The drovers' routes as environmental assets: A contingent valuation approach

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Abstract
The aim of this study was to evaluate the non-market benefits resulting from the restoration of an old drovers' route for recreation uses in Valencia (Spain). The valuation was carried out using the Contingent Valuation Method (CVM) through the elicitation of individuals' willingness to pay (WTP). Since 52% of the respondents stated a zero WTP response, in order to inform decision-making processes more accurately , special attention was paid to the problem of zero and protest responses, and also to the possible presence of self-selection by those that protested. For the different specifications considered, results suggest that mean WTP estimates are higher for "rural areas" than for "the Valencia area".

Keywords: drovers' routes; contingent valuation; protest and zero responses; spike model; sample selection bias.

JEL code: Q51, Q24.

1. Introduction
For centuries the practice of the transhumance throughout Spain allowed for the movement of livestock between winter and summer pastures, maximizing resource exploitation through grazing while benefitting ecosystem conservation and biodiversity (Ruiz and Ruiz, 1986). In order to develop this farming practice throughout the Iberian Peninsula a huge network of drovers' routes (named *Cañadas Reales*) was created. These drove roads were governed by livestock organizations (*La Mesta*) under the protection of special legislation dating back to the 13th century. This network of routes – with a length of over 120,000 km and an extension equivalent to 425,000 ha (i.e. 0.8% of the country's area)- was used to move up to 3.5 million sheep between lowland and highland areas (Rodríguez, 2004). The flourishing trade of merino wool –appreciated

for its high quality- prevented the ploughing of pastures. However, the abolition of *La Mesta* in the 19th century, along with agricultural intensification, industrialization, and subsequent urban expansion, led to a dramatic reduction in these transhumance practices. Hence today the vast majority of the remaining drovers' routes have been condemned to a state of neglect that is indeed threatening their very existence.

As Spain´s population has become increasingly urbanized, the demand for land-based recreation activities continues to grow for a sizable part of the population who have grown weary of living in an environment dominated by noise, concrete and asphalt (Saz-Salazar and Rausell-Köster, 2008). Therefore, the recovery and restoration of the traditional drovers' routes for rural recreation can undoubtedly generate significant economic revenue from rural land of otherwise marginal economic value. Hiking, mountain biking and horseback riding are some of the outdoor recreation activities that can act as a catalyst for rural and regional development. Apart from these recreational pursuits, these drovers' routes can also been considered ecological corridors (Múgica et al. 1996) permitting the movement of animals, the propagation of plants, and genetic interchange and connection between different protected areas.

While policy makers are aware of the economic opportunities arising from outdoor recreation activities, rational public decision-making requires us to clearly identify these economic benefits and evaluate them appropriately in order to compare them in a cost-benefit framework (Hanley and Spash, 1993; Buckley et al., 2009). However, estimating these benefits is not an easy and free-of-controversy task, given their non-market nature, as they share the non-rival and non-excludable nature of public goods. To overcome this obstacle, economists have traditionally addressed this valuation problem by adopting methodologies that rely upon surveys, as is the case of the Contingent Valuation method (CVM) (Mitchel and Carson, 1989). In a typical CVM survey respondents are asked about their willingness to pay (WTP) for the hypothetical provision of a public good or their willingness to accept (WTA) for its hypothetical loss. These economic values represent the economic benefits (or costs) of the proposed change and therefore may be aggregated in a cost-benefit framework to obtain the social benefits (or costs) from public policies that usually improve (or worsen) social wellbeing. Critics of CVM argue that elicited values are not valid measures of economic benefits because they are not founded upon actual behaviour. Hence the hypothetical nature of this methodology can result in economic values that are biased upwards (Cummings et al., 1995), thus affecting the validity and reliability of CVM. Nevertheless, as Barr and Mourato (2009) point out, whatever the feeling towards CVM, policy decisions that ignore non-market values are at least incomplete and at worst misleading.

This paper, using a contingent valuation approach, aims to contribute to the growing literature in this area of outdoor recreation (McConnell, 1985; Bockstael et al., 1991; Hanley et al, 2003; Buckley et al., 2009; Loomis and Keske, 2009; Howley et al., 2012). A case study is designed to estimate the non-market benefits derived from the restoration and maintenance of a drovers' route in Eastern Spain for recreational uses. This drovers' route, known as *Cañada Real del Reino de Valencia*, is located in the province of Valencia. Its current state of neglect –due to a reduction in transhumance practices- has prompted the need to seek alternative uses as a basis for the strategic planning of rural areas. Hence regional authorities are very interested in knowing the potential role that could be played by this environmental good in revitalizing and sustaining the rural economy.

In order to provide accurate WTP estimates to help in decision-making, another aim of this study is to shed some light on the issue of zero and protest responses in

CVM studies, since 52% of respondents stated a zero WTP response. To deal with this problem a twofold solution was adopted. On the one hand, assuming that a sizable part of the respondents were not in the market of the environmental good in question, a Spike model was applied (Kriström, 1997). And, on the other hand, a bivariate probit model with selection was estimated in order to demonstrate whether the protest decision is (or not) correlated with the decision to participate in the hypothetical market. This model takes into account the possible presence of self-selection originated by the presence of protest responses (Lee et al., 1980).

The remainder of the paper is organized as follows. In section 2 the case study is presented. Section 3 describes the design of the questionnaire and the sampling process. Section 4 presents the econometric models applied, while outlining the Spike model and the procedure followed to deal with the problem of zero and protest responses. Section 5 presents the results obtained and validates them from a theoretical point of view. Section 6 addresses the aggregation issue in order to estimate the non-market benefits resulting from this policy change aimed at restoring this drovers' route for recreational uses. In section 7 the results are discussed. Finally, section 8 draws some conclusions and policy implications.

2. Case Study: La Cañada Real del Reino de Valencia

In Spain the ecological rationale for the practice of transhumance can be found in the physical configuration of the Iberian Peninsula, which is dominated by the Mediterranean climate, and where only the most northern areas enjoy permanent moist conditions (Manzano-Baena and Casas, 2010). In fact, the main drovers' routes depart from the south-west finishing in the mountainous regions of the north of the country. *La Cañada Real* is a drovers' route located in eastern Spain that crosses the province of Valencia from east to north-west. It measures 130 km in length, with a variable width of between 37-75 m and covers an area of 9,240 ha (see figure 1). In the past, this piece of land allowed for the practice of the transhumance, that is, the seasonal movement of livestock from lowland to higher pastures in summer, while in winter the opposite route was taken. As with the rest of drovers' routes in Spain, the loss of special protection with the abolition of *La Mesta* in the 19th century was the beginning of its decline. Later, industrialization, technological changes in the cattle farming, which brought about the progressive intensification of production and the rationalization of feeding with the use of fodder, as well as alternative means of transport led to the progressive abandonment of this drovers' route and to its current state of neglect. In fact, its extension has been reduced considerably as a consequence of land reclaimed for forestry and for other agricultural, industrial, and urban uses. In some places, houses, and roads have been built over the original course of this drovers' route. Furthermore taking advantage of its course, a wind farm was set up near the town of Buñol. As a result of all these changes, it would now be virtually impossible to return the route to its original state. In view of its current state, the public bodies involved –mainly the regional government - have expressed the need to find new uses that are compatible with its original function –the movement of livestock. Therefore, this implies the recognition of the role that it can play as an environmental asset through the promotion of its recreational use (hiking, mountain biking and horseback riding, etc.) without forgetting its role as an ecological corridor favouring biodiversity, the movement of wildlife and the propagation of plants. To this respect, Gómez-Sal and Lorente (2004), point out that the extensive network of transhumant tracks have a high natural and cultural value and present problems of profitability that demand integrated approaches with a clear orientation towards multifunctionality (tourism, grazing, nature conservation, education, etc.).

Evidently, the recovery and subsequent maintenance of this public good for these new uses depend on the supply of public funds that must be justified. Therefore, it prompts the need to identify and estimate the non-market benefits that stem from these recreational uses in order to compare these in a cost-benefit framework.

3. The survey

In any CVM study the survey design is a crucial stage. Obtaining accurate benefit estimations requires detailed description of the public good or resource being valued, hence a great deal of effort must be devoted to carefully defining and clearly displaying the valuation scenario -with its corresponding welfare change- to the respondents (Loomis et al., 2000). The data obtained from several focus groups and two pilot surveys, covering 30% of the total sample, gave essential guidelines for the development of the questionnaire. After this pre-test stage, further changes were made both in the wording of the questionnaire, as well as in the visual aids used to facilitate understanding. A total of 356 face-to-face interviews were carried out in May 2010. In order to guarantee the representativeness of the sample, a quota controlled survey procedure was followed. Thus, the main sample parameters (gender, age, income, education, etc.) closely resembled those of the entire population. In this respect, it is worth mentioning that given the different origin of the population settled in the area covered by this natural resource, special attention was paid to guarantee that both rural and urban areas were adequately represented in the sample. Consequently, 55% of the interviews were conducted in the city of Valencia (the capital of the province) and its metropolitan area, while the remaining 45% were carried out in five municipalities along the course of this natural resource.

The valuation scenario comprised, on the one hand, a description of the current state of neglect of *La Cañada Real* and, on the other hand, an explanation of the public policy aimed at restoring this resource for land-based recreational activities. In order to reinforce the credibility of the hypothetical market constructed and to avoid free ride behaviour typical of voluntary payments, the payment mechanism proposed was an increase in the real estate tax currently paid by each dwelling. In this regard, Carson (1997) suggests that voluntary contribution mechanisms should be generally avoided in CVM surveys, since there is a strong incentive to free ride and for the survey question to over pledge.

The elicitation method used was the discrete choice or referendum format (Bishop and Herbelein, 1979). However, the respondents were first asked a binary question with the purpose of determining whether or not they were in the market. This allowed a Spike model (Kriström, 1997) to be applied in order to explain the two decisions made by the respondent: (i) whether or not to participate in the market and (ii) the response to the offered payment once they had decided to enter the market.

Following the procedure adopted by Cooper (1993), for the discrete choice question six different bids were considered (€25, €50, €75, €100, €150, and €200). This bid vector was based on the open-ended responses to the pilot survey that were used to produce estimates of the parameters of the distribution needed to obtain the number of bids and their respective sizes.

The specific wording of the WTP scenario read to respondents was:

"The restoration of *La Cañada Real* for recreational purposes, as previously explained, costs a great deal of money. Given limited government resources, in order to fund this action all the citizens would be asked to pay an annual increase on their current real estate tax bill over the next four years. If the majority of households vote in favour, this project will be carried out, while if a majority votes against the proposal, then this natural resource will remain as it is today. Considering all the benefits that stem from this project, would you willing to contribute financially to such a project for the next four years?"

Respondents who answered affirmatively to this previous question were asked the following WTP question: "This restoration program would cost your household € … a year. Would you vote in favour of this program, against or do not know?" On the other hand, respondents who answered negatively to the first question were not asked this second question, i.e. no payment was offered to them. Nevertheless, a follow-up question was asked to them in order to ascertain the reason behind the decision not to participate, thus allowing us to distinguish between genuine zero responses and protest responses.

4. Theoretical framework

For many policy issues WTP questions generate a considerable number of zero responses (Johnson and Whitehead, 2000). For example, in this particular study 52% of the respondents stated a zero WTP response while in the study conducted by Dziegielewska and Mendelsohn (2007) over 65% of the sample rejected the offered bid. Some zero responses are a true reflection of individuals' preferences, other may be motivated by protest behaviour. Hence the need to adopt an appropriate framework of analysis that allows us, on the one hand, to distinguish between genuine zero responses and protest responses and, on the other hand, to treat each type of zero response appropriately (Strazzera et al., 2003). Nonparticipation can have a substantial impact on the results of CVM studies, if it is inadequately accounted for in the estimation process resulting in an important difference in the final WTP estimates (Haab, 1999; Dziegielewska and Mendelsohn, 2007).

In this research 32.5% of respondents protested, reacting to some characteristic of the hypothetical market created (refusal to pay the proposed tax increase, mistrust in public bodies in managing public funds, etc.). A genuine zero value is not a problem since it reflects the true value that the public good has for the respondent. The problem is what to do with protest responses since developing unambiguous rules for truncating protest responses is really difficult (Jorgensen and Syme, 2000). Traditional CVM analysis has tended to exclude them from the sample data. However, this may not be the correct procedure if protest responses induce a selectivity bias (Calia and Strazzera, 2001), i.e. there is a systematic relationship between protesting and participating in the market.

Although there is no a general consensus in the CVM literature on the most appropriate way of dealing with this problem of nonparticipation, a solution that has gained an increasing popularity is the Spike model. Proposed by Kriström (1997) it explicitly allows for the possibility that some portion of the respondents are indifferent to the good being valued, i.e. this model assigns a non-zero probability to zero WTP responses. Without being exhaustive in our review, among the studies that have previously applied this model, we can highlight those of Reiser and Schechter (1999); Saz-Salazar and García-Menéndez (2007), Nahuelhual-Muñoz et al. (2004), Powe and Bateman (2004), Broberg and Brännhund (2008), Hanley et al. (2009a), Yoo and Kwak (2009) and Maduereira et al. (2011).

Following Kriström (1997), consider a household confronted with a question to accept or reject a project for a given sum of money *A*. The project can be represented as the change from q_0 to q_1 in environmental quality being $q_1 > q_0$, i.e. there is an improvement in the environmental quality. In our case study, the restoration of this natural resource would imply an increase in environmental quality enhancing both the practice of recreational activities and its role as an ecological corridor. The WTP for this change is defined as:

$$V\left(Y-WTP,q_1\right)=V\left(Y,q_0\right) \quad (1)$$

where V(y, q) is the individual's indirect utility function and *Y* is his income. Suppose now that there is a continuum of individuals with possibly different valuations of the project, then the probability that an individual's WTP does not exceed an amount *A* is given by:

$$P(WTP \leq A) = F_{WTP}(A) \quad (2)$$

where F_{WTP} (*A*) is a right, continuous, non decreasing function. Consequently, the expected WTP is given by:

$$E(WTP) = \int_0^{\infty} 1 - F_{WTP}(A)\,dA - \int_{-\infty}^{0} F_{WTP}(A)\,dA \quad (3)$$

In order to estimate F_{WTP} (*A*), when a dichotomous choice question is used, the proposed bid *A* must be varied across the sample, using a different *A* for each subsample. In this model it is assumed that the distribution function of WTP has the following form:

$$F(A) = \begin{cases} 0 \quad \text{if} \quad A < 0 \\ \dfrac{1}{1+e^{\alpha}} \quad \text{if} \quad A = 0 \\ \dfrac{1}{1+e^{\alpha+\beta A}} \quad \text{if} \quad A > 0 \end{cases} \quad (4)$$

This approach basically uses two valuation questions: the first asks whether or not the individual would be willing to contribute financially to the project, and the second suggests a price *A* only to those that have accepted to enter in the market. Thus, for each individual *i*, we have two indicator variables: IO_i and IA_i. The first indicator tells if the individual is in the market or not of the environmental good that is being valued. This first indicator is defined as follows:

$$IO_i = \begin{cases} 1 & \text{if} \quad WTP_i > 0 \\ 0 & \text{if} \quad WTP_i \leq 0 \end{cases} \qquad (5)$$

Now, only for those respondents who wish to enter in the market (IO_i=1) of this particular resource, a price A is suggested, and then we have the second indicator (IA_i):

$$IA_i = \begin{cases} 1 \quad \text{if} \quad WTP_i > A_i \quad \text{and} \quad IO_i = 1 \\ \qquad 0 \qquad \text{otherwise} \end{cases} \qquad (6)$$

The spike model can be estimated using a variety of approaches, but the most popular are the parametric maximum likelihood methods. Once the maximum likelihood function has been estimated, the mean WTP in this simple spike model is given by the following formula if β is positive:

$$E(WTP) = \frac{1}{\beta} \ln\left[1 + \exp(\alpha)\right] \qquad (7)$$

To address the impact of respondents' characteristics on WTP, the previous model can be extended including covariates. Thus if IA_i^* is the difference between the indirect utilities that imply for the i^{th} individual a change in the environmental quality from q^0 to q^1, then the equation for the latent variable IA_i^* is:

$$IA_i^* = \alpha + \beta A_i + \gamma_1 X_{1,i} + \gamma_2 X_{2,i} + \ldots + \gamma_M X_{M,i} + \varepsilon_{IA,i} \qquad (8)$$

where $X_{IA} = \{X_1, X_2, \ldots, X_M\}$ is a vector of explanatory variables besides the bid A offered to the respondent in order to enjoy an improvement in the environment quality from q^0 to q^1. With the introduction of this new indicator variable IA^*, the decision rule of each individual *i* with respect to accepting or not the offered bid *A* is now given by:

$$IA_i = \begin{cases} 1 & \text{if } IA_i^* > 0 \\ 0 & \text{if } IA_i^* \leq 0 \end{cases} \qquad (9)$$

Analogously, one can assume that behind the decision to participate in the hypothetical market there exists a latent variable IO_i^* given by:

$$IO_i^* = \gamma_0 + \gamma_1 V_{1,i} + \gamma_2 V_{2,i} + \ldots + \gamma_K V_{K,i} + \varepsilon_{IO,i} \qquad (10)$$

where $X_{IO} = \{V_1, V_2, \ldots, V_K\}$ is also a vector of explanatory variables not necessarily distinct of X_{IA}. In this case, the decision rule is:

$$IO_i = \begin{cases} 1 & \text{if } IO_i^* > 0 \\ 0 & \text{if } IO_i^* \leq 0 \end{cases} \qquad (11)$$

The disturbance terms are assumed to have a bivariate normal distribution with a correlation parameter ρ. That is, $(\varepsilon_{IA}, \varepsilon_{IO}) \sim \text{BVN}(0,0,1,1,\rho)$[1]. Therefore, with the introduction of these decision rules, the Spike model becomes a bivariate specification with sample selection:

$$\begin{cases} IO_i = 0 \ \text{ if } IO_i^* \leq 0 \\ IO_i = 1 \ \text{ if } IO_i^* > 0 \rightarrow \begin{cases} IA = 1 & \text{if } IA_i^* > 0 \\ IA = 0 & \text{if } IA_i^* \leq 0 \end{cases} \end{cases} \qquad (12)$$

The likelihood function can be written as follows:

$$L = \prod_{IO=0} P(IO^* \leq 0) \prod_{IO=1} \left[\prod_{IA=1} P(IO^* > 0, IA^* > A) \prod_{IA=0} P(IO^* > 0, IA^* \leq A) \right] \qquad (13)$$

[1] In this case, as the model is estimated by maximum likelihood, there is no “lambda” as there is in Heckman’s (1979) selection model generally estimated with two-step least squares.

which implicitly contains the joint probability of IO^* and IA^*, and the marginal probability of IO^*.

5. Results

The econometric analysis carried out in this section aims, on the one hand, to obtain valid WTP estimates considering different treatments for protest responses and, on the other hand, to validate these estimates from a theoretical point of view while checking for selectivity bias. This latter aim is undertaken estimating a bivariate probit model with selectivity.

5.1 WTP estimates

In estimating mean WTP values we have followed a double approach regarding protest responses. Firstly, following Meyerhoff and Liebe (2006), these responses are considered as genuine zeroes, so they are included in the sample. And secondly, they are excluded from the sample although this latter approach may always not be considered appropriate since it could introduce a selection bias affecting the validity of the WTP estimates. The issue of sample selection bias will be addressed in the next section.

The coefficients of the different models estimated to obtain the mean WTP values are shown in table 1. Apart of the dual treatment given to the protest responses, we have considered it interesting to go further and analyse how WTP differs between the two areas where the interviews were carried out: Valencia city and its metropolitan area versus rural regions. As can be observed, when protest bids are included the logit model yields an estimated mean WTP that is negative (€-14.74). This result can be explained by the high rate of zero responses obtained and by the fact that the logistic specification allows WTP to be negative. However, as the spike model –in this simple version[2]- divides the sample into respondents with zero WTP and respondents with positive WTP, then it appears to be ideally suited for cases where a sizable part of the sample has a zero WTP, thus yielding a positive WTP estimate (€47.35). On the other hand, when protest bids are excluded both specifications provide positive and higher WTP estimates (€66.30 and €46.72, respectively) although they can be biased as previously outlined.

Regarding the spatial analysis of WTP, in general for the different specifications considered the mean WTP values are higher for "rural areas" than for "Valencia and its metropolitan area". For example in the case of the Spike model, excluding protest responses, mean WTP value for the "rural areas" is €75.02, while for "Valencia and its metropolitan area" it is €57.36. If we keep protest responses these same figures are €54.40 and €40.41, respectively. This result will be reinforced in the next section with the estimation of a model with covariates.

At this point, let us examine the true magnitude of the WTP estimates obtained. Here, we compare these welfare measures with a reference figure, namely the average amount paid in real estate taxes by a house owner in this area in 2009. Considering that the average "property tax bill" was €265.73, and that the payment vehicle set was precisely an hypothetical increase in this tax over the next four years, then the mean WTP values obtained would imply an annual increase of between 17.8% and 24.9% for "all the sample" (see table 2). For the "Valencia area" this increase would be lower (between 15.2% and 21.6%) and for the "Rural areas" it would be larger (between 20.5% and 28.2%) since this latter area showed higher WTP values.

[2] The extended spike model split the simple in three categories: those who dislike the Project (losers); those who are indifferent and those who consider the Project welfare-improving (winners). See Kriström (1997) for greater detail.

Table 1
Estimated models and mean WTP

	Including protest responses						Excluding protest responses					
	All the areas		Valencia area		Rural areas		All the areas		Valencia area		Rural areas	
	Spike	Logit	Spike	Logit	Spike	Logit	Spike	Logit	Spike	Logit	Spike	Logit
Constant	-	-0.179444	-	-	0.47371	-	0.911911	0.765506	0.742740	0.820423	1.103202	0.738054
	0.070947	(-2.027)	0.183816	0.071214	(0.701)	0.279030	(14.372)	(7.105)	(8.634)	(5.332)	(11.670)	(4.849)
	(-1.499)		(-2.765)	(-0.564)		(-2.237)						
Bid (A)	0.013902	-0.012167	0.014981	-	0.013181	-	0.018846	-0.016384	0.019733	-0.019429	0.018524	-0.014003
	(20.320)	(-9.810)	(12.761)	0.015661	(14.826)	0.090244	(22.089)	(-11.780)	(14.955)	(-9.165)	(16.074)	(-7.517)
				(-8.374)		(-5.386)						
Mean WTP (€)	47.35	-14.74	40.41	-4.54	54.40	-30.91	66.30	46.72	57.36	42.22	75.02	52.70
S.D. mean WTP	2.47	8.51	3.14	8.49	3.84	18.72	2.82	4.07	3.73	4.99	4.21	6.53
Log-likelihood	1687.997	-1003.122	838.121	-483.364	844.8351	515.083	1172.756	-734.002	594.498	-356.850	571.653	-373.187
N	356	356	182	182	174	174	240	240	122	122	118	118

Note: t-statistic in parenthesis.

Table 2
Hypothetical increase in property tax bill

	Mean WTP (including protest responses)	Hypothetical increase in property tax bill	Mean WTP (excluding protest responses)	Hypothetical Increase in property tax bill
All the sample	€47.35	17.8%	€66.30	24.9%
Valencia area	€40.41	15.2%	€57.36	21.6%
Rural areas	€54.40	20.5%	€75.02	28.2%

5.2 WTP determinants

To give credibility to the results obtained, WTP determinants must be analysed. The construction of an equation that predicts WTP for the good with a reasonable explanatory power and coefficients with the expected signs provides evidence of the proposition that the survey has measured the intended construct (Carson, 2000). The explanatory variables used and their main descriptive statistics are shown in table 3. As previously mentioned, respondents were asked two questions: the first designed to find out if they were in the market or not, and the second offered a price to those that responded affirmatively to the first question. Therefore, as shown in table 4, two bivariate Probit models with selection have been estimated. In the first, the decision to participate in the market (IO=1) is conditional on the decision of non-protesting (NONPROTEST=1). While in the second the decision to accept the proposed bid (IA=1) is conditional on the decision of entering the market (IO=1). Regarding the first model, the selection equation explains the differences between protest and non-protest responses and it shows that the probability of non-protest is positively related to the respondent's household income, whether they hold a university degree, the use expectations of this natural resource, as well as to two variables related to environmental concern ("conservation" and "very-interested"). On the other hand, if the interview was carried out in Valencia city, or its metropolitan area, the probability of non-protesting is lower, i.e. the probability of protesting is higher. The second equation (participation equation) shows that the likelihood of accepting to participate in the hypothetical market is positively related to household income, to a set of variables indicating environmental concern ("conservation", "all", "change" and "veryinterested") and negatively related to those under 25 and to living in Valencia or its metropolitan area. The correlation parameter (ρ) between the disturbance terms is not statistically different from zero, therefore it seems that the decisions whether to protest and participate in the hypothetical market are not correlated, i.e.

protest response could be removed from the sample since it does not lead to any sample selection bias.

The second model explains the decision to accept the proposed bid (IA=1) once the individual has accepted to enter the market (IO=1). From the coefficients of the selection equation we can infer that the probability of entering the market is again positively related to household income, to the complete set of environmental concern variables ("conservation", "all", "change" and "veryinterested"), and negatively related to being unemployed, and to living in Valencia or in its metropolitan area. The elicitation equation, explains the probability of accepting the proposed bid for those who agreed with increasing their current property taxes in order to fund this restoration policy. Therefore, as expected this probability is negatively and significantly related to the offered bid, i.e. the higher the payment offered to the respondent, the lower the probability of acceptance. Another important variable that shows the correct sign and is very significant is household income, so the higher the respondent's household income, the higher his WTP, or probability of accepting the proposed payment. The literature on valuing public goods strongly suggests that income is positively correlated with environmental quality improvements (Hanley et al., 2009b). The variable "whitecollar" also exhibits positive sign, so respondents with a white collar job and a university degree are more likely to accept the proposed payment. The positive sign of "existence" indicates that respondents who not only have use values but also hold existence values regarding this natural resource, have a higher WTP. On the other hand, as expected, respondents that are unemployed are less likely to pay for the proposed bid given their current situation of uncertainty. Regarding the variable "Valencia", once again, those respondents living in the city and its metropolitan area have a lower probability of accepting the proposed bid. Therefore, this result reinforces the results obtained in the previous section that showed that the mean WTP estimates obtained were lower for residents in the Valencia area in comparison with residents in "rural areas". In our opinion, this result could be explained by the higher expectations of those living within these rural areas to see greater economic benefits as a direct result of the recreational activities proposed by public authorities. Finally, in this second model, the correlation parameter (ρ) is significant and positive indicating that, as expected, the decision to accept the payments is related to the decision of entering the market; hence ignoring this selection would have led us to yield inconsistent estimates of the parameters (Van de Ven and Van Praag, 1981).

Table 3
Description of the explicative variables

Variable	Description	Mean	S.D.
Bid	Offered bid ranging from €25 to €200	70.784	0.002
Income	Respondent's household income after taxes in eleven different intervals from €0 to > € 3,000	3.758	0.039
Conservation	If the respondent "agree" or "strongly agree" with "the protection of natural resources must be done regardless its costs" =1; other cases=0.	0.627	0.169
All	If the respondent "agree" or "strongly agree" with "we all have to contribute in order to protect the nature"=1; other cases=0.	0.877	0.217
Change	If the respondent "agree" or "strongly agree" with "I would be willing to change my current habits in order to protect the environment" =1; other cases=0.	0.601	0.133
Valencia	If the interview was carried out in Valencia and its metropolitan area=1: other cases=0	0.379	0.130
Under25	If the respondents is under 25=1; other cases=0	0.145	0.152
Use	If the respondent stated that he would "definitely" use the drover's route once it was restored=1; other cases=0	0.808	0.199
Veryinterested	If the respondent states that he was "very" or "quite" interested for the environment=1; other cases=0.	0.762	0.165
University	If the respondent has a university degree=1; other cases=0	0.169	0.117
Unemployed	If the respondents is unemployed=1; other cases=0	0.145	0.158
Existence	If the respondents stated that apart of use values he also holds existence values regarding this natural resource=1; other cases=0	0.582	0.134
Whitecollar	If the respondents has a white collar job and a university degree=1; other cases=0	0.235	0.175

Table 4
Sample selection models (Bivariate Probit with selection)

	Model 1		Model 2	
Variable	Selection eq. (NONPROTEST=1)	Participation eq. (IO=1)	Selection eq. (IO=1)	Elicitation eq. (IA=1)
Constant	-0.5931***	-1.9245**	-1.9378***	-1.5452***
	(-4.918)	(-2.418)	(-8.399)	(-4.746)
Bid				-0.0189***
				(-9.462)
Income	0.1494***	0.1216*	0.1107**	0.2780***
	(6.522)	(1.820)	(3.047)	(7.135)
Conservation	0.3945***	0.7598***	0.7087***	-0.7457***
	(5.327)	(4.046)	(6.635)	(4.403)
All		0.5024***	0.5329***	1.0481***
		(3.564)	(3.707)	(4.829)
Change		0.2704**	0.2745**	0.7814***
		(2.084)	(2.157)	(5.867)
Valencia	-0.2112**	-0.3851**	-0.3391***	-0.3837**
	(-2.888)	(-3.162)	(-3.286)	(-2.949)
Under25		-0.2954		
		(-1.946)		
Use	0.4114***	1.4448***	1.4608***	
	(4.624)	(7.268)	(11.319)	
Veryinterested	0.2483**	0.3568**	0.4181***	
	(2.982)	(2.165)	(3.287)	
University	0.3299**			
	(2.802)			
Unemployed			-0.3603**	-0.8703***
			(-2.273)	(-3.456)
Existence				0.3836**
				(2.865)
Whitecollar				0.5785***
				(3.303)
Log-likelihood	-1277.975		-747.330	
ρ	0.339		0.653*	
N	307		214	

Note: t-statistic in parenthesis.
***: 1% significance level; **: 5% significance level; *: 10% significance level.

6. Aggregation

The ultimate use of CVM in cost benefit-analysis is to provide an estimate of the aggregated benefits reflecting the economic benefits accruing to the general population as a consequence of a change in environmental quality. However, aggregation in non-market valuation is always a controversial issue. To this respect, Sagoff (1988) states that simple approaches as adding-up individual preferences sidestep the process of reaching agreement concerning the values and norms that should shape public policy; while Bateman et al. (1996) emphasize that these approaches can severely bias the aggregate estimates if the extension of the market is not accurately identified. Therefore, in this case study the extent of the market considered is precisely the number of houses settled in the municipalities through which *La Cañada Real* runs. We follow this aggregation criterion for two reasons. First, we cannot forget that caution should guide the practice of contingent valuation, so using another aggregation criterion as the population settled in this area would probably lead us to an overestimation of the aggregated benefits of this policy. And second, considering that the payment vehicle used was an increase in the real property tax, then this aggregation criterion arises as the most appropriate. Once the extension of the market is defined, it is necessary to choose a welfare measure among the different WTP estimates obtained. Again caution is a necessary requirement; hence the mean WTP estimates chosen have been the lowest ones, i.e. the estimates obtained from the Spike model including protest responses. Taking into account that 55% of the interviews were conducted in "Valencia and its metropolitan area", while the rest were conducted in the "rural areas", we have calculated a weighted mean WTP of €46.70, which is precisely the figure we used in the aggregation process. Finally a discount rate and a time horizon should be chosen. This issue is also troublesome, since the present value of the benefits accruing to the society depend also on these two variables. As our analysis does not focus on the long term, we have chosen two constant discount rates and a useful 25 year lifespan for the restoration process. So if we multiply the weighted mean by the number of houses settled in this area (401,349) we obtain that the present value of the benefits derived from this restoration process amounts to €326.4 million, if the discount rate considered is 3% and to €412.8 million if the discount rate is 1% (see table 6).

Table 6
Social benefits derived from restoring *La Cañada Real*

Number of houses	401,349
Weighted mean WTP (€)	46,70
Annual social benefits	18,742,998
Expected social benefits assuming a period of 25 years and an discount rate of 1% (€)	412.779.969
Expected social benefits assuming a period of 25 years and an discount rate of 3% (€)	326,374,597

Source: INE data and our own calculations

7. Discussion

In the case study carried out, an issue related to the credibility of the results obtained concerns the relative magnitude of the WTP estimates. As previously said, these estimates would imply a hypothetical increase in the property tax of somewhere in the region of 15 to 28%, depending on the area considered. Therefore, the most important question here is to know whether these tax increases are realistic or not. The answer will depend on how people wish to interpret and make sense of contingent valuation questions. Unfortunately economic valuation of the environment is not as straightforward as some CVM researchers may be inclined to think, i.e. sometimes the mere expression of a monetary value should not be taken as evidence that this is founded on an underlying value construct (Svedsäter, 2003). However, this assertion may not be directly transferable to CVM studies -as is the case presented- that use a referendum approach with its corresponding discrete choices and that aims to value environmental goods of low complexity for which the payment vehicle is familiar and straightforward to the respondents. In addition, our results have been able to pass some minimal test of theoretical validity, since in explaining WTP the main variables considered (household income, offered bid, environmental concern, etc.) showed the correct sign and were very significant.

If the ultimate aim of any CVM study is to accurately inform the decision-making process, we cannot sidestep the fact that the results obtained, although robust from a theoretical point of view, are very sensitive to both the econometric specifications assumed

(Bengochea et al., 2005) and to the aggregation criterion taken. Therefore, instead of having a single value indicator of the benefits stemming from a public policy, the researcher usually obtains a wide set of figures that could be baffling to the decision maker if they are not adequately explained. In this particular study WTP estimates are different depending on (i) whether protest responses are included or excluded from the sample, (ii) the area where the interview was carried out and (iii) the aggregation criterion chosen. Therefore, the steps to be followed before a valid estimation of the benefits can be reached, should be clearly explained to make the whole process feasible, realistic and meaningful. To this respect, Hanemann (1994) states that this methodology, though simple in its directness, is in fact difficult to implement without encountering a myriad of problems, and so each particular study needs to be scrutinized carefully.

8. Conclusions

This study primarily aims to estimate the non-market benefits that stem from the restoration of a drovers' route in Eastern Spain for recreation purposes. Considering the increasing demand for land-based recreation activities, the information gathered from this study arises as a key element in informing public policies hoping to revitalize and sustain rural areas through the promotion of the recreational use of this natural asset. Thus "breathing new air" into such areas can act as a catalyst for their economic success once the passage of time, and the subsequent technological changes, have deprived them from their traditional uses linked to the seasonal movement of cattle. Assuming a useful lifespan of 25 years for this restoration policy, a conservative estimate of the present value of the expected non-market benefits ranges from a minimum value of € 326.4 million if the discount rate considered is 3%, and a maximum value of € 412.8 million if a discount rate of 1% is applied.

These figures, although appealing given their magnitude, would be meaningless if they are not founded upon an underlying value construct. Therefore, special attention has been paid to the problem of zero and protest responses, and also to the possible presence of self-selection by those that protested. The results obtained show that the decisions of non-protesting and entering in the market are not correlated excluding the presence of a sample selection bias. In the same way, the results obtained have also been underpinned by the estimation a bivariate probit model with selection in which the main variables show the expected sign and significance level. The results also show that WTP is higher in rural areas - where the drovers' route is located- than in urban areas. Therefore, they seem to confirm previous findings of the effect of distance on WTP (Pate and Loomis, 1997; Hanley et al., 2003).

Finally, the reported estimates constitute only a fraction, maybe not even the most important part, of the benefits that could result from a policy clearly focused on the multifunctional role of drovers' routes as ecological assets. Therefore, there is significant scope for future research aimed, in particular, at estimating the non-use values related to this natural asset.

References

Barr, R.F., Mourato, S. 2009. Investigating the potential for marine resource protection through environmental service markets: An exploratory study from La Paz, Mexico. Ocean and Coastal Magement 52, 568-577.

Bateman, I.J., Cole, M.A., Georgiou, S., Hadley, D.J. 2006. Comparing contingent valuation and contingent ranking: A case study considering the benefits of urban river quality improvements. Journal of Environmental Management 79, 221-231.

Bengochea-Morancho, A., Fuertes-Eugenio, A.M., Saz-Salazar, S. del 2005. A comparison of empirical models used to infer the willingness to pay in contingent valuation. Empirical Economics 30, 235-244.

Bishop, R.C., Heberlein, T.A. 1979. Measuring values of extra-market goods: are indirect measures biased? American Journal of Agricultural Economics 61, 926–30.

Bockstael, N.E., McConnell, K.E., Strand, I. 1991. Recreation, in: Measuring the demand for environmental quality. Braden, J.B., Kolstad C.D. (Eds.), Elsevier, Amsterdam.

Broberg, T., Brännlund, R. 2008. On the value of large predators in Sweden: A regional stratified contingent valuation analysis. Journal of Environmental Management 88. 1066-1077.

Buckley, C., van Rensburg, T.M., Hynes, S. 2009. Recreational demand for far commonage in Ireland: A contingent valuation assessment. Land use Policy 26, 846-854.

Calia, P., Strazzera. E. 2001. A sample selection model for protest votes in contingent valuation analysis. Statistica 61, 473-485.
Carson, R.T., 1997. Contingent valuation: theoretical advances and empirical tests since the NOAA panel. American Journal of Agricultural Economics 79, 1501–1507.
Carson, R.T., 2000. Contingent valuation: a user's guide. Environmental Science and Technology 34, 1413–1418.
Cooper, J.C., 1993. Optimal bid selection for dichotomous choice contingent valuation surveys. Journal of Environmental Economics and Management 24, 25-40.
Cummings, R. G., Harrison, G.W. and Rutström, E.E. 1995. Homegrown Values and Hypothetical Surveys: Is the Dichotomous Choice Approach Incentive Compatible? American Economic Review 85, 260–266.
Dziegielewska, D.A., Mendelshon, R. 2007. Does "No" mean "No"? A protest methodology. Environmental and Resource Economics 38, 71-87.
Gómez Sal, A., Lorente, I. 2004. The present status and ecological consequences of transhumance in Spain, in Transhumance and Biodiversity, in: European Mountains. Report from the EU-FP5 project Transhumount (EVK2-CT-2002–80017) (Eds.) R.G.H. Bunce, M. Pérez Soba, R.H.G. Jongman, A. Gómez Sal, F. Herzog and I. IALE publication series no. 1, Austad, Alterra, Wageningen UR, Wageningen; pp. 233–248.
Haab, T.C. 1999. Nonparticipation or Misspecification? The Impacts of Nonparticipation on Dichotomous Choice Contingent Valuation. Environmental and Resource Economics 14, 443-461.
Hanemannn, W.M. 1994. Valuing the environment through contingent valuation. Journal of Economic Perspectives 8, 19-43.
Hanley, N., Colombo, S., Kriström, B., Watson, F. 2009. Accounting for negative, zero and positive willingness to pay for landscape change in a national park. Journal of Agricultural Economics 60, 1-16.
Hanley, N., Kriström. N., Shogren, J.F. 2009. Coherent Arbitrariness: On Value Uncertainty for Environmental Goods. Land Economics 85, 41-50.
Hanley, N., Saw, W.D., Wright, R.E. 2003. The new economics of outdoor recreation. Edward Elgar, USA.
Hanley, N., Schläpfer, F., Spurgeon, J. 2003. Aggregating the benefits of environmental improvements: distance-decay functions for use and non-use values. Journal of Environmental Management 68, 297-304.
Hanley, N., Spash, C.L. 1993. Cost benefit analysis and the environment. Edward Elgar Publishing, Cheltenham, UK.
Heckman, J. 1979. Sample selection bias as a specification error. Econometrica 47, 153-161.
Johnson, B.K., Whitehead, J.C., 2000. Value of public goods from sports stadiums: the CVM approach. Contemporary Economic Policy 18, 48–58.
Jorgensen, B.S., Syme, G.J. 2000. Protest responses and willingness to pay: attitude toward paying for stormwater pollution abatement.
Kriström, B., 1997. Spike models in contingent valuation. American Journal of Agricultural Economics 79, 1013–1023.
Lee, L.F., Maddala, G.S., Trost, R.P. 1980. Asymptotic covariance matrices of two-stages probit and two-stages tobit methods for simultaneous equations models with selectivity. Econometrica 48, 491-503.
Loomis, J., Kent, P., Strange, L., Fausch, K., Covich, A. 2000. Measuring the total economic value of restoring ecosystem services in an impaired river basin: results from a contingent valuation survey. Ecological Economics 33, 103-117.

Loomis, J.B., Keske, C.M. 2009. Mountain substitutability and peak load pricing of high alpine peaks as a management tool to reduce environmental damage: A contingent valuation study. Journal of Environmental Management 90, 1751-1760.

Manzano-Baena, P, Casas, R. 2010. Past, present and future of *Trashumancia* in Spain: nomadism in a developed country. Pastoralism 1, 73-90.

McConnell, K.E. 1985. The economics of outdoor recreation. In: Handbook of Natural Resource and Energy Economics, vol. 1., (Eds.) A.V. Kneese and J.L. Sweeney, Amsterdam: North-Holland.

Meyerhoff J, Liebe U. 2006. Protest beliefs in contingent valuation: Explaining their motivation. Ecological Economics 57, 583–594.

Mitchell, R.C., Carson, R.T., 1989. Using surveys to value public goods: the contingent valuation method. Resources for the Future, Washington DC.

Múgica, M. De Lucio, J.V., Pineda, F.D. 1996. The Madrid ecological network. In: Perspectives on ecological networks, (Eds.) Nowicki, P., Bennett, G., Middleton, D. Rientjes, S., Wolters, REuropean Centre for Nature Conservation, Tilburg, pp. 49-59.

Nahuelhual-Muñoz, L., Loureiro., M, Loomis, J. 2004. Addressing Heterogeneous Preferences Using Parametric Extended Spike Models. Environmental and Resource Economics 27, 297-311.

Pate, J., Loomis, J., 1997. The effect of distance on willingness to pay values: a case study of wetlands and salmon in California. Ecological Economics 20, 199–207.

Powe, N.A., Bateman, I.J., 2004. Investigating insensitivity to scope: a split-sample test of perceived scheme realism. Land Economics 80, 258–271.

Reiser, B., Schechter, M. 1999. Incorporating Zero Values in the Economic Valuation of Environmental Program Profits. Environmetrics 10, 87–101.

Rodriguez, D. 2004. La transhumancia: cultura, cañadas y viajes. Edilesa. León, España.

Ruiz, M., Ruiz, J.P. 1986. Ecological history of transhumance in Spain. Biological Conservation 37, 73-86.

Sagoff, M., 1988. The economy of the earth: philosophy, law, and the environment. Cambridge: Cambridge University Press.

Saz-Salazar, S. del, García-Menéndez, L. 2007. Estimating the non-market benefits of an urban park: Does proximity matter? Land Use Policy 24, 296-305.

Saz-Salazar, S. del, García-Menéndez, L., 2003. The nonmarket benefits of redeveloping dockland areas for recreational purposes: the case of Castellón, Spain. Environment and Planning A 35, 2115–2129.

Saz-Salazar, S. del, Rausell-Köster, P. 2008. A Double-Hurdle model of urban green areas valuation: dealing with zero responses. Landscape and Urban Planning 84, 241-251.

Svedsäter, H. 2003. Economic valuation of the environment: How citizens make sense of contingent valuation questions. Land Economics 79, 122-135.

Strazzera, E., Genius, M. Scarpa, R., Hutchinson, G. 2003. The effect of protest votes on the estimates of WTP for use values of recreational sites. Environmental and Resource Economics 25, 461-476.

Van de Ven, W., Van Praag, B. 1981. The demand of deductibles in private health insurance. A probit model with sample selection. Journal of Econometrics 17, 229-252.

Yoo, S.-H., Kwak, S.J., 2009. Willingness to pay for green electricity in Korea: A contingent valuation study. Energy Policy 37, 5408-5416.