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ANALYSIS

Choice modeling at the "market stall": Individual versus collective interest in environmental valuation

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ABSTRACT

The market stall, or valuation workshop, has recently been proposed as a way of addressing some of the limitations of conventional stated preference analysis. In this paper, we attempt to combine a participatory technique similar to the "citizens' jury" with choice modelling, a stated preference technique increasingly being applied in environmental economics. Our focus is on how changes in the context of decision-making (between choices made in isolation and those made in a group setting, and between choices made on individual well being versus collective criteria) produce differences in estimated welfare measures. The empirical context used is that of water quality improvements under the Water Framework Directive, the most significant reform in water legislation in the European Union for many years. We find that the choice experiment format can be successfully implemented in a valuation workshop and that moving from individual to collective choice produces, in this instance, a rather interesting change in both values and preferences which depends on the respondent's interests.

1. Introduction

Quantification of environmental values is increasingly demanded by policymakers and agencies responsible for implementing environmental policy (Bateman et al., 2002). Stated preference approaches are frequently chosen for quantifying these values, especially where non-use values are thought to be important. However, these methods–and contingent valuation in particular–have been the subject of some criticism (Burgess et al., 2000; Sagoff, 1998; Gregory et al., 1997; Jacobs, 1997). Criticisms have focused on problems of information provision, the notion that people have preformed certain preferences for environmental goods (Payne and Bettman, 1999) and notions of community rather than individual value (Sagoff, 1988). This controversy has led to attempts to incorporate elements of participatory approaches in environmental evaluation exercises (McDaniels et al., 2003).

The market stall, or valuation workshop, has recently been proposed as a way of addressing some of the limitations of conventional stated preference analysis (Kenyon et al., 2001, 2003; MacMillan et al., 2003). This approach has, to date, combined contingent valuation with elements of participatory analysis (group-based discussions) and time to reflect on preferences, and allows for greater information provision in the context of unfamiliar goods. In this paper, we attempt to combine a participatory technique similar to the "citizens' jury" with Choice Modelling, an alternative

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stated preference technique to contingent valuation which is increasingly being applied in environmental economics (Hanley et al., 2001). Our focus is on how changes in the context of decision-making (between choices made in isolation and those made in a group setting, and between choices made on individual well being versus collective criteria) produce differences in estimated welfare measures. We also explore differences due to the motivation of respondents, which we characterize as either "selfish" or "non-selfish". The empirical context used is that of water quality improvements under the Water Framework Directive, the most significant reform in water legislation in the European Union for many years.

2. Criticisms of stated preference approaches

As noted above, critics of stated preferences approaches have commented on the extent to which respondents are properly informed about environmental goods which they are to value, about the extent to which preferences are pre-existent for such goods or are constructed as part of the survey process, and whether respondents really understand what they are being asked to do in responding to willingness to pay questions (Clark et al., 2000; Slovic, 2000; Gregory et al., 1997; Jacobs, 1997, Payne and Bettman, 1999).

The focus in this paper is, however, on a different issue which critics have taken up. The standard economic model of demand which lies behind stated preference approaches assumes that individual's calculate their maximum willingness to pay for a prospective change in any good or service on the basis of individual utility maximisation: in other words, in terms of self-interest. This is also conventionally thought of as a fundamental aspect of one of the normative assumptions that underpins cost–benefit analysis: that individual preferences should count in determining "best" outcomes for society (Pearce, 1983), although authors have also pondered the admissibility of including altruistic motives in individual preferences (Andreoni, 1990). Sagoff (1988), however, alleges that society typically bases decisions on environmental, moral, health and safety issues on community preferences rather than the aggregation of individual preferences. In this situation, it is possible that people may forget about their particular self-interests on behalf of the common good. This idea has an earlier reference in Baumol (1952), who first distinguished between individual and collective behaviour, where this difference would be justified as motivated by ethical preferences based on an impersonal social basis, relative to subjective personal preferences (Harsanyi, 1955). In this context, decisions on social issues would be based on ethical preferences, in such a way that public policy should search for communitarian values. Musgrave (1959) points that the individual is guided under the idea of a fair society when facing political decisions, in contrast to the consumer who is lead by personal needs. Later, Marglin (1963) supposed two sides to *homo economicus*, which are each consulted for separate classes of decision. Likewise, Sen (1961) states that there is no reason why a person making political choices call on the same preferences as she uses during her daily life. There have been attempts to combine both kinds of preferences (Tullock, 1967), but both Sagoff (1988) and Goodin have advocated keeping the distinction. In this paper, we try and test for whether a difference exists.

Despite of this theoretical literature on the divergence between private and citizen, or social preferences, only a small number of studies have addressed this issue empirically. For example, Lázaro et al. (2001) estimated time preference for health and money in both contexts (private and social choice), finding that private time preferences exceeded social time preferences. In the same way, Gyrd-Hansen (2004) found that values for increases in health seemed to be affected by whether questions are framed as individual or social choices. The main conclusion of this paper was that the use of values (QALYs) elicited from an individual perspective may not be valid in social decision making. Both studies highlight that there is more than one perspective that can be used in the elicitation of preferences. In the same line, on the environmental economics literature, Norton et al. (1998) examined the role of the consumer sovereignty in the analysis of the environmental values, identifying four levels in relation to the exogeneity of preferences and tastes, or whether they change under the influence of factors such as education or cultural change. Finally, Russell et al. (2003) find missed effects of changing the framing of decision-making, in terms whether personal or public motivations for environmental management decisions are stressed, on most preferred management options for public forests in the US and Denmark.

3. Methodology

In order to address this issue of possible differences between citizen and private values, we combine elements of a "citizens' jury" with the choice experiment approach. This is an adaptation of the market stall approach used by MacMillan et al. (2003), which also allows us to circumvent some of the problems surrounding poorly informed consumers and complex environmental issues, as we describe below. Citizen's juries are small groups of citizens, usually around 12 in number, drawn from the relevant population to discuss a particular issue over 2 or 3 days (Coote and Lenaghan, 1997; Aldred and Jacobs, 2000; Jefferson Centre, 2004). The jury members, who are selected to be "symbolically representative[1]" of this population, hear witnesses present evidence on the issue, question these witnesses, and (usually through break-out groups), decide on an agreed, preferred course of action. This agreement is typically in terms of a ranking of alternative actions, for instance over strategies for reducing traffic in Edinburgh (Kenyon et al., 2001), ranking environmental risks (Crosby, 1998), on waste management (Kuper, 1997) or about the creation of wetlands (Aldred and Jacobs, 1997). Agreements may be unanimous or majority-view. However, WTP amounts are not usually sought from the jury and no approach that we are aware of has so far been made to

[1] Stewart et al. (1994) suggest this term due to the lack of statistical representativeness of the population due to the small number of participants.

integrate elements of the citizen jury approach with choice experiments.

3.1. Case study

The case study is an analysis of the local consequences of implementing the European Union' s Water Framework Directive (WFD). The WFD will bring about very significant changes in the regulation and management of Europe's water resources (Hanley et al., 2006). Major elements include a requirement for the preparation of integrated catchment management plans, with remits extending over point and non-point pollution, water abstraction and land use, the introduction of an EU-wide target of "good ecological status" for all surface water and groundwater, except where exemptions are granted on grounds of "disproportionate cost". Implementing the Directive will involve environmental agencies in wide-scale use of benefit–cost comparisons to identify cases of disproportionate cost. Finally, the Directive calls for the inclusion of stakeholders' views and preferences in the drawing up of catchment management plans.

Our exercise has its origins in a consultation process developed for testing a management plan for the Cidacos River in Navarra, Spain (Ministerio de Medio Ambiente, 2002). Relevant stakeholders included institutions/organizations concerned with the use of the Cidacos in terms of abstraction and those interested in the quality of its riverine ecosystems (Álvarez-Farizo and Barberán, 2003).[2] Consumers' organizations, irrigation unions, local political representatives, farmer and angler associations, water treatment and sewage plant managers and environmental associations were all invited to participate in this consultation. The consultation process was aimed at identifying the perceived costs of implementing the plan, disagreements on the diagnosis of the situation and on the consequences and the possibility of proposing alternatives for the attainment of objectives.

The environmental problems identified by the experts for the River Cidacos are summer low flow episodes leading to ecological damage, nitrate, ammonia and thermal pollution. The main source of these problems is water extraction for domestic, agricultural and industrial use, together with pollution from farms and sewage works (Ministerio de Medio Ambiente, 2002). Translating WFD objectives to this water-body has resulted in targets of an increase in flows of 12%, to improve water quality to "drinkable" and to improve the river as a habitat for cyprinid fish. To achieve these targets, two kinds of measures have been proposed: those aimed at saving water and those designed to reduce pollution. Among the former are better practices in farm irrigation, modernization of irrigation capital, investments to minimize losses from water mains in urban areas, measures to promote the re-use of water and campaigns to raise public awareness about water consumption. For reducing pollution, several measures have been considered, including investments in on-farm waste storage and improvements in urban sewage works.

[2] Includes a list with the names of participants.

3.2. Study design

In order to achieve "the inclusion of stakeholders' views and preferences in the drawing up of catchment management plans" several issues had to be taken into account. To inform these decisions, focus groups were held to on aspects such as who should participate, information provision materials and questionnaire wording. These focus groups were initially held at the University of Zaragoza in winter 2002. Concerning the selection of participants for the experiment itself, a panel of possible participants was organized from a randomly selected sample. Two "jury groups" each composed of 12 citizens from the Zaragoza area were then recruited for the main study. Recruitment was organized to have a balanced group taking into account several demographic and attitudinal variables. Among demographic variables, special attention was paid to age, education and area of residence within the city. Regarding attitudes, participants were selected according to their degree of interest in water management issues: we thus included individuals with farming interests, members of environmental groups and members of the general public. The following three-stage valuation method was then followed—each session noted below was held between 3 and 4 days apart.

3.2.1. First session

Each group of respondents was brought together in a room. Step 1 was the provision to group members of concise information about the problems facing the river and the proposed solutions under the WFD. This information related to the nature of the Water Framework Directive and its implications for the Cidacos River. Possible measures to improve water quality were introduced (as noted above) and likely before-and-after conditions in the river were described. All this information was provided by experts who had been involved in drawing up the catchment management plan.

Step 2 was focussed on a questionnaire gathering data on respondents' general and environmental attitudes and their socio-economic situation. Of particular interest was to establish baseline attitudes towards environmental and other public policy issues, and whether these attitudes and beliefs could be related to their personal situation. This primary collection of perceptions will help later to explain choices. The questionnaire also contained a choice experiment (described below) which respondents completed individually, based on an instruction to consider their choices from a self-interested perspective. In Step 3, a debate between group members was promoted wherein questions and problems arising from the session were discussed. Finally, members were recommended that in the following days they should discuss the issues raised in the meeting with family and friends, and/or learn more about the issues discussed from their own sources (e.g. local libraries, the internet).

3.2.2. Second session

First, the brief summary of the Cidacos River plan was reviewed. Participants could then raise any issues/questions, which had occurred to them in the period between the two sessions with the moderators. Again, a debate was encouraged

	OPTION A	OPTION B
Cost of the option €	2 € per month (333 Ptas) (24 € per year)	1 € per month (167 Ptas) (12 € per year)
Habitat	• High variety of aquatic plants, fish and birds	• Absence of fish • Low variety of aquatic plants and birds
River Surroundings	• Absence of garbage and wastes • Absence of bad smells • Clean water flow in basin • Abundance of vegetation and river bank trees • Minimal erosion	• Absence of garbage and wastes • Absence of bad smells • Clean water flow in basin • Abundance of vegetation and river bank trees • Minimal erosion
Supplies	• Urban supply is guaranteed with high quality water • Irrigation supply is guaranteed all year long	• Urban supplies subject to risk of running out of water • Irrigation supply insufficient most of the year.

If you don't want any of the options A nor B please tick NEITHER

OPTION A ☐ OPTION B ☐ NEITHER ☐

Fig. 1 – Example choice card.

on issues such as desirability and feasibility of the objectives, alternatives and convenience of the whole project. Next, a second questionnaire was implemented, with the same structure and content as the previous questionnaire (the intent was thus to record any changes in beliefs, attitudes and choices that had occurred between the two sessions). Thirdly, aggregate results from the initial questionnaire were shown to group members. Finally, they were reminded about the desirability of having conversations on this issue with family and/or friends before the last session.

3.2.3. *Third session*

Step 1 was a brief summary of the process so far, and presentation of results from the previous two sessions. Participants were then told that this was the last chance for influencing the catchment management plan and reminded that their views were an important input to the policy process. In Step 2, a collective choice experiment was implemented. This was identical to the choice experiment used in sessions 1 and 2, except that participants were asked to make their choices on the basis of what they thought would be best for the community and the environment overall (that is, to express their *citizen* values), and to make these choices collectively.[3] This, we would argue, is a better way to arrive at the citizen values than urging respondents to think as citizens while making private, individual decisions. The collective decision for each choice is also more in line with the majority/unanimity rule adopted in most citizen juries (Coote and Lenaghan, 1997).

The choice experiment referred to above contained four attributes, extracted from the experts report (Ministerio de Medio Ambiente, 2002) and tested during the pilot study. *River ecology* was described in terms of the variety of aquatic plants, fish and birds (insects were omitted intentionally, due to focus group reactions). This attribute was set at two levels, namely low and high diversity. *Surroundings of the river* was defined as the presence or absence of litter and bad smells, the visual quality of the water, abundance of trees and riverside vegetation, and the level of erosion on the river banks. Again, two levels were specified, referring to high and low quality of this attribute. The third attribute was *supplies of water* for urban and agricultural purposes, with the two levels: guaranteed or subject to fluctuations. The lowest level for all attributes corresponded to the current, actual level on the river. Finally, a *cost* attribute was included, as a social cost of water use, in line with the prescriptions of the WFD. Current local estimates of a cost-recovery water charge are in the region of 65 to 76€ per river per household per year. For this reason, we specified the cost variable in the choice experiment as increases in the cost of the monthly shopping basket, with increases of 1, 2, 5, 8 and 15€ being included in the design. We used a fractional factorial main-effects design, which gave eight choice sets.[4] An example choice card is presented below as Fig. 1. Each card contained two options A and B, but

[3] We mean by "collectively" that the participants had to choose one option as the majority preference, subject no one wanting to veto this choice.

[4] We designed our experiment following Sloane (web page referred at the references).

participants had the additional option of not choosing any change over the status quo. Neither option A or B was systematically chosen over the other, both show the same percentage of being chosen (47%), while the *neither* option was chosen 6% of the time.

Using standard choice experiment procedures, we then take the choices respondents make between each of the alternative management plans implicit in the experimental design, in sessions 1–3, and analyze them using a conditional logit model. Estimated parameters (βs) for each of the three attributes (ecology, river surroundings, water supply security) reflect the importance (utility value) of each attribute, while dividing any given attribute parameter by the (–)β value for the cost attribute yields a monetary equivalent of the utility associated with a change in the level of that attribute.

4. Results

In order to test whether preferences change according to whether people are making individual or collective choices, or according to whether they are encouraged to choose for selfish reasons or for the "common good", we estimated separate logit models of the choices made in each session. In all cases, a standard conditional logit model was estimated after testing for the IIA property[5] (independence of irrelevant alternatives) using a test suggested by Hausman and McFadden (1984). The model is specified as

$$U_{in} = \beta_{RE}\text{*River ecology}_i + \beta_{RS}\text{*River surroundings}_i + \beta_{WS}\text{*Water supplies}_i + \beta_C\text{*Cost}_i + \alpha\text{*ASC} + \varepsilon_{in}$$

Results for the logit models are given in Table 1.[6] As it may be seen, in each of the three samples (sessions 1, 2 and 3), each of the three river attributes has a statistically significant impact on the choices made. Parameter signs for these attributes are in line with expectations, in that improvements in river ecology, the river's surroundings or in the security of water supply, give an increase in utility, while increases in cost do not. The significance level on the cost attribute falls in moving from session 1 to session 2, to the extent that cost is no longer a significant determinant of choice in session 2. However, when choice is made collectively in session 3, cost again becomes a significant determinant of preferences over river management options, although only at the $p<0.10$ level. It is worth mentioning here that this pattern of results corresponds with the issues raised during the jury debates. In the first instance, during session 1, several of the questions raised were around the issue cost, about the need or not of increasing monthly household expenses to improve the river, and in terms of who should pay. During the second jury debate, there was a general recognition and agreement on the necessity of costs to the public. A discussion of whether the polluter pays principle occurred, but the group eventually reached a consensus that, even if costs were originally borne by farmers and industry, these costs would eventually be passed on to consumers.

Other covariates, such as socio-economic characteristics of respondents and perceptions/attitudes as measured by three indices measuring attitudes towards current ecological condition ("Ecology"), possible uses of the river ("Uses") and implications of implementing the catchment management plan for the local economy ("Impacts"), were also included in the conditional logit models. These variables have to be interacted to be included in the analysis, since they are constant across choice occasions for each respondent. An alternative specific constant (ASC) is also included, coded 1 in the case of choosing alternative A or B, and 0 where respondent chooses the status quo. Socio-economic covariates such as *Education* (level of education achieved, coded as 1 if education was high school and over) and *Income* are significant and with the expected signs, so higher educated and higher income respondents are more willing to pay to achieve at least one of WFD objectives included as river quality/quantity attributes. In other words, because both alternatives A and B mean an improvement in one or more aspects of the river (compared to the *neither* option), the result of the interaction of the covariates with ASCs indicates that the probability of being willing to pay for an improvement for one or more attributes is higher for those of higher income or education. Other socio-economic variables included are *Agri* (if respondent's job or personal situation is related with agriculture), the negative sign of which is indicating that those who work in agriculture-related sectors are less likely to be willing to take actions to improve water quality, and *Public* (if respondent's job is in the public sector as a decision maker), showing that those with public responsibilities are more prone to accept any action directed to improvements. All are significant throughout the three sessions and the model shows a good fit in terms of the pseudo-R^2 (ρ^2).[7]

Do preferences change significantly across the three sessions? We seek to answer this question by testing the null hypothesis of equality of parameters across the three conditional logit models, that is, we test:

$$\text{Ho}: \beta_{\text{session 1}} = \beta_{\text{session 2}} = \beta_{\text{session 3}}$$

The test statistic in this case is distributed as chi-squared, with a value given by [–2(ln1 – ln2)]. This test statistic is shown in Table 1 as LR_1, LR_2, LR_3 for $\beta_{\text{session 1}}=\beta_{\text{session 2}}$, $\beta_{\text{session 2}}=\beta_{\text{session 3}}$, $\beta_{\text{session 1}}=\beta_{\text{session 3}}$, respectively. With 5 degrees of freedom, this has a critical value of 11.07 at the 95% level of confidence; therefore, we cannot reject the null, so that we accept the hypothesis of parameter equality across the three models. In other words, our estimates of a preference function do not change significantly in moving between sessions. This is true even for the change from

[5] IIA states that the relative probabilities of two alternatives being selected will not be affected by the removal (or introduction) of other options.

[6] Table 4 explains names and codes from the rest of the tables.

[7] Domenich and McFadden (1975) compare values of ρ^2 between 0.2 and 0.4 to values between 0.7 and 0.9 of the R^2 for OLS.

Table 1 – Conditional logit choice model results for the three sessions

		Session 1	Session 2 (individual values, post-discussion)	Session 3 (collective values, post-discussion)
Attributes	River ecology	0.576 (2.7)*	0.63 (2.8)*	0.62 (2.8)*
	River surroundings	0.453 (2.3)*	0.52 (2.2)*	0.49 (2.2)*
	Water supplies	0.554 (3.3)*	0.48 (3.0)*	0.45 (2.8)*
	Cost	−0.093 (−2.0)*	−0.073 (−1.4)	−0.079 (−1.9)*
Socio-economic variables	Education*Asc	0.436 (2.3)*	0.436 (2.2)*	
	Income*Asc	0.551 (2.0)*	0.548 (2.0)*	
	Agri*Asc	−0.672 (−3.6)*	−0.666 (−3.5)*	
	Public*Asc	0.441 (4.6)*	0.408 (3.9)*	
Constant	Asc	1.23 (2.2)*	1.20 (2.0)*	1.17 (2.2)*
	Log-likelihood	−647.96	−640.86	−438.56
	LR_1	5.81		
	LR_2	5.297		
	LR_3	7.96		
Num. obs.	576	576	576	576

Values in parentheses are *t*-statistics. *$p<0.01$, **$p<0.05$, ***$p<0.1$.

individual values (session 2) to collective, citizen values (session 3).

However, it seems possible, a priori, that differences between the values people place on river quality improvements as individual consumers compared to their citizen values might depend on the degree to which they themselves use the river. If we segment the data into those with a pecuniary interest in the use of the river (such as farmers or representatives of industries using the river) and those who we classify as being more motivated by altruistic behaviour

Table 2 – Choice model results for the three sessions for "selfish" and "non-selfish" respondents

Non-self-interest				With a particular interest			
	Ss 1	Ss 2	Ss 3		Ss 1	Ss 2	Ss 3
River ecology	0.46 (2.6)*	0.48 (2.1)*	0.66 (2.4)*	River ecology	0.56 (2.1)*	0.59 (2.0)*	(1.9)*
River surroundings	0.37 (1.1)	0.50 (2.0)*	0.44 (2.7)*	River surroundings	0.32 (1.7)***	0.42 (2.2)*	0.45 (2.2)*
Water supplies	0.56 (2.1)*	0.60 (1.9)**	0.27 (2.4)*	Water supplies	0.46 (2.7)*	0.44 (2.6)*	0.57 (2.1)*
Cost	−0.101 (−2.0)*	−0.100 (−1.4)	−0.085 (−1.9)**	Cost	−0.088 (−1.9)**	−0.088 (−1.16)***	−0.094 (−2.0)*
RivEco*Noself	0.068 (1.8)**	0.12 (1.7)***		RivEco*Self	−0.10	−0.11	
RivSurr*Noself	0.06 (2.0)*	−0.17 (2.0)*		RivSurr*Self	0.05	0.07	
WatSup*Noself	−0.18 (1.8)**	−0.16 (1.9)*		WatSup*Self	0.08 (1.7)***	0.15 (1.9)*	
Cost*Noself	0.012 (1.9)**	0.011 (1.0)		Cost*Self	−0.013 (1.1)	−0.012 (0.7)	
ASC*Noself	1.1 (2.3)*	0.9 (2.0)*		ASC*Self	0.782 (1.9)*	0.731 (1.8)**	
Educ*Asc*Noself	0.36 (1.8)**	0.29 (1.9)*		Educ*Asc*Self	0.436 (2.3)*	0.436 (2.2)*	
Incom*Asc*Noself	0.53 (2.0)*	0.51 (2.0)*		Incm*Asc*Self	0.551 (2.0)*	0.548 (2.0)*	
Asc	0.96	1.10	0.81	Asc	1.231 (2.2)*	1.200 (2.0)*	1.177 (2.2)*
Ecolog*Asc*Noself	0.09 (1.9)*	0.13 (1.9)*	0.61 (2.1)*	Ecolog*Asc*Self	0.08 (1.3)	0.08 (1.0)	0.09 (0.9)
Uses*Asc*Noself				Uses*Asc*Self			
Impact*Asc*Noself	0.16 (1.2)	0.24 (0.2)	0.13 (1.6)***	Impact*Asc*Self	0.05 (1.6)***	0.18 (1.8)**	0.17 (1.7)**
Log-L	−336.3	−361.8	−227.3	Log-L	−327.15	−330.24	−199.16
ρ^2 (pseudo-R^2)	0.28	0.19	0.37	ρ^2 (pseudo-R^2)	0.31	0.26	0.22
LR_{11}	30.98						
LR_{22}	88.16						
LR_{33}	24.2						
$LR_{12\ noself}$	100.28						
$LR_{12\ self}$	15.86						
Num. obs.	576	576	576	Num. obs.	576	576	576

Values in parentheses are *t*-statistics. *$p<0.01$, **$p<0.05$, ***$p<0.1$.

Table 3 – Part-worths (implicit prices in €) from the three sessions and confidence intervals (at 95%)

	Session 1			Session 2	Session 3		
	NS	S	H_0:NS=S	S	NS	S	H_0:NS=S
River ecology	5.8 (4.7–6.2)	4.6 (3.4–5.9)	0.05	4.8 (3.3–5.4)	7.8 (5.8–8.3)	4.8 (3.5–6.1)	0.06
River surroundings	4.8 (3.9–5.6)	3.7 (2.5–4.2)	0.01	4.9 (3.6–5.5)	5.2 (4.1–6.2)	4.7 (3.5–5.8)	0.03
Water supplies	4.3 (3.1–6.0)	5.4 (4.8–6.6)	0.13	6 (5.1–7.0)	3.2 (2.6–4.1)	6.1 (5.4–6.8)	0.00
(Self) Ho: Ss1=Ss3	0.02						
(Non-self) Ho: Ss1=Ss3	0.05						

(such as volunteers in environmental causes) or those who can take decisions in the public sector, the situation differs dramatically.[8] We therefore estimated two conditional logit models, including in the first a dummy indicating if the participant had a commercial interest in water resource management (SELF=1) and the second including a dummy for those identified as being motivated by altruism (NOSELF=1). These dummies have to enter as interactions with the river quality attributes, since they are constant across choices for each individual. In the third jury session, separate models are estimated for each category, rather than using dummies, since collective choices are made rather than individual choices.

Do preferences change according to motivation? The null hypothesis of equality of parameters across the two groups could be tested by:

$$Ho_1: \beta_{\text{session 1 noself}} = \beta_{\text{session 1 self}}$$

$$Ho_2: \beta_{\text{session 2 noself}} = \beta_{\text{session 2 self}}$$

$$Ho_3: \beta_{\text{session 3 noself}} = \beta_{\text{session 3 self}}$$

And, what about between the two sessions but in the same group?

$$Ho_{12\ \text{noself}}: \beta_{\text{session 1 noself}} = \beta_{\text{session 2 noself}}$$

$$Ho_{12\ \text{self}}: \beta_{\text{session 1 self}} = \beta_{\text{session 2 self}}$$

This test statistic is shown in Table 2 as LR_{11}, LR_{22}, LR_{33} for $\beta_{\text{session 1}}=\beta_{\text{session 1}}$, $\beta_{\text{session 2}}=\beta_{\text{session 2}}$, $\beta_{\text{session 3}}=\beta_{\text{session 3}}$; $LR_{12\ \text{noself}}$ for $\beta_{\text{session 1}}=\beta_{\text{session 2}}$; and $LR_{12\ \text{self}}$ for $\beta_{\text{session 1}}=\beta_{\text{session 2}}$, for participants with no particular interest and for those who are self-interested, respectively. In general, we reject the hypothesis of parameter equality between groups and sessions, but, for those with a commercial or business interest (second left halve of Table 2), the LR test ($LR_{12\ \text{self}}$) (critical value $\chi^2_{0.05;9}=16.92$) shows that we have to accept the hypothesis of parameter equality (so the preferences kept unaltered over the sessions) at least between sessions 1 and 2. On the contrary, for those with a non-selfish interest, it seems to show a learning process during which there is an alteration in their stated preferences. Aspects such as river ecology (β on River ecology+β on RivEco*Noself) show a strong increase in the appreciation from the first to the last session, while water supplies shows a decrease in that same importance of the attribute.

In terms of values, these may be approximated using estimates of "part-worths" from the MNL models (Bennett and Blamey, 2001). These part-worths are given in Table 3. As is apparent, changes in the value of river attributes do occur in moving between the three treatments. Moving from session 1 to session 2, it will be recalled, involved an opportunity to discuss the issues raised with other group members, but also with family and friends prior to the meeting of group 2 (rather similarly to the "market stall" approach of MacMillan et al., 2003). Moving from sessions 2 to 3 means a change from individual values to collective values. Looking first at those respondents with "selfish" interests, moving from session 1 to session 2 increases mean willingness to pay for all three attributes, although not by much: for river surroundings, the difference is just statistically significant, for the other two attributes it is not. Willingness to pay, though, does not really change at all for these "selfish" users in moving to session 3.

Table 4 – Data labels

Session 1	Individual choices collected prior to group discussion
Session 2	Individual choices collected after group discussion
Session 3	Collective choices, post-discussion
River ecology	Effect coded 1=improved situation; −1 current and degraded situation
River surroundings	Effect coded 1=improved situation; −1 current and degraded situation
Water supplies	Effect coded 1=supplies guaranteed; −1 supplies not guaranteed
Cost	Linear in 1, 2, 5, 8 and 15€
ASC	Alternative specific constant for options A and B, =1 if either option chosen, =0 otherwise
Educ(ation)	Level of education achieved, =1 if equal or higher than high school
Income	Reported household income/100
Agri	If respondent's job situation is related to agriculture
Public	If respondent's job is in the public sector with a decision responsibility
Self	Coded 1 for participants with a commercial interest in water resources
Non-self	Coded 1 for participants who are either members of environmental pressure groups or work in public sector with decision responsibilities
Ecology	Likart scale score (1…5) for perceptions of current ecological condition of river
Uses	Likart scale score (1…5) for perceptions of current uses to which the river can contribute
Impacts	Likart scale score (1…5) for perceptions on extent of impacts on local economy of current (poor) state of river quality

[8] Around 40% of jury participants stated a direct or indirect commercial interest in the river.

For "non-selfish" persons, no estimate of willingness to pay can be made for session 2, as the parameter estimate on Cost in Table 2 for this group is insignificant. Comparing sessions 1 and 3, however, we see a rise in willingness to pay for improvements in river ecology and river surroundings, but a *fall* in willingness to pay for security of water supplies. For river ecology, this rise in WTP is statistically significant at the 95% level (Table 4).

5. Discussion and conclusions

This paper has attempted to test empirically for a difference in preferences and values between individuals acting in the self-interest, compared to the same individuals acting in the collective interest. On the whole, we find little evidence to support significant differences in these two aspects of value, except in cases where we allow for differences in motivation of respondents. Of relevance to the implementation of the Water Framework Directive is the finding that in all treatments, the value of water resource improvements is significantly different from zero.

In comparing individual values following different levels of group discussion and in comparing individual and collective values, it is important to note that neither of the tests used here are without problems. The LR test could be argued to be more a test of the difference in underlying choice models, rather than of underlying differences in preferences. The comparison of implicit prices is hampered by the imprecision of implicit price estimates, and by the fact that both the numerator and denominator of these implicit prices are only estimated with an error. Tests should also, ideally, be sensitive to differences in the error variance across samples, and in the correlation of errors both within and between sessions.

This study used the choice experiment (CE) technique in combination with elements of participatory analysis, in contrast to previous work which has employed contingent valuation (CV). An obvious question is whether CE is any better is this combined approach than CV. No formal test is possible in this case; however, CE does offer a way around the "small numbers" problem which MacMillan et al. (2003) note with regard to CV, since each respondent makes multiple choices. This may be an important advantage if the intention of a future study is to produce estimates of value, which can be aggregated for use in policy analysis.

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REFERENCES

Aldred, J., Jacobs, M., 1997. Citizens and wetlands: what priority, if any, should be given to the creation of wetlands in the fens? Report of the Ely Citizen's Jury, Centre for the Study of Environmental Change (CSEC). Lancaster University, Lancaster (September 1997, 40 pp.).

Aldred, J., Jacobs, M., 2000. Citizens and wetlands: evaluating the Ely citizen's jury. Ecological Economics 34 (2), 217–232.

Álvarez-Farizo, B., Barberán, R., 2003. Análisis del plan de cuenca del río Cidacos en el contexto de la Directiva Marco del Agua. Doc. Trabajo 3/2. Servicio de Investigación Agraria- Unidad de Economía y Sociología Agrarias. Gobierno de Aragón.

Andreoni, J., 1990. Impure altruism and donations to public goods: a theory of warm-glow giving. Economic Journal 100, 464–477 (June).

Bateman, I., Carson, R., Day, B., Hanemann, M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Ozdemiroglu, E., Pearce, D., Sugden, R., Swanson, J., 2002. Economic Valuation with Stated Preferences. Edward Elgar in association with DTLR and DEFRA, Cheltenham.

Baumol, W.J., 1952. Welfare economics and the theory of the State. Harvard University Press, Cambridge.

Bennett, J., Blamey, R., 2001. The Choice Modelling Approach to Environmental Valuation. Edward Elgar, Cheltenham.

Burgess, J., Clark, J., Harrison, C.M., 2000. Culture, communication and the information problem in contingent valuation surveys: a case study of a Wildlife Enhancement Scheme. Environment and Planning, C. 18, 505–524.

Clark, J., Burgess, J., Harrison, C.M., 2000. 'I struggled with this money business': respondents' perspectives on contingent valuation. Ecological Economics 33, 45–62.

Coote, A., Lenaghan, J., 1997. Citizens' Juries: Theory into Practice. Institute for Public Policy Research, London.

Crosby, N., 1998. Using the citizens jury process for environmental decision making. In: Sexton, K., Marcus, A.A., Easter, K.W., Burkhardt, T.D (Eds.), Better Environmental Decisions: Strategies for Governments, Businesses and Communities. Island Press, Washington, DC.

Domenich, T., McFadden, D., 1975. Urban travel demand: a behavioural approach. North-Holland, Amsterdam.

Gregory, R., Flynn, J., Johnson, S.M., Sattefield, T.A., Slovic, P., Wagner, R., 1997. Decision-pathways surveys: a tool for resource managers. Land Economics 73, 240–254.

Gyrd-Hansen, D., 2004. Investigating the social value of health changes. Journal of Health Economics 23, 1101–1116.

Hanley, N., Mourato, S., Wright, R., 2001. Choice modelling approaches: a superior alternative for environmental valuation? Journal of Economic Surveys 15 (3), 453–462.

Hanley, N., Wright, R., Alvarez-Farizo, B., 2006. Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive. Journal of Environmental Management 78, 183–193.

Harsanyi, J., 1955. Cardinal welfare, individualistic ethics and interpersonal comparisons of utility. Journal of Political Economy 63, 309–321.

Hausman, J.A., McFadden, D., 1984. Specification tests for the multinomial logit model. Econometrica 52, 1219–1240.

Jacobs, M., 1997. Environmental valuation, deliberative democracy and public decision making institutions. In: Foster, J. (Ed.), Valuing Nature? Economics Ethics and Environment. Routledge, London.

Jefferson Centre, 2004. Citizens' Jury Handbook. Minnesota, Estados Unidos.

Kenyon, W., Hanley, N., Nevin, C., 2001. Citizens' juries: an aid to environmental valuation? Environmental Planning C: Government and Policy 19 (4), 557–566.

Kenyon, W., Kevin, C., Hanley, N., 2003. Enhancing environmental decision-making using citizens' juries. Local Environmental 8 (2), 221–232.

Kuper, R., 1997. Deliberating waste: the Hertfordshire citizens' jury. Local Environment 2 (2), 139–153.
Lázaro, A., Barberán, R., Rubio, E., 2001. Private and social time preferences for health and money: an empirical estimation. Health Economics 10, 351–356.
MacMillan, D., Philip, L., Hanley, N., Alvarez-Farizo, B., 2003. Valuing non-market benefits of wild goose conservation: a comparison of interview and group-based approaches. Ecological Economics 43, 49–59.
Marglin, S., 1963. Social rate of discount and the optimal rate of investment. Quarterly Journal of Economics 77, 95–111.
McDaniels, T., Gregory, R., Arvai, J., Chuenpagdee, R., 2003. Decision structuring to alleviate embedding in environmental valuation. Ecological Economics 46, 33–46.
Ministerio de Medio Ambiente y Gobierno de Navarra, 2002. Análisis económico del Plan de Cuenca del Cidacos. Aplicación de la Guía de análisis económico (Directiva Marco del Agua 2002). Unpublished report.
Musgrave, R.A., 1959. The theory of public finance. McGraw-Hill, New York.
Norton, B., Constanza, R.Y., Bishop, R.C., 1998. The evolution of preferences. Why «sovereign preferences» may not lead to sustainable policies and what to do about it. Ecological Economics 24 (2–3), 193–211.
Payne, J.W., Bettman, J.R., 1999. Measuring constructed preferences: towards a building code. Journal of Risk and Uncertainty 19, 243–270.
Pearce, D.W., 1983. Cost–Benefit Analysis, 2nd edition. MacMillan, London.
Russell, C., Bjorner, T.B., Clark, C., 2003. Searching for evidence of alternative preferences: public as opposed to private. Journal of Economic Behavior & Organization 51 (1), 1–27.
Sagoff, M., 1988. The Economy of the Earth. Cambridge University Press, Cambridge.
Sagoff, M., 1998. Aggregation and deliberation in valuing environmental public goods: a look beyond contingent pricing. Ecological Economics 24, 213–230.
Sen, A.K., 1961. On optimizing the rate of saving. Economic Journal 71 (283), 479–496.
Sloane, N., http://www.research.att.com/~njas/oadir/.
Slovic, P., 2000. The construction of preferences. In: Kahneman, D., Tversky, A. (Eds.), Choices, Values and Frames. Cambridge UP, Cambridge.
Stewart, J., Kendall, E., Coote, A., 1994. Citizen's Juries. IPPR, London.
Tullock, G., 1967. Toward a Mathematics of Politics. University of Michigan Press, Ann Arbor, Michigan.