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Responses in Choice
Experiments**

By **Melina Barrio**, Universidade de
Santiago de Compostela, Spain

Maria Loureiro, Universidade de
Santiago de Compostela, Spain

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Summary

Not much attention has been given to protest responses in choice experiments (CE). Using follow-up statements, we are able to identify protest responses and compute welfare estimates with and without the inclusion of such protest responses. We conclude that protest responses are fairly common in CE, and their analysis affects the statistical performance of the empirical models. In particular, when the sample is corrected by protests, our results come from utility consistent models. Thus, future choice experiments should consider the role of protest responses as contingent valuation studies have done.

Keywords: Protest Responses, Choice Experiments

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Address for correspondence:

Maria Loureiro
Department of Economic Theory
Universidade de Santiago de Compostela, Spain
Facultade de Ciencias Económicas e Empresariais
Avda. do Burgo s/n Campus Norte
15782 Santiago de Compostela
Spain
Phone:+34 981563100 (ext 11674)
Fax:+34 981 59 99 35
E-mail: maria.loureiro@usc.es

The Impact of Protest Responses in Choice Experiments

M. Barrio¹ and M. L. Loureiro.²

Abstract

No much attention has been given to protest responses in choice experiments (CE). Using follow-up statements, we are able to identify protest responses and compute welfare estimates with and without the inclusion of such protest responses. We conclude that protest responses are fairly common in CE, and their analysis affects the statistical performance of the empirical models. In particular, when the sample is corrected by protests, our results come from utility consistent models. Thus, future choice experiments should consider the role of protest responses as contingent valuation studies have.

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¹ PhD Student “Maria Barbeito”, IDEGA (Universidade de Santiago de Compostela, Spain). Av. das Ciencias s/n. Campus Sur. Santiago de Compostela-Spain. Phone: +34 981 563 100 (ext 14372). Fax number:+34 981 59 99 35 melina.barrio@usc.es

² (corresponding author). Department of Economic Theory, Universidade de Santiago de Compostela, Spain. Facultade de Ciencias Económicas e Empresariais. Avda. do Burgo s/n Campus Norte. 15782 Santiago de Compostela-Spain. Phone:+34 981563100 (ext 11674) Fax number:+34 981 59 99 35 maria.loureiro@usc.es

1. The impact of Protest Responses in Choice Experiments

In the last years, the assessment of environmental and recreational values with choice experiments (CE) has increased (Adamowicz et al., 1998; Boxall et al., 1996; Hanley et al., 1998; Morrison et al., 2002). The CE method is a generalization of the contingent valuation (CV) method, in the sense that rather than asking people to choose between a baseline scenario and a specific alternative, CE ask people to select between cases that are described by attributes (Adamowicz et al., 1998). CE share a common theoretical framework with dichotomous-choice contingent valuation in Random Utility Models (RUM) (Luce, 1959; McFadden, 1974), as well as a common basis of empirical analysis with limited dependent variables (Greene, 1997). For these reasons, we look at the treatment of protest responses in CV, aiming to adopt it to CE.

As the literature has shown, if protesting occurs, stated preference methods may fail to determine the correct economic value of the good in question (Meyerhoff and Liebe, 2008). The treatment of protest responses becomes particularly important when the benefit aggregation issue is considered (Halstead et al., 1992), because such protests may provide underestimated welfare measures if all responses are included in the analysis (e.g. Hearne and Santos, 2005; Chuan-Zhong et al., 2004); or else, overestimated results if removal of all the status quo responses of the analysis is done (e.g. Adamowicz et al. 1998³). Therefore, a correct analysis of protest responses seems required.

³ They remove individuals who selected always the current situation and were treated the same as the “I don’t know” response in a CV question.

Protest responses have been widely debated in CV studies (Strazzera et al., 2003; Jorgensen et al., 1999, among others), showing that the identification and their later treatment may have a significant influence on the welfare estimates. Therefore, problems commonly encountered in CV related to protest responses might also be present in CE, although not much attention has been given to these issues yet in the literature.

In CE, in addition to the different attribute combinations which are associated with some changes in the good or services valued, another option is typically presented to respondents that contains the current situation and a zero payment, denoted as the status quo option (Hearne and Santos, 2005; Mercer and Snook, 2004). Protest responses may hide behind the selection of the status quo options (Adamowicz et al., 1998; Meyerhoff and Liebe, 2009). Just in the last years, authors such as Meyerhoff and Liebe (2008, 2009) treat more explicitly the topic of protest responses in CE. Meyerhoff and Liebe (2008) employ a follow up question with CE and CV to differentiate the protest beliefs and responses, and to assess whether the likelihood of protest responses differs across methodologies. They do not find clear differences between protests responses in both methodologies. Meyerhoff and Liebe (2009) analyze the motives to select the status quo alternative. Furthermore, they assess the impact of the alternative specific constant for the status quo into the computation of compensating surplus.

The novelty of the analysis that follows is that it is based on the treatment of protest responses, distinguishing explicitly between protest and non-protest responses based on the selection of the status quo option. In this way, the indirect utility function and the associated welfare estimates are computed per treatment. Therefore, this analysis

allows not only for the assessment of the impact of protest responses on the welfare estimates, but also on the estimated parameters of the indirect utility function.

In order to properly account for the effect of protest responses, first, a conservative treatment of protests is employed, treating the protest responses in the analysis as true zero respondents. In a second approach, protest responses are excluded from the empirical analysis, under the assumption that individuals who do not share the valuation scenario should not be taken into account when estimating welfare estimates (Freeman, 1986). As far as we know, this is the first empirical application that explicitly deals with the treatment of protest responses per se in the context of CE, analyzing two ways to identify the protests. At the same time, the identification of protesters follows the steps of the previous works conducted in CV but novel in CE studies. Additionally, secondary objectives are related to the assessment of the sensitivity of welfare estimates when including and excluding protest responses, respectively. These analyses seem necessary due to the propensity to find protest responses in CE.

The rest of the paper is structured as follows: first, we conduct a literature review of previous studies linked to protests responses and their treatment, continuing with the choice experiment model estimation. It follows with the description of the case study area and the survey mechanism. Later, we present and compare the results for the whole sample with the results corrected by protests responses, ending with some conclusions and recommendations based on the obtained results.

2. Analysis of Protest Responses

Protest respondents are those who oppose or do not approve the survey mechanism and fail to respond the valuation question, either giving positive responses although invalid,

or a non-true zero value to a product or service (Halstead et al., 1992). Nevertheless, the first concern of protest responses appears with respect to their identification. There is no protocol or theoretical criterion for classifying responses (Boyle and Bergstrom 1999); however, the classification of all zero bids must be carefully examined to identify the legitimate zero and protest responses. To differentiate between them, previous analyses have used a set of debriefing questions that were presented to those respondents who were unwilling to pay (Meyerhoff and Liebe, 2008⁴, Loomis et al., 1996, Strazzera et al., 2003). Based on statements as the previously used in the literature, and presented in Table 1, real zero values and protest responses were also identified in this analysis.

Table 1 around here

As we can observe in Table 1, there are differences related to the presented statements aiming to classify individuals, but also with respect to the criteria applied to identify a response as protest. Some authors presented the statements to the full sample (Meyerhoff and Liebe, 2008), trying to distinguish not only protest responses related to zero WTP values, but also general protests beliefs in the entire sample. On the contrary, other studies only presented statements to the individuals who were not willing to pay (Halstead et al., 1992; Loomis et al., 1996). Furthermore, the criteria to be classified between protests and true zero values varied considerably between different authors, as denoted in Table 1, although there are some commonalities across studies. Halstead et al. (1992) present four statements, including reasons for the rejection of the payment vehicle, the concept of paying for the good or the impossibility to afford the payment,

⁴ They presented these follow-up questions to all individuals in the sample, not only those do not willing to pay.

and in addition an open ended question. Along the same line, the rest of the authors include other reasons related to the value of the good, the sense that others should pay for the program, or that they cannot afford the payment. Giraud et al. (2002), Jakobsson and Dragun (2001), Loomis et al. (1996), Strazzera et al. (2003) differentiated between true zero and protest responses, according with the statements of Table 1. The italics denote the statements identifying protest respondents, while the rest are classified as true zeros.

Once the protesters had been identified, different treatments were applied to the protest responses in the CV literature. Generally, there have been three main ways of dealing with protest zero bids (Halstead et al., 1992). The first consists on eliminating them from the data set (Freeman, 1986; Mitchell and Carson, 1989). The second includes the protest bids in the data set and treats them as legitimate zero bids (Giraud et al., 2002). The third method assigns protest bidders mean WTP values based upon their socio-demographic characteristics, relative to the rest of the sample. Thus, as the literature shows, both the treatment and identification of protest responses have been quite different across studies.

Even though there are different ways to deal with protest responses, the most common application in CV is to delete them from the sample (see Adamowicz et al., 1998; Morrison, et al., 2000). Strazzera et al. (2003) argue that the rationale for removal of protest zeros is explained by Freeman's (1986) with the following statement: "The person who refuses to state a monetary value on the grounds that it is unethical to do so or that he has an inherent right to the environmental good must be dropped from the sample when mean bids are calculated. If a person bids zero on the grounds that he had an inherent right to the good, the bid is not an indicator of his true valuation". However

Jorgensen and Syme (2000) considered that protest beliefs were representative of attitudes towards the valuation process and argued that censoring of protest responses is unjustified. In the present application, we use CE for the valuation of various managements programs to be applied in a natural protected area.

3. Choice Experiments and Estimation

Choice experiment methods are consistent with utility maximization and demand theory (Bateman et al., 2002). Respondents are asked to choose between different bundles of (environmental) goods, which are described in terms of their attributes, or characteristics, and the levels that these take.

According to this framework, the individual i has a utility function (U) of the form:

$$U_{ij} = V\left(X_{ij}, S_{ij}\right) + \varepsilon_{ij} = \beta X_{ij} + \alpha_j S_{ij} + \varepsilon_{ij} \quad (1)$$

This indirect utility function can be described as a sum of two components: a deterministic part (V) and a stochastic part (ε). The first element is a function of the attributes of the different management programs (X) to be valued and the social characteristics (S) of the individuals. β is a vector of parameters to be estimated and α_j is another vector of parameters corresponding with the j -th alternative to be selected. The stochastic element represents unobservable factors on individual choices independent of the deterministic part.

A person chooses the alternative k when $u_{ik} > u_{ij}$ for all $k \neq j$. Accordingly, with J choices, the probability of choice k is:

$$P(\text{choose } k) = P\left(u_{ik} > u_{ij} \text{ for all } k \neq j\right)$$

(2)

One of the prevalent models used in the previous literature to model choice behavior has been the multinomial logit. An assumption of this model is that the error term is independently and identically distributed (IID). The non-fulfillment of IID implies violations in the independence of irrelevant alternatives (IIA) property. This property states that the ratio of choice probabilities between two alternatives in a choice set is unaffected by changes in that choice set. In order to test for IID/IIA violations, a Hausman-McFadden test was conducted⁵, which involves the construction of a likelihood ratio test around different specifications of the same model where choice alternatives are excluded. A χ^2 value of 75.14 was computed for a conditional logit model when ‘‘Option B’’ alternative was excluded from the choice set. This value exceeds the critical value (which from the Chi-squared table at 5% significance level

⁵ The statistic for this procedure is given by the following equation:

$$\chi^2 = \left(\hat{\beta}_s - \hat{\beta}_f\right)' \left[\hat{\Sigma}_s - \hat{\Sigma}_f\right]^{-1} \left(\hat{\beta}_s - \hat{\beta}_f\right)$$

where $\hat{\beta}$ indicates the coefficient vector, $\hat{\Sigma}$ denotes the estimated covariance matrix, and f and s respectively the full and reduced choice specifications. This statistic follows a limiting chi-squared distribution with k degrees of freedom, where k is the number of attributes.

with 5 degrees of freedom is 11.07). Therefore, the null hypothesis was rejected, indicating an IIA problem.

When a violation of the IIA hypothesis is observed, more complex statistical models are necessary in order to relax the assumptions employed. These include the multinomial probit model (MNP) (Chen and Cosslett, 1998; Hausman and Wise, 1978; Lusk and Schroeder, 2004), the random parameters logit model (Revelt and Train, 1998; Train, 1998; Train, 2003), the nested logit (Louviere et al., 2000), and the heterogeneous extreme value logit (Allenby and Ginter, 1995; Bhat, 1995; Lusk and Schoroeder, 2004).

The approach that we follow in this analysis is the MNP. The MNP assumes that the error term follows a multivariate normal distribution, with mean 0 and covariance

matrix, such that:
$$\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \cdot & \sigma_{1n} \\ \sigma_{12} & \sigma_2^2 & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \sigma_{1n} & \cdot & \cdot & \sigma_n^2 \end{bmatrix}.$$

(3)

Hausman and Wise (1978) proposed the structured covariance matrix for this model to consider heterogeneity among individuals. Note that allowing the error variance to differ across alternatives while errors are normally distributed is equivalent to relax the restrictive IIA assumption.

When the errors are correlated, Train (2003) shows that the parameters in Σ are not identified unless constraints are imposed. These constraints are linked to the fact that neither adding nor dividing a constant to the utility for each alternative will affect the choice that is made according to equation (2). Then, we have to normalize the model to

eliminate the irrelevance effects of the base level and scale of utility. To remove the first effect, we use the resulting utility from taking the difference between each alternative's utility and the utility of the base alternative, in this case k . This means that:

$$\begin{aligned}
 \eta_{ijk} &= u_{ij} - u_{ik} \\
 &= \beta \left(X_{ij} - X_{ik} \right) + \left(\alpha_j - \alpha_k \right) S_i + \left(\varepsilon_{ij} - \varepsilon_{ik} \right) \\
 &= \beta \gamma_{ij^*} + \delta_{ij^*} S_i + \varepsilon_{ij^*} \\
 &= \lambda_{ij^*} + \varepsilon_{ij^*}
 \end{aligned}$$

(4)

where $j^* = j$ if $j < k$ and $j^* = j - 1$ if $j > k$, so that $j^* = 1, \dots, J-1$. Now, we can work with the $(J-1) \times (J-1)$ covariance matrix Σ for $\varepsilon_i^* = \left(\varepsilon_{i1}, \dots, \varepsilon_{i, J-1} \right)$. For the second effect, we fix the value of one of the variances⁶ σ_m^2 of Σ . Thus, there are a total of at most $J(J-1)/2 - 1$ identifiable variance-covariance parameters. If each individual is a utility maximizer, the probability that individual i chooses alternative k from a choice set to any alternative J , can be expressed as:

$$\begin{aligned}
 P \left[i \text{ choose } k \right] &= P \left[\eta_{i1k} \leq 0, \dots, \eta_{i, J-1, k} \leq 0 \right] \\
 &= P \left[\varepsilon_{i1} \leq -\lambda_{i1}, \dots, \varepsilon_{i, J-1, 1} \leq -\lambda_{i, J-1, 1} \right]
 \end{aligned}$$

(5)

More specifically the probabilities are written as:

⁶ We fit the model using STATA 10. By default, this program fixes one of the variances to 2.

$$P \left[\text{choose } k = \beta, \alpha_j, X_{ij}, S_i, \Sigma^* \right] = \int_{-\infty}^{\beta * X_1 + \alpha_1 * S^*} \int_{-\infty}^{\beta * X_{j-1} + \alpha_{j-1} * S^*} f \left(\varepsilon_{i1}^*, \dots, \varepsilon_{ij-1}^* \right) d\varepsilon_{i1}^*, \dots, \varepsilon_{ij-1}^*,$$

(6)

where $f(\cdot)$ is the probability density function of the multivariate normal distribution.

4. Data

In this study, we analyze different management alternatives in the Spanish Biosphere Reserve: Eo, Oscos y Terras de Burón. This Biosphere Reserve is an area in the Northwest of the country on the scenic Cantabrian coastline between. In this reserve, the Eo River estuary is an internationally recognized wetland under the RAMSAR treaty and has sustainable development plans for its rational management. Livestock, forestry, and tourism are currently the area's main economic activities. Biosphere reserves are designed to bring together a broad range of actors to work cooperatively towards common objectives (UNESCO, 2005). In total, there are 553 Biosphere reserves worldwide in 107 countries (UNESCO, 2009).

The designation of a Reserve does not carry any legal implications, although the establishment of different actions to integrate biodiversity conservation and economic development is expected. For policy purposes, the understanding of different interventions is relevant, given that policymakers need to ensure better integration of diverse community interests. With this objective in mind, we designed a choice modeling survey that was presented to 453 individuals, from which 276 live inside the Reserve and 177 in neighborhood areas. The survey was conducted face to face between November 2008 and March 2009. The sample was restricted to individuals 18 years

and older. The number of surveys in each city and village was determined by proportional sampling weights.

The structure of this survey followed others previously conducted with similar objectives. Its first part collected participant's opinions about different social problems and whether they visited the Reserve. The second section provided information to participants about the Biosphere Reserve, to continue with additional questions about the participant's degree of approval with this designation, and various perception types of questions with respect to some of the management actions presented. Then, the different choice sets were presented, containing each two alternative programs and the status quo option. We have included a status quo option, not only to differentiate between protest and non-protest, but also because one of the options must always be in the respondent's currently feasible choice set in order to be able to interpret the results in standard welfare economic terms (Hanley et al., 2001). In choice modeling, most researchers have included the alternative "do nothing" or status quo (Adamowicz et al., 1994; Adamowicz et al., 1997; Hearne and Santos, 2005, Blamey et al., 2000), although others have not (Holmes et al., 1998, Mackenzie, 1993).

Table 2 describes the different attributes and the corresponding levels used in the valuation scenario. The contained attributes are: reforestation actions, river and salmon conservation actions, patrimonial and architectural restoration actions, and finally the associated cost representing an increase on the current income tax level.

Table 2 around here

These attributes and levels were designed following the guidelines of the Biosphere Reserve Councils. In order to test the understanding of survey participants, a pretest was

conducted among 40 participants. Furthermore, and following the previous CV literature, when the individuals selected the status quo option, follow up questions were presented to identify if their no-votes were protests or real zeros. The set of presented statements are displayed in Table 3, using the most common statements from previous studies and an open-ended question recommended by some authors (Bateman et al., 2002).

Table 3 around here

Finally, the last part of the survey contained ethical and socio-economic questions about the respondent's characteristics. Employing the criteria presented in Table 3, we have identified different answers, which are displayed in Table 4. Using these results, we have classified as "protest responses" those individuals who did not like the actions presented, were not willing to pay more taxes, or who considered that they should not have to pay for this type of program. In order to investigate the importance of these protest responses, three classifications were attempted. On one hand, protest responses were treated as zero respondents, and included into the dataset. Secondly, protest responses were differentiated via the presented statements at each choice occasion, and excluded from the sample; while in the third treatment, individuals providing any of the protest reasons in any of the choice occasions were excluded from the sample. Therefore, we have estimated three alternative models, one with the full sample with the protest responses treated as true zeros; a second with protests classified by each choice sets and excluded, and a third one, where in order to avoid inconstancies, responses coming from the same individual were classified all as protests or not.

Table 4 around here

5. Results

In total, 453 surveys were collected with an overall response rate of 40.27%. Each individual responded to six choice occasions that amount to a total of 2718 observations. Surveys were conducted inside and outside the protected area, from a sample of the general population. Table 5 summarizes the socio-demographic characteristics of the sample.

Table 5 around here

The empirical representation of the utility function has the following functional form:

$$V_{a,b} = \beta_1 \text{Forest} + \beta_2 \text{River} + \beta_3 \text{Wolf} + \beta_4 \text{Patrimony} + \beta_5 \text{Tax} + \alpha_a + \alpha_b,$$

(7)

where α_a and α_b represent respectively the specific constants for selecting option A and B respectively, with respect to the status quo (choice C). Table 6 presents the results from this baseline model estimated with the sample. In this model, all the attributes, except river, are statistically significant. The attributes forest, wolf and patrimony have a positive sign, while the coefficient corresponding with the required tax payment carries a negative one, as expected. This implies that the presence of the former attributes increases utility, while the latter attribute decreases utility in a statistically significant way.

Table 6 around here

An extended model has been also estimated by introducing different socio-demographic characteristics. With this extension, we can further analyze how individual characteristics affect choice selection, so that the impact of socio-economic variables is analyzed with respect to the status quo and choice of any of the two proposed programs.

In this case, the utility function is represented by the following expression:

$$V_{a,b} = \beta_1 \text{Wolf} + \beta_2 \text{Patrimony} + \beta_3 \text{River} + \beta_4 \text{Forest} + \beta_5 \text{Tax} + \alpha_{a1} \text{Reserve} + \alpha_{a2} \text{Farmer} + \alpha_{a3} \text{Age} + \alpha_{a4} \text{NoDegree} + \alpha_{a5} + \alpha_{b1} \text{Reserve} + \alpha_{b2} \text{Farmer} + \alpha_{b3} \text{Age} + \alpha_{b4} \text{NoDegree} + \alpha_{b5}.$$

(8)

where the included socio-demographic variables are: *Reserve*, denoting whether the surveys were carried out inside the Biosphere Reserve; *Farmer*, denoting that the respondent was a farmer; *Nodedegree*, representing individuals with the lowest education level, and finally, *age*, providing information about the respondents' age (*age*).

This extended specification improves the model's goodness of fit. A log-likelihood ratio test has been performed being the null hypothesis that all coefficients of the additional variables are zero ($LR=316.46, \chi^2_{0.01,8}=20.09$) rejected. The results (table 6) show that when the individual is a farmer, the utility linked to the selection of an alternative different from the status quo decreases. The same occurs when the individual has low education, older age, or was interviewed inside the Biosphere Reserve. With respect to the attributes' coefficients, their significance levels and corresponding signs are maintained. The only difference is the forest attribute significance level, which increases from 10% to 1% significance level in this extended model.

5.1. Identification of protest responses

As denoted, among the respondents who choose the status quo, we have identified the protesters using the statements of table 3. We found that 53.9% of the individuals chose the status quo in some occasion, and 37.3% always chose the status quo. Nearly 47% of the total sample selected, in some choice occasion, made a statement that was classified as protest response, and about 35% of the individuals were considered as protest in all of their choices. The most important reason behind the protest responses is related to the fact that participants consider that they are paying already enough taxes, while the true zeros usually are not able to afford the payment for the program. We have classified the protest responses by both individual and by choice sets. Through these classifications, we have identified as protests, on the one hand, 1055 choices sets and, on the other, 212 individuals who in some of their elections have provided protest reasons. This fact shows that in most occasions, when the status quo is chosen, this can be classified as a protest response. Results are presented in table 4. In the next section, we compare results according to the outlined classification.

5.2. Results with and without protest responses

Two additional MNP models for the corrected samples were estimated (table 7). When classifying protest responses at the individual level, the sample is reduced to 241 individuals, affecting 1445 choice sets, while if the protesters are classified based on choice sets, the remaining sample contains 1662 choice sets. The first two columns show the results corresponding with the sample corrected by individual protest responses, while the next correspond with the sample corrected by choices sets protesters. The results show that the difference between both sets of estimates is mainly

related to the significance of the attribute *patrimony* and the *tax* level, which are statistically significant at the 0.1% and 1% significance level respectively, for the sample corrected by choices set protests, and at the 10% significance level if the sample is corrected at the individual level. The *wolf* and *forest* attributes have a positive effect on the utility of individuals in both cases, while the attribute *tax* has a negative and significant effect. In addition, in the entire sample, the *river* attribute is not significant, although positive.

Table 7 around here

Comparing the results between both corrected samples and the full sample, we can observe that there are no significant differences related to the magnitude and significance levels of the coefficients, except those denoting the selection of alternatives A and B with respect to the status quo. In the previous results employing the entire sample these coefficients are not statistically significant. This implies that selection of a particular alternative A or B does not increase the individual's utility over the status quo option. Nevertheless, in the corrected samples, these alternative indicators are positive and statistically significant at the 0.1% level, showing statistical evidence that when an individual chooses an alternative in which some actions are carried out, her/his utility increases with respect to the status quo option. In terms of statistical fit, the corrected models have also improved notably, minimizing the Akaike Information Criterion (AIC) and the Bayesian information criterion (BIC).

5.3. WTP Estimates

WTP estimates are computed with the formula in (9), while asymptotic standard errors were obtained via the delta method for each attribute (table 8). The mean WTP for each attribute was estimated as the ratio of the coefficient associated with the attribute of interest over the Tax coefficient (see Hanemann and Kanninen 1999)⁷. Each of these ratios is understood as a price change associated with a unit increase in a given attribute:

$$\text{WTP} = -1 \left(\frac{\beta_{\text{attribute}}}{\beta_{\text{tax}}} \right)$$

(9)

Tabla 8 around here

When excluding the protest responses, WTP estimates are not significantly different across models. In fact, observing the confidence intervals, we can conclude that all the intervals overlap. On average, the respondents of the entire sample are willing to pay 19.1 €/year for rehabilitation and restoration programs of patrimonial elements, while if we exclude the protest responses, the corresponding WTP estimate reaches 20.96 €/year, and 21.22 €/year, respectively for the corrected sample by individual and corrected choice sets protest. Finally, the wolf protection program has an associated WTP of 10.97 €/year for the full sample and 17.54 €/year and 11.72 €/year without individual and choice set protest responses. The lowest positive WTP is estimated for the reforestation policy, ranging from 1.55 € for the total sample, and 1.60 €/year for the sample corrected by individual protesters, and 1.43 €/year when corrected for choice sets protests. To conclude, we can observe subtle differences with respect to the WTP

⁷ Following Lusk et al. (2003), we have multiplied by two the river, wolf and patrimony coefficients, because of effects coding.

estimates for actions to be implemented in the Reserve according to the treatment of protest responses, only in the case of wolf protection when the sample is corrected by individual protesters, the confidence interval does not overlap with the other cases.

6. Conclusions

In this research, we investigate the effects of protest responses in the results of a CE exercise and the sensitivity of the derived WTP estimates. We estimate models corrected and not corrected by protest responses, as well as an extended model with socio-demographic characteristics by choice alternative. As far as we know, this is one of the few applications using a multinomial probit model for modeling choice behavior. The protest responses were classified by two rules, one at the individual level, and a second one, considering them at the choice occasion level. The results show some quantitative differences across treatments of protest responses. With respect to the empirical objective at hand, we show the necessity that protest responses are identified in choice experiment, given that the statistical model fit improves considerably, providing more consistent results with the underlying economic theory. When the sample is corrected by protest, the utility of selecting any of the alternatives versus selecting the status quo, increases as expected according to individual's rationality. Therefore, the corrected models are more consistent with economic theory. In addition, the valuation of some attributes, such as the wolf protection program vary slightly in terms of welfare estimates, denoting that the presence of this attribute in the choice set may trigger some protest responses. This finding makes sense in a geographical area where wolf protection unleashes controversy.

In the context of contingent valuation, Halstead et al. (1992) show that the exclusion of protest responses may bias WTP results, but the direction of such bias is indeterminate a

priori. However, the majority of the studies indicate that samples without protest bidders will result in higher WTP estimates (Jakobsson and Dragun 2001). The same result has been found in this study employing CE. Therefore, estimation of WTP values considering protest responses is necessary and can provide a range of estimates producing more accurate results. At the same time, it seems that the identification of protest responses should be done at the individual level instead of the choice level. In terms of statistical accuracy, a better model fit can be confirmed for the corrected protest model. Future research should therefore identify and treat protest responses in the context of CE.

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Table 1. Examples of Statements Presented to Differentiate Between True Zeros and Protest Responses in Different Studies

Giraud et al. (2002)	Halstead et al. (1992)
<p>The expanded Steller sea lion program is not worth this much money to me I am not willing to pay this amount, but I would be willing to pay \$ <i>It is unfair to expect me to pay for the expanded Steller sea lion program</i> <i>I believe that the expanded Steller sea lion program will not help preserve this species</i> <i>I do not want additional restrictions placed on commercial fishing in this area</i> <i>I am opposed to paying for more government programs</i> <i>The loss to the coastal Alaskan communities and their economic livelihood is too large</i> The length of payment is too long; <i>Other</i></p>	<p>The amount is too much; I would donate \$__ per year over the next five year (please write in the maximum dollar amount that you would contribute) <i>The bald eagle should be preserved on New England but the money should come from taxes and licenses fees (from game species) instead donations</i> The bald eagle is not worth anything to me <i>Bald eagle preservation is important to me but I refuse to place a dollar value on it</i> Other, please explain</p>
Jakobsson and Dragun (2001)	Loomis et al. (1996)
<p>The amount given is too high, but I would pay \$_ per year <i>I did not want to put a dollar value on protecting plants and animals</i> Society has more important problems than protecting plants and animals Protecting plants and animals is not worth anything to me <i>The government should protect plants and animals using taxes already paid</i> <i>Not enough information is given. I object to the way the question is asked</i> I can't afford to pay anything <i>Other</i></p>	<p>This program is not worth anything to me I cannot afford to pay at this time <i>I do not think program would work</i> <i>It is unfair to expect me to pay</i> <i>I am opposed to new government programs</i> <i>Fire is natural and benefits forest</i> <i>Other</i></p>
Meyerhoff and Liebe (2008)	Strazzer et al. (2003)
<p>I already pay enough for other things Lower Saxony should cut public spending on other things instead of expecting a voluntary contribution from me It is my right to have a high level of forest biodiversity and not something I should have to pay extra for I refuse to assess nature in monetary terms Those who enjoy biodiversity in forests should pay for the measures I do not have enough information about forest conversion</p>	<p>Recreational benefits stemming from the forest were not enough to warrant any payment Budget constraints impose a restriction on additional expenses <i>The method of payment (entry charge) is considered inappropriate</i> <i>It is unfair to charge for recreation in that forest</i></p>

Note: Meyerhoff and Liebe (2008): rated the statements with a five-point scale, from completely disagree (1) to completely agree (5).

Table 2. Attributes, levels and status quo

Attribute (<i>Variable</i>)	Levels	Status quo
Forest program (<i>Forest</i>)	5% increment on forest or 5400ha	0 ha
	20% increment on forest or 21000ha	
River and salmon program (<i>River</i>)	Yes, if cleaning and restoration actions are undertaken	No
	No, otherwise	
Rehabilitation patrimonial program (<i>Patrimony</i>)	yes , if rehabilitation of architectural cultural heritage is undertaken	No
	No, otherwise	
Wolf program management (<i>Wolf</i>)	Yes, if management actions for wolf recovery is undertaken	No
	No, otherwise	
Tax (<i>Tax</i>)	15 € increment on tax over current levels	0 €
	30 €	
	50 €	

Table 3. Statements Presented to Differentiate Between True Zeros and Protest

Response in Our Survey

These actions are interesting, but nowadays I can't afford this payment

I don't like the actions to be undertaken (Why?):

It is not fair that I have to pay to protect the Biosphere Reserve, because I pay enough taxes already

Another reason (indicate):

Table 4. Number of Observation per Stated Motives

	Choices	Individuals	Classified as Protest response
Motives to choose the status quo option			
These actions are interesting, but nowadays I can't afford the payment	482	87	No
I don't like the presented actions (Why?)			No
I don't like the different combinations	32	19	No
I don't like the different levels	5	2	No
<i>I don't like a specific action such as wolf recovery or forest restoration</i>	97	38	Yes
<i>It is not fair that I have to pay to protect the Biosphere Reserve, because I pay enough taxes</i>	952	177	Yes
Other reason (indicate)			No
Too expensive	18	16	No
<i>People should not have to pay for these actions</i>	7	2	Yes

Table 5. Socio Economic Characteristics of the Different Treatments

Socio economic characteristics	Sample Corrected by Choices Set Protest Responses	Sample Corrected by Individual Protest Responses	Full Sample	Reference Population
Average age	48.06	47.85	52.40	47.80
Studies				
<i>No degree</i>	2.41	2.49	6.18	2.05
<i>Primary</i>	30.13	24.80	39.96	49.86
<i>Secondary</i>	20.20	21.16	17.66	32.00
<i>Practical trainer</i>	18.34	18.67	14.35	6.84
<i>Tertiary</i>	28.08	29.46	21.85	9.24
<i>DK</i>	0.84	0.41	1.32	
Sex				
<i>Male</i>	50.93	51.04	47.68	48.47
<i>Female</i>	49.07	48.96	52.32	51.53
Income<400	1.08	1.24	0.88	3.78
>=400<600	2.22	2.49	2.43	12.08
>=600<1000	6.67	7.05	7.95	14.48
>=1000<1500	37.40	34.02	47.02	21.55
>=1500<2000	24.59	25.73	21.41	16.38
>=2000<2500	11.67	12.86	8.83	10.22
>=2500<3000	7.64	7.47	5.52	8.81
>=3000<4000	5.41	6.22	3.75	7.59
>=4000	3.31	2.90	2.21	5.12

Table 6. Results for Baseline Model and Expanded Model. Entire Sample

Attribute	Baseline model	Extended model
	Coefficient	Coefficient
	(Std. Err.)	(Std. Err.)
Forest	0.025* (0.010)	0.027** (0.010)
River	-0.058 (0.048)	-0.052 (0.051)
Wolf	0.091** (0.032)	0.094** (0.032)
Patrimony	0.158** (0.054)	0.167** (0.055)
Tax	-0.017** (0.006)	-0.017** (0.006)
Alternative A		
Reserve	-	-0.157* (0.071)
Farmer	-	-0.780*** (0.175)
Age	-	-0.026*** (0.002)
No degree	-	-0.996*** (0.172)
_cons	-0.177 (0.158)	1.398*** (0.257)
Alternative B		
Reserve	-	-0.130* (0.061)
Farmer	-	-0.699*** (0.172)

Age	-	-0.022*** (0.004)
No degree	-	-0.760*** (0.181)
_cons	-0.016 (0.089)	1.284*** (0.282)
Log simulated-likelihood	-2628.6962	-2470.4682
AIC	5275.392	4974.936
BIC	5338.446	5094.037
Wald test	15.26	268.68
p-value	0.0093	0.000
Individuals	453	453
Observations	8154	8151
Number of choices sets	2718	2717

Variable Definition:

Reserve	=1 if surveys were carried out inside the Reserve; =0 if outside
Farmer	=1 if respondents are ranchers, farmers or forest owners; =0 other
Age	Age of respondent
No degree	=1 if respondents have formal educational levels below primary studies; = 0 otherwise

Note: ***, **, * = Coefficients significantly different from zero at 0.1%; 1%; and 10% significance level.

Table 7. Results for Sample Corrected by Individual and by Choice Sets Protest

Attribute	Without protest (individual)		Without protest (choices)	
	Coefficient (Std. Err.)	Z	Coefficient (Std. Err.)	Z
Forest	0.028 (0.014)	1.94*	0.034 (0.014)	2.42*
River	0.045 (0.095)	0.47	0.082 (0.099)	0.82
Wolf	0.153 (0.074)	2.07*	0.140 (0.063)	2.21*
Patrimony	0.183 (0.078)	2.36*	0.254 (0.076)	3.34***
Tax	-0.017 (0.008)	-2.06*	-0.024 (0.009)	-2.81**
Alternative A				
_cons	1.173 (0.227)	5.18***	1.057 (0.223)	4.75***
Alternative B				
_cons	1.106 (0.242)	4.57***	0.958 (0.237)	4.04***
Log simulated-likelihood	-1107.1048		-1247.3967	
AIC	2232.21		2512.793	
BIC	2289.58		2571.423	
Wald test	9.38		23.45	
p-value	0.095		0.0003	
Individuals	241		296	
Observations	4335		4986	
Number of choices sets	1445		1662	

Table 8. Willingness to Pay Estimates for the Three Samples

	Entire Sample		Without protest (individual)		Without protest (choices)	
	WTP	95% C.I.	WTP	95% C.I.	WTP	95% C.I.
Forest	1.55	(1.36, 1.75)	1.60	(1.37,1.82)	1.43	(1.17, 1.69)
Wolf	10.97	(8.76, 13.17)	17.54	(15.16, 19.92)	11.72	(9.16, 14.27)
Patrimony	19.1	(17.86, 20.36)	20.96	(18.47, 23.46)	21.22	(18.93, 23.52)

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