3. A contingent valuation method incorporating fairness and citizen participation*

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3.1 INTRODUCTION

Concepts associated with envy, equity and 'superfairness' have received considerable attention in the last decade, being considered by both political scientists and economists (for example, Baumol, 1987; Renn et al., 1995; Zajac, 1995), although the theory has received little application (Zajac, 1995). An extensive discussion of fairness is to be addressed later, but an example of 'strict fairness' is giving two people a cake, letting one cut it in two, and the other choose which slice he wants. Concepts of economic justice, for example the 'just price', have a long history: for instance the discussions by St. Thomas Aquinas in the thirteenth century (St. Aquinatis, 1897) and earlier (for example Valerius Maximus), although these were later displaced through the efforts of Adam Smith and others (Zajac, 1995).

Generally discussed in the context of the concepts above is citizen participation. Adding fairness to interactions between policymakers and the household level is a way of encouraging citizen participation in policy decisions, as called for by the guidelines for sustainable agriculture and rural development (SARD), for example. People's participation is an essential element of any successful SARD policy. Unfortunately, however, much of what is written about participation, while long on rhetoric, is short on practical guidelines for implementation. In essence, in making a benefit valuation consistent with the guidelines of SARD, we are looking for instruments aimed at establishing a democratic and participatory process designed to involve all interested groups in decision making and implementing SARD. Given that concepts of fairness are relevant to the contingent valuation method (CVM), that CVM can be used to estimate the benefits associated with SARD, and that fairness can be linked with SARD, then it follows that CVM, fairness and SARD may be usefully linked.

While closed ended CVM (CE) is the CVM elicitation format recommended by the NOAA Blue Ribbon Panel (Arrow et al., 1993), forcing such a high level of control over the bid offers does not appear to be in keeping with the spirit of fairness. At first glance, the open-ended CVM (OE) elicitation approach may appear fair. Open-ended questions (as well as iterative bidding formats) have a strong participatory element because while the interviewer fixes the scenario, the respondent is free to choose the bid. However, it is unfair to the interviewer as it allows the respondent to engage in strategic response biases. Furthermore, in cases where the respondent does not intend to engage in strategic responses, just as it may be unfair to give the respondent no say over the bids, it may be unfair to give the respondent complete freedom over the bid; he may be placed in a difficult situation in stating an open-ended value to a good he has much less experience evaluating than does the interviewer. The multiple bounded discrete choice (MBDC) approach is arguably fairer than the open-ended and the closed-ended approaches. MBDC allows ample opportunities for strategic bias in the responses, but otherwise the level of flexibility is a compromise between OE and CE. However many researchers prefer CE approaches for the reasons stated earlier. Our goal is to modify the CE approach to incorporate a greater degree of fairness in Baumol's envy-free sense, while maintaining many of the desirable characteristics of CE. Bateman et al. (2004) observe that 'within stepwise formats the degree of scope sensitivity varies dramatically and significantly depending upon the direction order in which values are elicited' (p. 88).

Specifically, we revise the elicitation approach to let the respondents choose the bid, within bounds, that they want to respond to. What are the benefits in doing so? The answer is that we want to make the willingness to pay (WTP) elicitation process as participatory as possible while minimizing the response biases discussed above. To do this, we modify the one-and-one-half-bound (OOHB) approach (Cooper et al., 2002) to a fair one-and-one-half-bound (FOOHB) approach, instead of modifying the double bound (DB) approach, given that OOHB may have less potential for bias in response to the follow-up bid than DB (ibid). We increase fairness by allowing the respondent to choose whether they want to start the questioning process with the low bid or the high bid. In other words, the respondent is allowed to choose only the starting bid and not the value itself, as this would result in an open-ended question format.

Regarding the relationship between discrete choice (DC) and citizen participation, we note Renn et al.'s (1995) assertion that while referenda (a common payment vehicle for DC CVM) meet their criteria for fairness, by themselves they are not participatory. They suggest that referenda are an excellent way of legitimizing a final decision after it has been subject to

review by citizens. The FOOHB approach, by allowing the respondent more participation in the bid offer process, can be considered a simple initial review process.

Pretty (1995) presents a discussion of moving from an 'old professionalism' to a 'new professionalism' in the strategy and context of inquiry, which is relevant to the association between discrete choice and citizen participation. Characteristics of 'old professionalism' include: investigators know what they want; there is a pre-specified research plan or design; information is extracted from controlled experiments; and context is independent and controlled. Characteristics of 'new professionalism' include: investigators do not know where research will lead; it is an open-ended learning process; understanding and focus emerge through interaction; and the context of inquiry is fundamental. To differing degrees, the various CVM elicitation formats fall into 'old professionalism', although to a large extent, the focus group and pre-testing stages that are part of a quality CVM survey embody 'new professionalism'. Of course, we do not move so far as to make the final CVM question completely characteristic of 'new professionalism', but placing the choice of starting bid in the hands of the respondent moves the discrete choice CVM question format more in that direction.

On the statistical side, OOHB is already designed to address response bias to the follow-up bid that sometimes is evident in multiple bound discrete choice surveys. So the difference between OOHB and FOOHB is the fairness concept embedded in the FOOHB. In fact, the two methods have two data generating process that are nested. To estimate the coefficients for the FOOHB model, we use the Welsh–Poe (1998) maximum likelihood specification for multiple bounded discrete choice. Welsh–Poe's specification is the most general (compared with Hanemann, 1994) in that it incorporates the Hanemann model, while at the same time allowing for endogeneity between the response and the bid amount. The FOOHB model lies between the Hanemann and Welsh–Poe model in flexibility.

While we can establish whether or not respondents prefer a more participatory process through survey questions, whether or not the FOOHB model produces more accurate results than the OOHB model requires knowing the true willingness to pay, which is expensive to elicit. However transferring the concepts of fairness to economic applications has proved difficult in practice. We are attempting a first stab at this, and concern ourselves at this point with how fairness can be applied, and not on its accuracy. Pre-testing our surveys in which we ask the respondents whether they prefer to respond to FOOHB or OOHB question formats indicates that they prefer FOOHB. While this choice could be influenced by some perception that FOOHB allows more possibilities for strategic bias than OOHB, the pre-tested group was unlikely to have these motivations. Their

comments suggested that they preferred the more participatory aspect of FOOHB over OOHB.

The remainder of the chapter is organized as follows. Section 2 compares survey formats and formally describes the likelihood functions associated with OOHB and FOOHB formats. Section 3 presents an empirical comparison with the West Garda Regional Forest in Italy based on a split sample contingent valuation survey using the FOOHB and OOHB formats and presents the values of the functions supplied by the natural area. Our conclusions are summarized in Section 4.

3.2 COMPARISON OF THE SURVEY FORMATS

In this section we analyse different survey formats, the single bound (SB) format, the double bound (DB) format and the one-and-one-half-bound (OOHB) by Cooper et al. (2002), and we compare them with a new model: the fair-one-and-one-half-bound model (FOOHB). The log-likelihood functions for the survey formats are estimated using maximum likelihood techniques programmed in Gauss.

3.2.1 The Single Bound (SB) Format

In the single bound format, the *i*-th respondent is asked if she would be willing to pay some given amount b_i^* (the 'bid') to obtain a given improvement in environmental quality. The answer is 'no' if her own WTP is inferior to b_i^*, it is 'yes' in the opposite case (Figures 3.1 and 3.2).

We refer to 'full visibility' of the choice set when 'the respondent

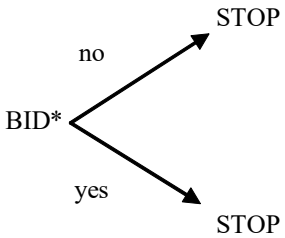


Figure 3.1 Single bound – full visibility – sequential representation

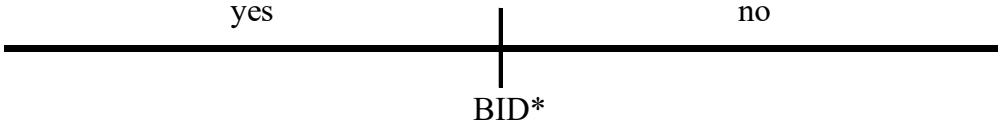


Figure 3.2 Single bound – full visibility – linear representation

perceives [the set of goods] the full extent of purchase options which will be made available in the course of that exercise' (Bateman et al., 2004, p. 75).

The probability of a negative answer is equal to the probability that WTP is inferior to the bid, while the probability of a positive answer probability is that WTP is greater than the bid:

$$\Pr(no) = \Pr(WTP_i < b_i^*) = F(b_i^*; \theta)$$
$$\Pr(yes) = \Pr(WTP_i \geq b_i^*) = 1 - F(b_i^*; \theta)$$

where F is the cumulative distribution function of WTP; and θ represents the parameters of the distribution.

The resulting log-likelihood function for the SB format is:

$$\ln L^{SB}(\theta) = \sum_{i=1}^{n} \{d_i^Y \ln[1 - F(b_i^*; \theta)] + d_i^N \ln F(b_i^*; \theta)\}.$$

where $d_i^j = 1$ if the i-th response is j ('yes' or 'no'), and 0 otherwise.

An individual should be willing to pay some given amount C, if her utility will be greater or equal to the utility before the payment. Thus:

$$U_0(Y; x) \leq U_1(Y - C; x),$$

where U_0 is the utility at time 0 and U_1 at time 1 following the payment of the amount C, Y is the individual income and x is a vector of demographic and attitudinal variables, such as the respondent's age or sex, or whether or not the respondent is an environmentalist; and possibly other variables relating to the willingness to pay. The utility function U is a random variable because it is not observable. We denote the mean of U by V. Then we consider a stochastic error ε_i identically distributed with a mean zero. The previous equation can be written as:

$$V_0(Y; x) + \varepsilon_0 \leq V_1(Y - C; x) + \varepsilon_1.$$

If $V_0(Y; x) = \alpha_0 - \beta Y$, where $\beta < 0$ and $V_1(Y - C; x) = \alpha_1 - \beta(Y - C)$, this expression can be written as:

$$\alpha_0 - \beta Y + \varepsilon_0 \leq \alpha_1 - \beta(Y - C) + \varepsilon_1$$

and in probabilistic notation:

$$\Pr(WTP \geq C) = \Pr(V_0 + \varepsilon_0 \leq V_1 + \varepsilon_1) = \Pr(\varepsilon_1 - \varepsilon_0 \geq V_0 - V_1)$$
$$= \Pr(\varepsilon_1 - \varepsilon_0 \geq -\alpha - \beta C)$$

where $\alpha = \alpha_1 - \alpha_0$.

Applying a logistic probability function to the utility model we obtain:

$$\Pr(WTP \geq C) = F_{\varepsilon}(\Delta V) = 1 - [1 + \exp(-(\alpha + \beta C))]^{-1}$$

where $F_{\varepsilon}(.)$ is the cumulative distribution funtion of $\varepsilon = \varepsilon_1 - \varepsilon_0$ and ΔV is the difference between the two utility functions V_0 and V_1. If we disarrange α in the sum of its components, in the case of a multiple regression with q explicative variables we obtain:

$$E(WTP|x_i) = \frac{\alpha_1 x_{i,1} + \alpha_2 x_{i,2} + \ldots + \alpha_q x_{i,q}}{-\beta}.$$

3.2.2 The Double Bound (DB) Format

The objective of the econometric model is to infer the maximum willingness to pay (WTP) starting from a given price and a series of dichotomous answers that we define as 'yes' and 'no'. We choose the starting values that minimize the average quadratic standard error of the willingness to pay using Cooper's procedure (1993).

The DB format starts with an initial bid b_i^*. If the respondent answers 'yes', she receives a follow-up bid $b_i^U > b_i^*$; if she answers 'no', she receives a follow-up bid $b_i^L < b_i^*$ (Figure 3.3). The possible outcomes are four: (yes, yes), (yes, no), (no, yes) and (no, no) (Figure 3.4).

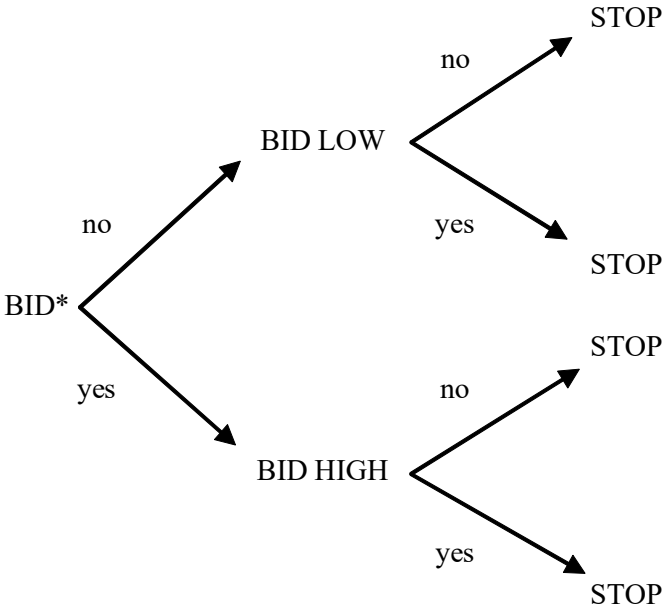


Figure 3.3 Double bound – sequential representation

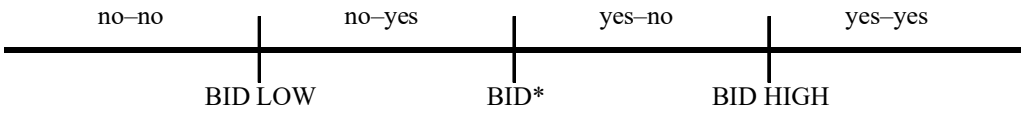


Figure 3.4 Double bound – linear representation

The corresponding response probabilities are:

$$\Pr(yes, yes) = \Pr(WTP_i \geq b_i^U) = 1 - F(b_i^U; \theta);$$
$$\Pr(yes, no) = \Pr(b_i^* \leq WTP_i \leq b_i^U) = F(b_i^U; \theta) - F(b_i^*; \theta);$$
$$\Pr(no, yes) = \Pr(b_i^L \leq WTP_i \leq b_i^*) = F(b_i^*; \theta) - F(b_i^L; \theta);$$
$$\Pr(no, no) = \Pr(WTP_i \leq b_i^L) = F(b_i^L; \theta).$$

The double bound log likelihood (Hanemann et al., 1991) is:

$$\ln L^{DB}(\theta) = \sum_{i=1}^{n} \{d_i^{YY} \ln[1 - F(b_i^U; \theta)] + d_i^{YN} \ln[F(b_i^U; \theta) - F(b_i^0; \theta)] + d_i^{NY} \ln[F(b_i^0; \theta) - F(b_i^L; \theta)] + d_i^{NN} \ln F(b_i^L; \theta)\},$$

where F is the cumulative distribution function of respondent WTP; b_i^* is the initial bid; b_i^U is the upper bid; b_i^L is the lower bid; θ represents the parameters of the distribution, which are to be estimated on the basis of the responses to the contingent valuation survey; $d_i^{YY} = 1$ if the i-th response is (yes, yes) and 0 otherwise; $d_i^{YN} = 1$ if the i-th response is (yes, no) and 0 otherwise; $d_i^{NY} = 1$ if the i-th response is (no, yes) and 0 otherwise; $d_i^{NN} = 1$ if the i-th response is (no, no) and 0 otherwise. Let $\hat{\theta}^{DB}$ the resulting maximum likelihood estimator (MLE), the associated information matrix, $I^{DB}(\hat{\theta}^{DB})$, is equal to minus the expectation of the Hessian of the maximized log-likelihood function.

3.2.3 The Multiple Bounded Discrete Choice Model (MBDC)

The multiple bounded model is the generalization of the double bounded model (Welsh and Poe, 1998). The respondent is asked to vote on a range of referendum thresholds and to indicate how she would vote if passage of the referendum cost her that amount.

Consider the case where the individual can respond 'yes' or 'no' to a wide variety of bids (Figure 3.5). We define b_i^U as the maximum bid amount that the individual would vote for, and b_i^L as the minimum bid amount that the individual would vote for. Her willingness to pay lies in the interval $[b_i^U, b_i^L]$. When the respondent says 'no' to every bid amount then $b_i^L = -\infty$ and when she says 'yes' to every bid amount then $b_i^U = \infty$.

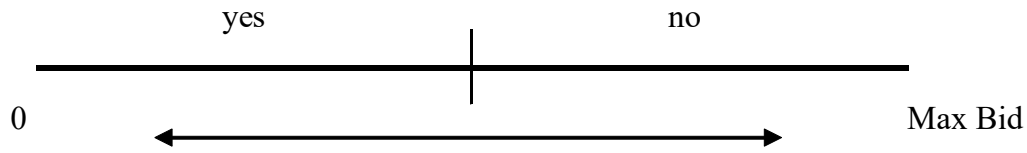


Figure 3.5 MBDC – full visibility but sensitive to scope– linear representation

The corresponding log-likelihood function is:

$$\ln L^{MBDC}(\theta) = \sum_{i=1}^{n} \{\ln[F(b_i^U;\theta) - F(b_i^L;\theta)]\}$$

where F is the cumulative distribution function of respondent WTP with parameter vector θ. $F(b_i, \theta)$ and $[1 - F(b_i, \theta)]$ respectively denote the probability that an individual votes 'no' and 'yes' to a specific bid amount b_i. The probability WTP for individual i-th lies between any two bid thresholds and it is equal to $[F(b_i^U;\theta) - F(b_i^L;\theta)]$.

As pointed out by Welsh and Bishop (1993), this most likely representation of the data generating process nests discrete choice models in general. This is also true for the following survey formats: the one-and-one-half-bound and the fair-one-and-one-half-bound models.

3.2.4 The One-and-One-Half-Bound Model (OOHB)

In the OOHB format the i-th respondent is given two prices up front and told that, while the exact cost of the item is uncertain, it is known to lie within the range bounded by these two prices, a lower bound and an upper bound. A random process determines if the respondent has to start from the upper bound or the lower one. In this case the choice set is 'partially visible' because the respondent does not know the starting bid but only the possible price range.

Another distinguishing feature is that the follow-up question is only asked when the 'yes' response is given to the lower bound or when the 'no' response is given to the upper bound. No follow-up question is asked when in response to the initial question an upper amount is accepted or a lower amount rejected (Figure 3.6).

Since the respondent is told about the possible range of costs at the beginning of the survey, she is less likely to form false cost expectations, enter into bargaining mindset, or experience loss-aversion when responding to the follow-up bid. The analytic analysis suggests that the loss of statistical efficiency from using OOHB instead of double bound model may be small or negligible (Cooper et al., 2002).

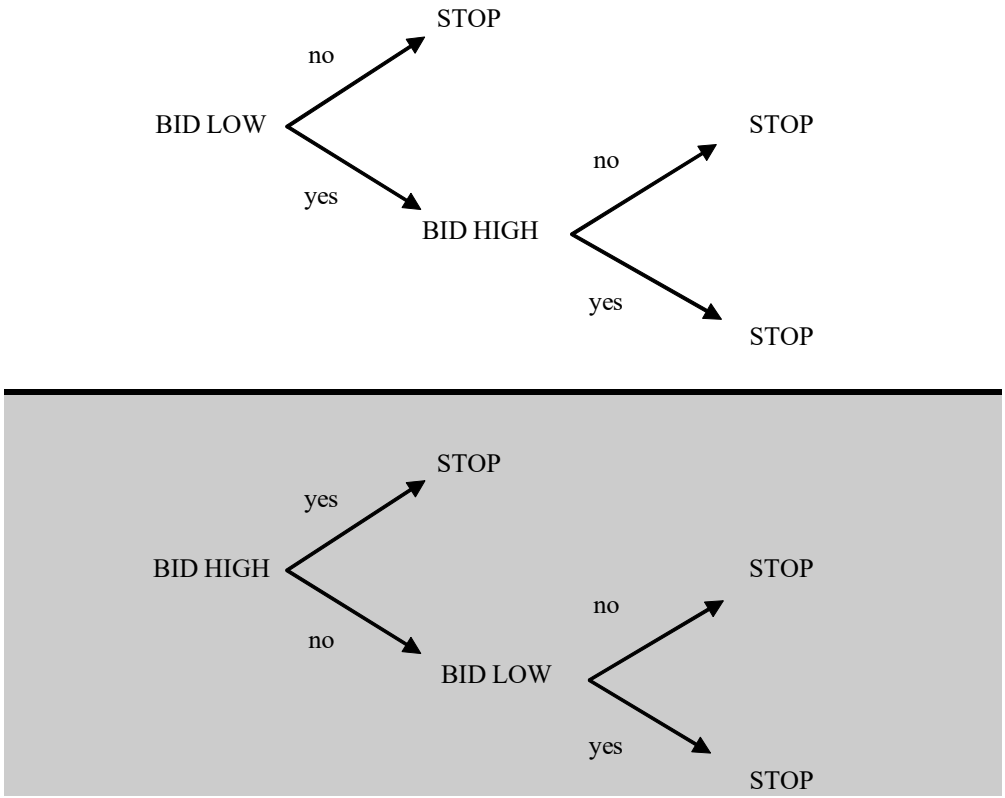


Figure 3.6 OOHB – conditional sequential disclosure – partial visibility – sequential representation

Define a range of bid values as $[b_i^L, b_i^U]$ where $b_i^L < b_i^U$. If the lower price, b_i^L, is randomly drawn as the starting bid, the three possible response outcomes are (no), (yes, no) and (yes, yes) (Figure 3.7); if the higher price, b_i^U, is randomly drawn as the starting bid, the possible response outcomes are (yes), (no, yes) and (no, no) (Figure 3.7).

The corresponding response probabilities are:

$$\Pr(no) = \Pr(no, no) = \Pr(WTP_i \leq b_i^L) = F(b_i^L; \theta);$$

$$\Pr(yes, no) = \Pr(no, yes) = \Pr(b_i^L \leq WTP_i \leq b_i^U) = F(b_i^U; \theta) - F(b_i^L; \theta);$$

$$\Pr(yes, yes) = \Pr(yes) = \Pr(WTP_i \geq b_i^U) = 1 - F(b_i^U; \theta).$$

The corresponding log-likelihood function is

$$\ln L^{OOHB}(\theta) = \sum_{i=1}^{n} \{d_i^Y \ln[1 - F(b_i^U; \theta)] + d_i^{YN} \ln[F(b_i^U; \theta) - F(b_i^L; \theta)] + d_i^N \ln[F(b_i^L; \theta)]\},$$

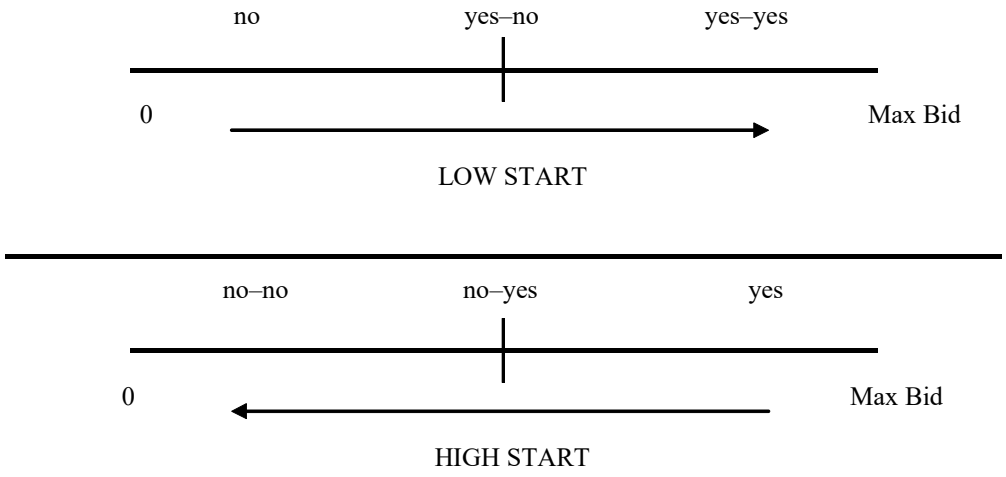


Figure 3.7 OOHB – conditional sequential disclosure – partial visibility – linear representation

where F^v is the cumulative distribution function of respondent's answer $v = \{$no, yes–no, yes–yes, yes, no–yes, no–no$\}$; d^v is a dummy variable equal to 1 for v and 0 otherwise; θ represents the parameters of the distribution, which are to be estimated on the basis of the responses to the CV survey; $d_i^N = 1$ if either the starting bid is b_i^L and the response is (no) or the starting bid is b_i^U and the response is (no, no) and 0 otherwise; $d_i^{YN} = 1$ if either the starting bid is b_i^L and the response is (yes, no) or the starting bid is b_i^U and the response is (no, yes) and 0 otherwise; and $d_i^{YY} = 1$ if either the starting bid is b_i^L and the response is (yes, yes) or the starting bid is b_i^U and the response is (yes) and 0 otherwise.

3.2.5 A Contingent Valuation Method incorporating Fairness: The Fair One-and-One-Half-Bound Model (FOOHB)

Open-ended questions (as well as iterative bidding formats) have a strong participatory element because while the interviewer fixes the scenario, the respondent is free to choose the bid. Discrete formats reduce the respondents' flexibility. To some extent, this reduction is positive from the interviewer's standpoint – respondents may have a difficult time giving an open-ended value for an unusual good, they may engage in strategic bias and generally, are used to buying products with take-it-or-leave-it pricing. By allowing the respondent to choose the starting point for the bidding process, FOOHB introduces fairness into discrete choice CVM question format. However since the interviewer still controls the bounds on the starting bids, the interaction between the two parties is not completely flexible.

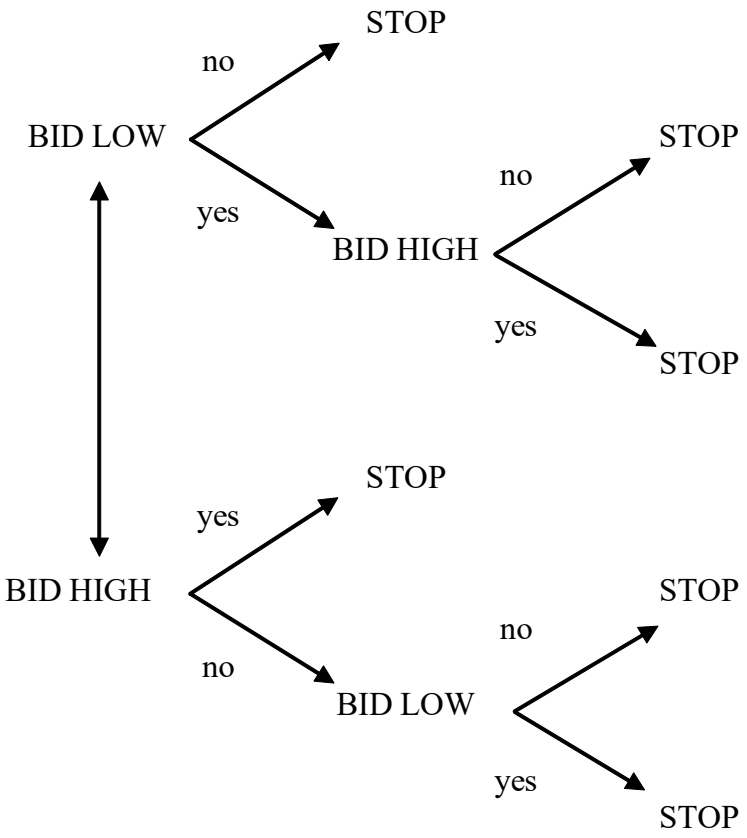


Figure 3.8 FOOHB – unconditional (fair) sequential disclosure – full visibility of a small choice set – sequential representation

The relationship between answers and WTP is the same in the two models as Figures 3.7 and 3.9 show. The difference consists in the fact that the interviewer does not select at random one of the two prices and then she asks the respondent if she would be willing to pay the price selected. In the FOOHB model the respondent chooses the starting price. The process consists of two phases: in the first phase, the respondent chooses whether to start from the upper price or the lower one; in the second phase, she chooses the value that she should be willing to pay (Figure 3.8).

To estimate the coefficients for the FOOHB model, we use the Welsh–Poe (1998) maximum likelihood specification for the multiple bounded discrete choice model (MBDC). This specification is the most general (compared with Hanemann, 1994) in that it incorporate the Hanemann model, while at the same time allowing for endogeneity between the response and the bid amount. The FOOHB model lies between the Hanemann (1994) and Welsh–Poe (1998) model in flexibility (Figures 3.8–3.9).

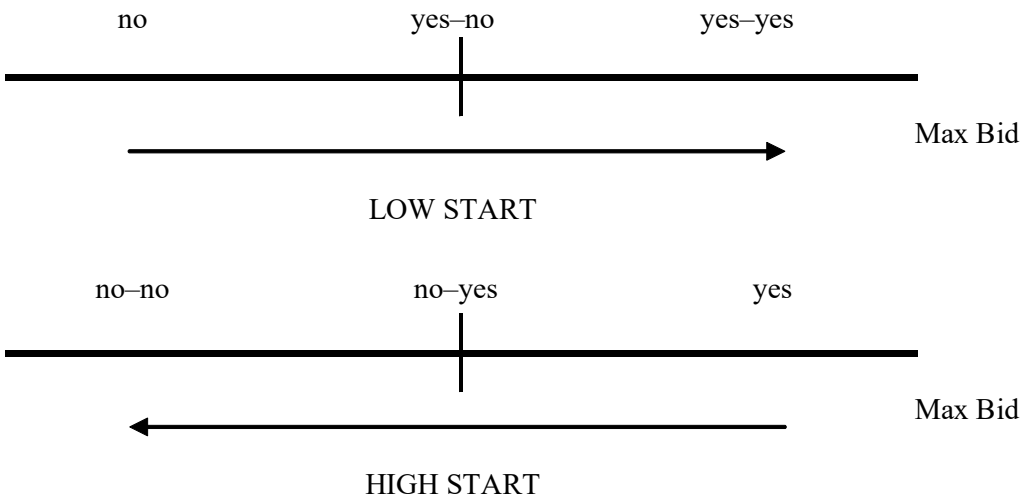


Figure 3.9 FOOHB unconditional (fair) sequential disclosure – full visibility of a small choice set – linear representation

The log-likelihood function using the FOOHB format is:

$$\ln L^{FOOHB}(\theta) =$$

$$\sum_{i=1}^{n}\begin{Bmatrix} g_i^L \ln G^L\{d_i^{YY}\ln[1-F(b_i^U;\theta)]+d_i^{YN}\ln[F(b_i^U;\theta)-F(b_i^L;\theta)]+d_i^{N}\ln[F(b_i^L;\theta)]\}+ \\ g_i^U \ln G^U\{d_i^{Y}\ln[1-F(b_i^U;\theta)]+d_i^{NY}\ln[F(b_i^U;\theta)-F(b_i^L;\theta)]+d_i^{NN}\ln[F(b_i^L;\theta)]\} \end{Bmatrix}$$

where F, d_i and θ are defined as in the OOHB model; g_i^L is a dummy variable equal to 1 if the respondent starts from the lower bound (b_i^L), equal to 0 otherwise; and g_i^U is a dummy variable equal to 1 if the respondent starts from the upper bound (b_i^U) and equal to 0 otherwise; G^L and G^U respectively denote the probability that the respondent starts from the upper and lower bound.

Any bounded model, independently of the number of bounds, can be converted in a discrete choice model with no loss of relevant information given a suitable adjustment of the data (Welsh and Bishop, 1993). In the case of the FOOHB format the log-likelihood function becomes:

$$\ln L^{FOOHB}(\theta) = \sum_{i=1}^{n}\{\ln[F(b_i^U;\theta)-F(b_i^L;\theta)]\}.$$

3.3 A FIELD TEST OF THE FOOHB AND OOHB FORMATS

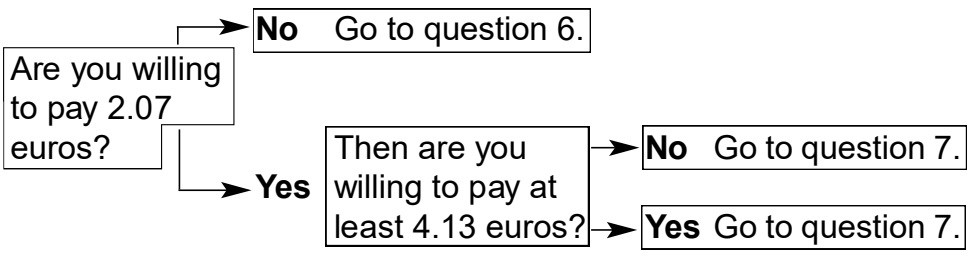
We present the results of the contingent valuation survey conducted in Italy to value the West Garda Regional Forest. The survey was conducted by the

University of Verona in June–October 1997 and it took the form of on-site[1] interviews of adult visitors (mean age of 39 years). Access to the forest is currently free; in the contingent valuation survey, respondents were asked whether they would be willing to pay for an entrance ticket in order to improve the quality of the management and preservation of the area, and an annual subscription fee, which finances projects to improve the quality and quantity of recreational activities. The survey was prepared following the guidelines by the NOAA[2] Blue Ribbon Panel. In order not to incur bias, in the introduction of the survey it was emphasized that the objective was to improve the area and that the prices were hypothetical. To guarantee the consistency of the contingent valuation, before asking about the willingness to pay for a ticket the visitor was asked to give an opinion about the area as to whether it is crowded and if the number of visitors should be regulated.

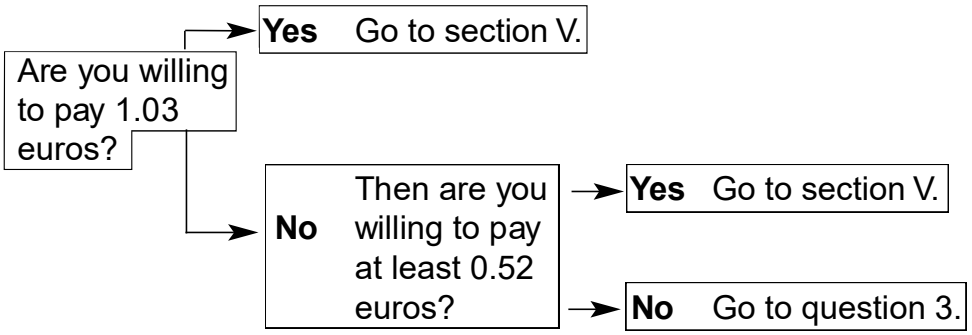
In order to compare the results of the two models the sample was split between the OOHB (25 per cent of the sample) and FOOHB (75 per cent of the sample) elicitation formats, with random assignment between formats. In the OOHB version, respondents were first told that the price of admission to the forest will be somewhere in the range of b^L to b^U euros: they did not know the precise amount asked. One of the prices was selected at random by the interviewer and the respondent was asked 'If the price of this admission were [selected price], would you willing to pay for it?', with a follow-up question using the other price where this was logical. Fifty per cent of the OOHB sample started from the lower bound of the range and 50 per cent started from the upper bound. Examples of OOHB questions are the following (Box 3.1 and Box 3.2):

'Suppose the bureau of land management asks you to pay for a ticket to visit the area to improve the quality of the management and preservation of the area. Given these conditions, are you willing to pay for a ticket that may vary within a range of 2.07 euros and 4.13 euros keeping in mind that the *exact price is uncertain*?'

BOX 3.1 EXAMPLE OF OOHB QUESTION – WILLINGNESS TO PAY FOR A TICKET



BOX 3.2 EXAMPLE OF OOHB QUESTION – WILLINGNESS TO PAY FOR AN ANNUAL MEMBERSHIP FEE



'Suppose now that to gain access to the natural area you are asked to be part of an association called "Friends of the Mountains", which finances projects to improve recreational activities according to the preferences that you revealed in question no. 1. Let us hypothesize that the annual membership fee for each recreational activity may vary within a range of 0.52 euros to 1.03 euros. Are you willing to pay it?'

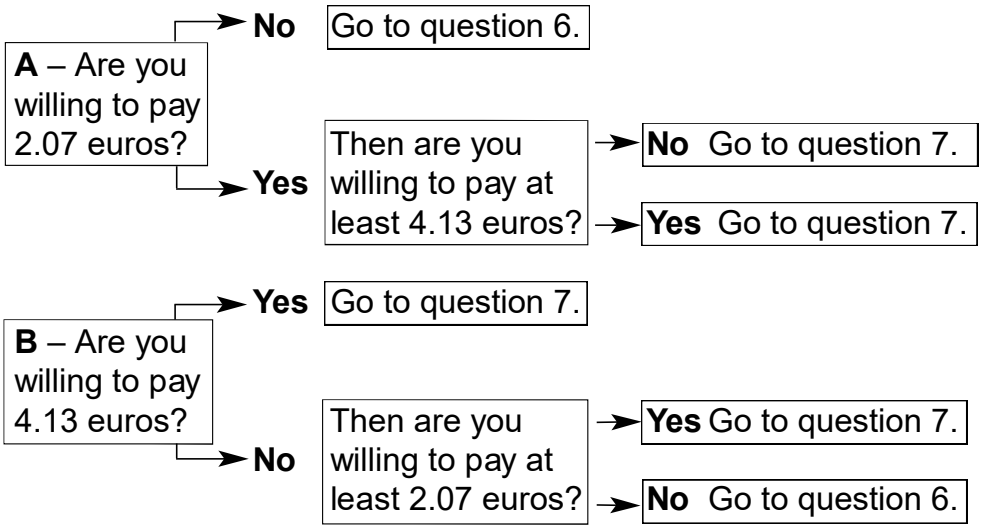
The FOOHB version was submitted to the remaining 75 per cent of the sample to improve respondent's participation to the survey and to inhabit strategic behaviour in the answers about their willingness to pay. Respondents were asked to choose if they would like to start from the lower bound or from the upper bound of the range of b^L to b^U euros. Respondents chose the starting price, not the interviewer, in order to make the survey fairer. For example it was asked (Box 3.3 and Box 3.4):

'Suppose the bureau of land management asks you to pay for a ticket to visit the area to improve the quality of the management and preservation of the area. Given these conditions, are you willing to pay for a ticket that may vary within a range of 2.07 euros (*point A*) and 4.13 euros (*point B*) keeping in mind that the exact price is uncertain?

'*Please, choose to start from point A or B as you prefer*, and answer questions following the directions. Note that your choice of the starting point does not affect the final results of the survey.'

'Suppose now that to gain access to the natural area you are asked to be part of an association called "Friends of the Mountains" which finances projects aiming at improving recreational activities according to the preferences that you revealed in question no. 1. Let us hypothesize that the annual membership fee for each recreational activity may vary within a

BOX 3.3 EXAMPLE OF FOOHB QUESTION – WILLINGNESS TO PAY FOR A TICKET



range of 0.52 euros (*point A*) and 1.03 euros (*point B*). Would you be willing to pay it?'

'*Please, choose to start from point A or B as you prefer*, and answer questions following the directions. Note that your choice of the starting point does not affect the final results of the survey.'

Different prices were randomly assigned across subjects in both models. These prices were derived on the basis of a pretest made in the area, using the bid design approach in Cooper (1993). Different ranges were divided equally in the sample (Table 3.1). Ticket prices ranged from a minimum of 1.55 to a maximum of 8.26 euros, while membership fees ranged from 0.77 to 3.62 euros. Table 3.2 shows the answers for both models. Table 3.2 shows that in the most cases of FOOHB format the respondents chose to start from the lower bid for both ticket and fee. This happens when the ticket cost more than the fee. So the OOHB format does not fairly represent the respondents' behaviour because it starts 50 per cent of the sample from the lower bound and 50 per cent from the upper bound, but most of the respondents would like to start from the lower one.

The survey also includes some questions about the reason for a negative answer to the willingness-to-pay question, in order to verify whether the FOOHB format increases the respondent's participation and, if so, whether it reduces the probability of strategic behaviour in the answers. When the reason for refusal was, 'It is a service that the state should offer to citizens

BOX 3.4 EXAMPLE OF FOOHB QUESTION – WILLINGNESS TO PAY FOR AN ANNUAL MEMBERSHIP FEE

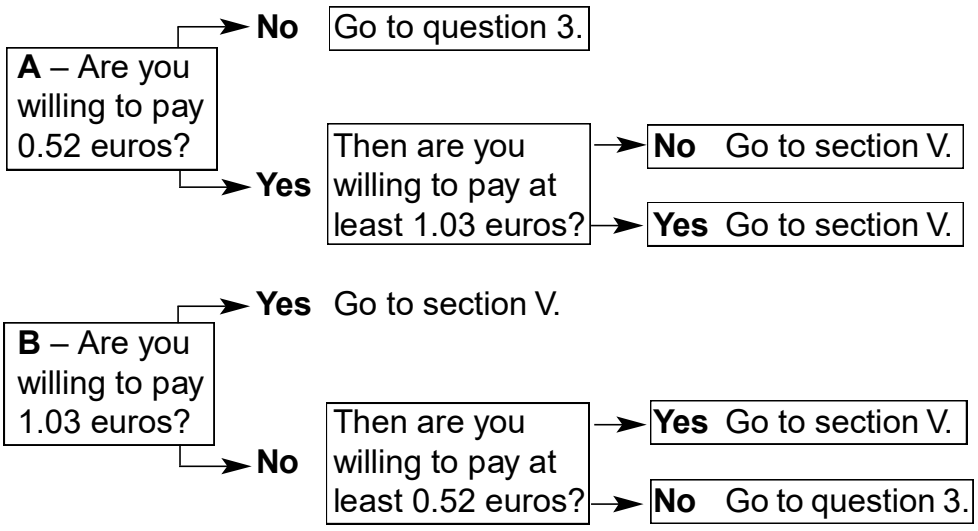


Table 3.1 Price ranges (euros)

Ticket			Fee		
Min.	Max.	%	Min.	Max.	%
1.55	3.10	20.22	0.77	1.55	20.22
2.07	4.13	23.27	1.03	2.07	23.27
3.10	6.20	18.84	1.29	2.58	18.84
3.62	7.23	18.28	1.55	3.10	18.28
4.13	8.26	19.39	1.81	3.62	19.39

and the cost must be paid by the state,' or 'It is my right to enjoy the area, you cannot ask me to pay,' then we did not consider the surveys to estimate WTP. The percentage of negative answers is greater when the question is about the WTP for a ticket than a fee because the lower bound for the ticket is higher than the one for the fee.

Note in particular that the percentage of rejections is lower in the FOOHB model than in the OOHB one. Table 3.2 shows that considering the WTP for the ticket, 26 per cent of FOOHB surveys were rejected versus 29 per cent of OOHB surveys. When we consider the WTP applied to the

Table 3.2 Frequency of willingness to pay using FOOHB and OOHB

Answers		Ticket				Fee			
		FOOHB		OOHB		FOOHB		OOHB	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
no		88	31.65	11	13.25	91	32.73	9	10.84
yes–no		99	35.61	16	19.28	62	22.30	16	19.28
yes–yes		42	15.11	12	14.46	55	19.78	14	16.87
	Subtotal 1	229	82.37	39	46.99	208	74.82	39	46.99
yes		44	15.83	12	14.46	69	24.82	21	25.30
no–yes		3	1.08	15	18.07	1	0.36	5	6.02
no–no		2	0.72	17	20.48	0	0.00	18	21.69
	Subtotal 2	49	17.63	44	53.01	70	25.18	44	53.01
Total		278	100.00	83	100.00	278	100.00	83	100.00
Rejected surveys		73	26.26	24	28.92	13	4.68	3	3.61

Table 3.3 Willingness to pay for a ticket using FOOHB and OOHB models (in euros)

	FOOHB	OOHB
Krinsky and Robb's confidence interval		
99% C.I.	$3.18 < WTP < 4.92$	$4.95 < WTP < 6.19$
95% C.I.	$3.86 < WTP < 4.77$	$4.22 < WTP < 5.95$
90% C.I.	$3.92 < WTP < 4.68$	$4.32 < WTP < 5.69$
Krinsky and Robb's mean	4.30	4.96
Krinsky and Robb's median	4.30	4.91

Source: Krinsky and Robb (1986).

Table 3.4 Willingness to pay a fee from FOOHB and OOHB models (in euros)

	FOOHB	OOHB
Krinsky and Robb's confidence interval		
99% C.I.	$2.14 < WTP < 3.15$	$2.15 < WTP < 3.85$
95% C.I.	$2.28 < WTP < 3.01$	$2.25 < WTP < 3.47$
90% C.I.	$2.35 < WTP < 2.94$	$2.30 < WTP < 3.27$
Krinsky and Robb's mean	2.62	2.73
Krinsky and Robb's median	2.61	2.68

Source: Krinsky and Robb (1986).

fee, we have the same rate of rejection in both models but in this case the fees are lower than the ticket prices.

In Tables 3.3 and 3.4 we compare the estimated WTP for both a ticket and a fee, applying the OOHB and FOOHB formats. These tables present the Krinsky and Robb confidence interval, mean and median (Krinsky and Robb, 1986). The variables used in the OOHB–FOOHB model are described in Tables 3.5 and 3.6 and the estimated coefficients in Tables 3.7 and 3.8. Note that the willingness to pay for a ticket is greater when applying the OOHB model (4.90 euros) than the FOOHB one (4.30 euros). But we have to consider that the subsets for the two models are different. If we consider the wiliness to pay a fee, the results are almost the same: OOHB–WTP is 2.69 euros, FOOHB–WTP is 2.61 euros.

Finally, before asking about the willingness to pay the fee to improve the recreational activities of the area, the visitor is asked how she allocates

Table 3.5 Descriptive statistics of variables using FOOHB and OOHB models for ticket (in euros)

Variables	Mean	St. Dev.	Min.	Max.
*risp*1	1.142	1.128	0.516	3.099
*min*1	2.809	1.862	1.549	4.132
*max*1	5.618	3.724	3.099	8.263
*aff*1	4.608	1.728	1	10
ln_*clsr*	9.890	0.516	9.068	11.034
ln_*sp2*	7.482	0.640	5.225	9.127
istrz	12.651	4.062	5	21
eta	39.355	14.321	14	85
sex	1.442	0.498	1	2
ln_*valtxi*	1.036	1.897	0	6.142

Notes:

*risp*1	Answer to the question about WTP for an entrance ticket.
*min*1	Lower bound.
*max*1	Upper bound.
*aff*1	Crowding level of the area.
ln_*clsr*	Log annual income interval.
ln_*sp2*	Log annual leisure expenditure.
istrz	Education.
eta	Age.
sex	Sex.
ln_*valtxi*	Log WTP a fee to preserve the natural area.

her time during the visit between the functions offered by the forest. As Table 3.9 shows, from this question we derive that about 77 per cent of the visitors prefer spending their time on tourist activities (mountain biking, horse riding, hiking, picnicking, visiting historic places), about 20 per cent into naturalistic activities, such as harvesting flowers, mushrooms and going sightseeing, and the remaining percentage on hunting and fishing. We find the WTP for each function by summing the WTP for the ticket and the daily association fee, and multiplying this total WTP by the percentage of visitor's preference in time allocation. We found that the price for the tourist function is 3.37 euros and for the naturalistic function is 0.85 euros. We found the price for the protective function considering the answer to the specific question: 'How much are you willing to pay in order to preserve the area for the future generations if you have to pay a tax?'. The average visitor is willing to pay 21.10 euros per year in order to preserve the West Garda Regional Forest.

Table 3.6 Descriptive statistics of variables using FOOHB and OOHB models for fee (in euros)

Variables	Mean	St. Dev.	Min.	Max.
risp2	1.228	1.189	0.5165	2.582
min2	1.263	0.708	0.7747	1.808
max2	2.527	1.415	1.5494	3.615
qtai	7.300	1.258	4	10
ln_*clsr*	9.890	0.517	9.0684	11.034
ln_*sp2*	7.482	0.640	5.2253	9.127
istrz	12.651	4.062	5	21
eta	39.355	14.321	14	85
sex	1.442	0.497	1	2
ln_*valtxi*	1.036	1.897	0	6.142

Notes:

risp2	Answer to the question about WTP a fee.
min2	Lower bound.
max2	Upper bound.
qtai	Quality of the area.
ln_*clsr*	Log annual income interval.
ln_*sp2*	Log annual leisure expenditure.
istrz	Education.
eta	Age.
sex	Sex.
ln_*valtxi*	Log WTP a fee to preserve the natural area.

3.4 CONCLUSIONS

This chapter introduces the fair one-and-one-half-bound model (FOOHB) as an alternative to the one-and-one-half-bound model (OOHB). By allowing the respondent to choose the starting point for the bidding process, FOOHB introduces fairness into the discrete choice CVM question format and it should decrease the potential for the respondent to consider the interview to be largely a top-down process that minimizes the input of the respondent to making simply a 'yes' or 'no' response. Adding fairness to interactions between policymakers and the household level is a way of encouraging citizen participation in policy decisions. We increase fairness by allowing the respondent to choose whether they want to start the questioning process with the low bid or the high bid. In other words, the respondent is allowed to choose only the starting bid and not the value itself.

Our real world data set suggested that respondents preferred the more participatory aspect of FOOHB over OOHB. The percentage of negative

Table 3.7 Coefficients of willingness to pay for a ticket using FOOHB and OOHB models

Variables	FOOHB		OOHB	
	Coeff.	St. Dev.	Coeff.	St. Dev.
constant	0.589	1.423	0.452	0.796
*risp*1	−0.048	0.018	−0.074	0.035
*aff*1	0.105	0.374	0.205	0.110
ln_*clsr*	0.057	0.055	0.153	0.124
ln_*sp*2	0.468	0.544	0.219	0.125
istrz	−0.150	0.191	0.133	0.134
eta	−0.011	0.066	−0.073	0.112
sex	0.066	0.182	−0.124	0.137
ln_*valtxi*	−1.523	0.172	0.149	0.115
mills	1.104	2.079	–	–
rho	−0.878	0.098	−0.861	0.153

Note: 361 observations; mills = inverse Mills ratio; rho = correlation coefficient; all other variables are described in Tables 3.5 and 3.6.

Table 3.8 Coefficients of willingness to pay a fee using FOOHB and OOHB models

Variables	FOOHB		OOHB	
	Coeff.	St. Dev.	Coeff.	St. Dev.
constant	−0.034	0.559	1.621	0.804
*risp*2	0.095	0.037	−0.259	0.081
qtai	0.021	0.051	0.184	0.159
ln_*clsr*	−0.094	0.145	0.664	0.258
ln_*sp*2	−0.068	0.301	0.189	0.172
istrz	−0.035	0.149	−0.667	0.173
eta	−0.053	0.054	−0.030	0.149
sex	0.108	0.247	0.024	0.015
ln_*valtxi*	−0.234	0.700	0.240	0.159
mills	2.102	2.254	–	–
rho	−0.850	0.155	0.632	0.318

Note: 361 observations; mills = inverse Mills ratio; rho = correlation coefficient; all other variables are described in Tables 3.5 and 3.6.

Table 3.9 Willingness to pay and preferences (%) for West Garda Regional Forest's functions

WTP for a visit of one day in euros (a)	4.366
% Preference for tourist function (b)	77.310
% Preference for naturalistic function (c)	19.240
% Preference for hunting/fishing (d)	3.450
WTP for tourist function in euros (e = a·b)	3.370
WTP for naturalistic function in euros (f = a·c)	0.850
WTP for hunting/fishing in euros (g = a·d)	0.151
WTP for protective function in euros	21.100

answers to the WTP is lower from the FOOHB model than the OOHB one. In most of the cases with the FOOHB format, respondents chose to start from the lower bid for both the ticket and the fee. While the OOHB model starts 50 per cent of the sample from the lower bound and 50 per cent from the upper bound, the respondent would like, in most cases, to start from the lower one. So the difference between OOHB and FOOHB is the fairness concept embedded in the FOOHB format.

NOTES

* The views presented here are those of the authors and do not necessarily represent the views or policies of the Economic Research Service or the United States Department of Agriculture.

1. Visitors were interviewed in the following places: Passo Spino (27.98 per cent of the respondents), Valvestino (17.17 per cent), Tignale (30 per cent), Tremosine (12.47 per cent), Tremalzo (4.16 per cent) and others ones (8 per cent). There were 400 respondents but after skimming the actual sample consists of 361 observations.
2. Here we give only a partial list of guidelines by the NOAA (National Oceanic and Atmospheric Administration) Blue Ribbon Panel (for a complete discussion about the NOAA guidelines see Arrow et al., 1993):

   (a) face to face interviews with pre-test for interviewer effects in order to minimize non-response rates;
   (b) conservative design, when aspects of the survey design and analysis of the responses are ambiguous;
   (c) elicit willingness to pay rather than willingness to accept;
   (d) dichotomous choice referendum format;
   (e) incorporate follow-up questions investigating the specific reasons why the respondent answered 'yes' or 'no' to the payment questions;
   (f) remind the respondent of substitute commodities;
   (g) remind the respondent of budget constraint.

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