	Triangle	1.50	3.00
	Square	2.00	6.00
Cost		2.00	2.00
		3.00	3.00
		4.00	4.00

2. Experimental design

The induced value experiment we use mimics the salient features of a CE. Subjects' preferences are induced for a multi-attribute laboratory good, we refer to this as a token. A token has four attributes and each attribute has three levels: colour (red, yellow, blue); shape (circle, triangle, square); size (small, medium, large); and cost (see third column of Table 1). The value to subjects of each token depends on the token's attributes. The total reward, or payoff, that subjects receive from a given token is the sum of the attributes' induced values minus the cost. As is typical in a CE questionnaire, tokens are arranged into choice sets of three alternatives—two tokens and an opt-out. Subjects choose one of three actions: buy token A, buy token B or buy no token (opt-out). The tokens and choices sets were selected using a fractional factorial design. Subjects complete a series of nine choices, and the choices are randomized across subjects.

To retain the hypothetical nature of CE questionnaires, in the BASELINE treatment choices are hypothetical. Subjects are paid £10 for participating in the experiment, irrespective of their choices. The instruction sheet is framed using subjective language: subjects are asked to "Put yourself in a situation where your account balance at the end of the experiment would depend on the choice you made..." (Taylor et al., 2001).

Subjects were recruited from students at the University of Aberdeen during academic year 2009/10 using the Exlab software.²

² Students logging on to University computers see a virtual notice board that includes adverts about participating in economics experiments. Students register with Exlab and then receive emails notifying them of experiments they can participate in. While many subjects had participated in other experiments, no subject had participated in any similar experiment.

The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007). Before the experiment began each subject received a consent form, a set of instructions for the experiment, and a payment form. Subjects read and signed the consent form, which was collected before the experiment started. Following this the researcher read the instruction sheet aloud to the group and answered any questions that subjects had.

3. Results

The payoff maximizing token in each choice set can be identified from the induced values. Table 2 shows the subjects' payoffs from each token in the nine choice sets, the payoff difference between the tokens, and the proportion of subjects who chose the payoff maximizing token.

At the aggregate level, the results are two-fold. First, only two thirds of choices are payoff maximizing. Second, the proportion of payoff maximizing choices varies across choice sets. In response to choice set C, 34.0% of subjects made a payoff maximizing choice. This is in contrast to choice set I in which 82.9% made payoff maximizing choices. Choice set C is notable for the low proportion of payoff maximizing choices. The choice sets with the highest proportion of payoff maximizing choices (B and I) have a high payoff difference between the tokens or contain tokens with zero or very small payoffs.

At the subject level, we compute the proportion of payoff maximizing choices that each subject made during the experiment. Fig. 1 presents the Probability Distribution Function and the Cumulative Distribution Function of these proportions. In Fig. 1(b), each bullet corresponds to a subject. Only two subjects made nine payoff maximizing choices and 16 subjects (34%) made eight payoff maximizing choices. Around 50% of subjects made strictly less than seven payoff maximizing choices.

3.1. Salience of attributes levels

The above results suggest that choices may be easier when the payoff difference between tokens is large. In the WIDE treatment, we induce larger payoff differences by making the level differences within an attribute more salient (Louviere et al., 2008). Attribute levels for the WIDE treatment are presented in the fourth column of Table 1. For example, the difference between a small and a large token is £3.50 in the WIDE treatment and £2 in the BASELINE treatment.

Table 3 shows the subjects' payoffs and the proportion of payoff maximizing choices for the WIDE treatment. The overall proportion

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