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Respondent Certainty and Payment Vehicle Effect in Contingent Valuation: an Empirical Study for the Conservation of Two Endangered Species in Zakynthos Island, Greece.

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Abstract. This paper focuses on providing evidence of what explains respondent certainty by assessing at the same time the sensitivity of the Contingent Valuation Method (CVM) to payment vehicle effect. Two different samples were collected from local residents and foreign visitors of the Zakynthos Island in Greece and a split-sample approach was employed. The elicited conservation values concerned two endangered species, the loggerhead turtle, Caretta caretta and the monk seal, Monachus monachus. In terms of policy implications, the stated Willingness-to-Pay (WTP) values confirmed that there is a potential for a range of internal funding options, which could sustain the future operation of the existing National Marine Park of Zakynthos (NMPZ). From a methodological point of view, the study explores the determinants of self-reported certainty with regard not only to different payment modes but also to attitudinal and socio-economic variables and adds evidence to the debate about the validity of CVM by testing the presence of a payment vehicle effect. The results show evidence of sensitivity of the method to the mode of payment and reveal a relationship between the chosen payment vehicle and respondents' degree of certainty.

JEL Code: Q51; C52

Keywords: Respondent Certainty, Polychotomous Choice, Payment Vehicle Effect, Biodiversity Conservation, Contingent Valuation, National Marine Park of Zakynthos (Greece).

1. Introduction

Biodiversity decline has been seen as the result of a choice of a particular path of development (Swanson 1995) and lately the shift towards conservation in managed systems seems to be preferred. This paper deals with biodiversity and in particular with two endangered species whose habitat is under pressure, the loggerhead turtle Caretta caretta and the monk seal Monachus monachus on Zakynthos Island, in Greece. The study elicits open-ended (OE) Contingent Valuation (CV) bids for the conservation of these species and contributes to the limited Willingness-to-Pay (WTP) studies in Greece, on marine conservation. Two other CV studies were undertaken on Zakynthos Island, which examined the value of the loggerhead sea turtle (Kalfagianni 2000; Togridou et al. 2006). Furthermore, Langford et al. (1998, 2001) also investigated the WTP in relation to protecting the Mediterranean monk seal in the Aegean area.

However, this paper apart from determining WTP it explores the issue of respondents' certainty and it also employs different payment methods. The payment modes used here were donation versus landing fee for the sample of visitors and donation versus taxation for the sample of residents. By adopting different payment modes our study adds to the information

available to the national park authorities regarding self-financed options. In particular, taxation has been used before only in Kalfagianni's study (2000) while Togridou's (2006) study explored the possibility of an admission fee. The study by adopting a split-sample approach explores the possibility of payment being affected by the method of payment, known as the 'payment vehicle effect'. In CV questionnaires, the 'payment vehicle' is usually the means of securing an environmental or other outcome (Cummings et al. 1986). This is a crucial element to the study as it provides a context for the way payments are made and affects the way respondents answer the 'elicitation' question, since their choices may depend on when the payment is due and the way in which it is collected (Morrison et al. 2000).

As there are not many studies that compare different payment vehicles, this study adds to the literature that explores the validity of (CVM) regarding the sensitivity to the selected payment mode. In particular, the one that is mostly related to this study is that of Jakobsson and Dragun (2001). Their study compared taxation and donation payment modes for the conservation of endangered species. Furthermore, Brookshire et al. (1980) made use of utility bill and hunting license fees to value wildlife-related amenities; Campos et al. (2007) used trip expenditures and entrance-fees to estimate the economic, recreational values of two Spanish forests. Other studies, which have explored the 'payment vehicle effect', have focused on water quality (Bergstrom et al. 2004; Greenley et al. 1981), non-genetically-modified goods (Kontoleon et al. 2005), open space land purchase (Champ et al. 2002), damage prevention for wetlands (Morrison et al. 2000) and flood-defence work (Bateman et al. 1995). Stevens et al. (1997) completed a study, which explored the concept of 'temporal embedding' expressed in alternative temporal payment schedules (lump sum versus recurring payments) for two goods (movie passes and restoration of Atlantic salmon). Finally, Akter et

al. 2009 investigate the effect of different payment compliance regimes (mandatory carbon tax versus a voluntary contribution) to the possibility of actually paying. Most of the above studies find evidence that methods of payment do have an effect. It should be made clear at this point that what was tested in our study was the existence of a payment vehicle 'effect' rather than a payment vehicle 'bias'[1]. According to Mitchell and Carson (1989), payment vehicle bias occurs 'where the payment vehicle is either misperceived or is itself valued in a way not intended by the researcher'. As long as the effects of a payment vehicle are appropriate for the context of the study, payment vehicle bias is not an issue.

The paper investigates as well whether the degree of certainty is affected by the payment mode employed. In addition to the impact of the payment mode, the effect of other determinants on respondents' certainty is also commented. The degree of certainty is captured through a polychotomous question of five certainty levels. With regard to answering the question of what explains respondents' certainty/uncertainty in a CVM context, there are few studies that provide empirical evidence. Respondent prior knowledge of the good seems to be significant explanatory factor in Loomis and Ekstrand (1998) where respondent uncertainty was measured by a post-decision certainty scale from 1 (not certain) to 10 (very certain). In Champ and Bishop (2001) a numerical certainty scale was used and respondent perception and attitude towards the proposed program were capturing a portion of variation in uncertainty scores. Respondents' attitude to hypothetical market affected certainty as well in Samnaliev et al. 2005 who tested for the effect of different certainty measurement techniques, using both numerical certainty scale and polychotomous choice methods. Finally, Akter et al. (2009) used a five category polychotomous question format

[1] See Morrison et al. (2000) on tests that can be used to detect payment vehicle bias.

(Extremely unlikely, Fairly unlikely, Not sure, Fairly likely, Extremely likely) and respondents were asked to indicate the level of likelihood that they would actually pay the stated OE WTP value if the carbon travel tax to offset carbon emissions would be voluntary. According to the findings besides the bid price, respondent sense of responsibility and belief in the effectiveness of the voluntary carbon market were among the main reasons for the experienced uncertainty.

The paper is structured as follows. The first four sections describe background information on the study site, administration issues, questionnaire design, research design and the hypotheses that are to be tested. Section six presents the methodology used. Section seven provides the results of the analysis and finally, in section eight, the results are discussed and some conclusions are offered in section nine.

2. Study site

Zakynthos is part of the Ionian Island complex and it covers an area of about 40,600 ha. The resident population amounts to 41,500 though this number rises considerably during the summer period. The nesting habitat of loggerhead sea turtle (Caretta caretta) is located in the Bay of Laganas, which comprises six discrete beaches totalling about 5km in length. The Bay has been included in the national list proposed for the Natura 2000 network, under the EU – Habitats Directive 92/43 (Dimopoulos et al. 1999). Over the past twenty years Zakynthos has experienced a fast growing tourist industry, where 50 % of tourist facilities are located in the Bay of Laganas, exerting significant pressure on the turtles' nesting habitat. Furthermore, the reproductive period of the species coincide with the peak tourist period, June to August. In

December 1999 the first Presidential decree to set up the National Marine Park of Zakynthos (NMPZ) was signed.

The second marine species that we consider in our study is the Mediterranean monk seal (Monachus monachus), which is regarded as the most endangered seal in the world (International Union for Conservation of Nature (IUCN) 1984). Today, the largest population of monk seals in the Mediterranean is found in Greece, spread out over the whole of the Aegean and Ionian Seas. The cause of the endangerment can be located in the competition for fish between fishermen and the seals and in increasing human development and tourist activities. Considering the endangerment status of those two species it makes it easy to appreciate the importance of the established Marine Park of Zakynthos, as well as the need to establish more protected areas where necessary. In Zakynthos, there is no defined protected area for the Mediterranean monk seal although it is regarded that the west coast of the island is it's the habitat. It is estimated that Zakynthos is inhabited by twelve to fourteen individuals, while the whole population is estimated to be only a few hundred individuals (about 500) scattered throughout the Mediterranean and on the shores of the North Atlantic.

3. Survey administration

Both samples were randomly selected and a self-completion, drop–off, paper-and-pencil data collection mode was adopted. The questionnaire was personally delivered for self-completion and collected afterwards. It took about 15-20 minutes for the respondent to complete and no financial incentives were provided.

The survey was conducted in August 2003. In total 285 people, visitors and residents were contacted, returning an overall sample of 235 questionnaires (response rate ≈82%). The final total, usable questionnaires provided were 200–100 observations for the resident sample and 100 for the visitor sample. Thirty-five questionnaires were eliminated due to incomplete answers. As it will become clear in the next sections, in total, there were eight different versions of the questionnaire, four for the residents' sample and four for the visitors' sample. All questionnaires were evenly distributed in a cross-orthogonal design, assuring twenty-five respondents for each version of the questionnaire.

In the case of the residents, a random sample was drawn in the capital of the island in order to avoid residents that had financial interests in the area of the Park, like business people and land owners. Respondents were approached in their working environment and in public and private sector buildings; every second person was asked to participate.

The visitor sample consisted of respondents who were mainly foreigners and not Greek nationals; they were different nationalities with the majority coming from the UK. The distribution of the questionnaires took place on three main beaches of NMPZ: Laganas, Kalamaki and Gerakas. As this was an intercept survey, every eighth person was sampled two times during the day – before and after midday. The choice of the on-site sample was justified by the intention to address questions to the most informed tourists, so as to make it easier to respond to the valuation questions.

The choice of sampling and survey mode was mainly dictated by logistics, time and cost limitations. Hence, although intercept surveys may be associated with self-selection bias, by

adopting a drop-off mode we managed to avoid interviewer bias, while giving the survey a 'human face' with the initial personal contact (Bateman et al. 2002).

4. Questionnaire design

All versions of the questionnaire were divided into four main parts. The first part consisted of the introductory information about the species and the pressures on the described habitats. The second part contained questions that focused on the familiarity of the respondents with the subject, while the third part presented the valuation scenario for each species which described the current situation and the nature of the changes.[2] Respondents were asked to treat the two conservation schemes as if they were happening simultaneously. Finally, the fourth part intended to gather information about the socio-economic characteristics of the respondents as well as to collect behavioural information.

After the valuation scenario respondents were asked if they wanted to participate by giving them five options in order to identify the probability of payment and to avoid, what is called, 'importance bias' (Mitchell and Carson 1989). By using the polychotomous choice approach respondents were able to express their certainty/uncertainty by choosing from the following options: 'Positively yes, Probably yes, Unsure, Probably no, and Absolutely no'. That variable reveals the censoring of a naturally ordered underlying preference scale (Greene and Hensher 2008). The second stage asked all respondents, except those that chose 'Absolutely

[2] We should note though that the current conservation status for each of the species is different as well as the suggested change in their provision. In the case of the loggerhead turtle, the money would be spent for 'extra activities needed to fully enforce the Park regulations' while in the case of the seal, for 'a creation of a protected

no', to state the maximum amount of money that they were willing to pay. If the respondent gave a zero amount or selected the 'Absolutely no' option, he was asked to justify their answer by proposing a short list of alternatives and by giving them an option to specify 'Other reasons'. Three of the possible answers were 'I can't afford to pay anything', 'Society has more important problems than protecting animals' and 'I have already paid for the protection of the seal or turtle respectively'. If one of these statements was the reason for the zero WTP, then the responses were treated as 'true' zeros. Respondents that chose the option 'The Government should pay' were identified as 'protesters'.[3] Although this elicitation mechanism is subject to various problems it is considered a more straightforward method that does not involve a bias and at the same time is very informative, since maximum WTP can be identified for each respondent. A dichotomous choice was not preferred because of the large sample size required. Nevertheless, even this method is not without its problems as it is associated with larger estimates, compared to open-ended questions, and is subject to some degree of 'yea-saying' or starting-point bias (Balistreri et al. 2001; Halvorsen and Sœlensminde 1998; Kealy and Turner 1993; Loomis 1990).

5. Research design and hypotheses testing

A diagrammatical representation of the research design is presented in Figure 1. As shown, the total sample was split into two samples, one for residents and one for visitors. Each of these samples were further split in two sub-samples, showing a different sequence of the

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area in the North West of Zakynthos' area outside the borders of the existing NMPZ. For more information see Kaval et al. (2009).

species. Furthermore, each of these samples were split in two other samples that differed in their payment modes. Two different payment mechanisms were considered for each sample. For the residents, the two payment modes that were tested were: an extra tax payment (lump sum) versus a donation to a charity; while in the sample drawn from the population of visitors, the payment modes used were: a landing fee per head versus a donation to a charity. In total there were eight versions of the questionnaire, four for the sample of residents and four for the visitors.

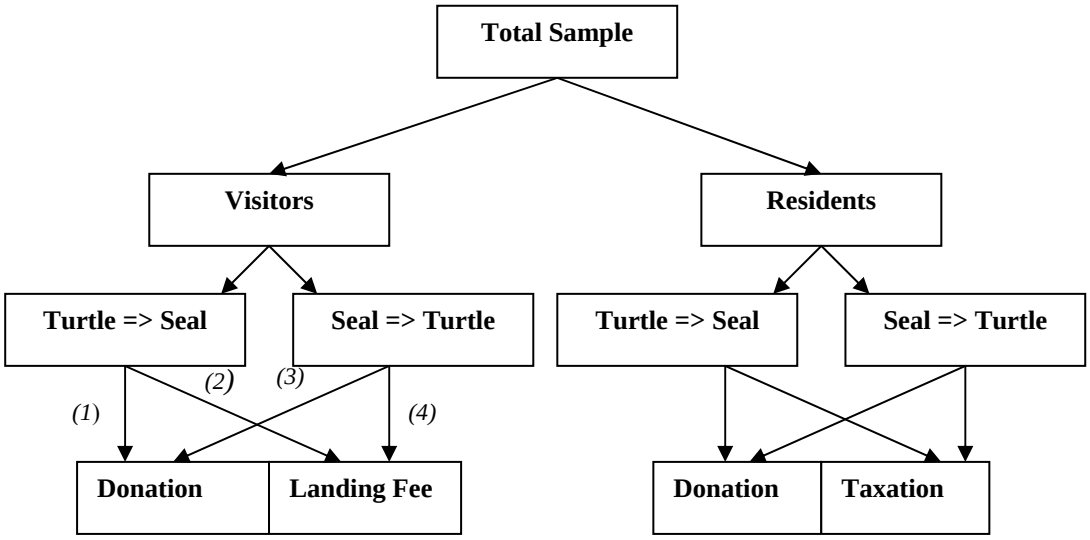

Fig. 1. Research design

In this paper we accept and test the view that 'respondents in a CV study are not valuing levels of provision of an amenity in the abstract; they are valuing a policy which includes the conditions under which the amenity will be provided, and the way the public is likely to be asked to pay for it' (Diamond and Hausman 1994, pp. 53–54). The existence of a payment

[3] Protesters are also respondents that either object to valuing the environment for ethical reasons or they object to the method of payment. If any of these or some other was the reason for their 'protest bid' they were given the chance to express it using their own words in the 'Other reason' option.

vehicle effect was explored between those questionnaires where framing remained constant. Hence, comparisons were made between samples (1) and (2) and then between samples (3) and (4) (see Figure 1) where the order of the species was the same and only the payment mode differed. The same tactic was followed in the sample for the residents. The payment vehicle effect was tested both for the mean WTP bids and the probability of payment.

6. Data analysis

CV results can be quite sensitive to the treatment of potential outliers. OE survey questions typically elicit a large number of 'protest' zeros and a small number of extremely high responses. Inference about the right tail of the WTP distribution is often problematic as only a very small fraction of the population, holding an extremely high set of ethical values, can dramatically influence the mean WTP (Carson 2000). The results that are presented in this section derive from a sample from which we eliminated the extreme cases. The outliers that were excluded were those that bid €300 and €1000. In addition, our sample included only 'true' zeros and excluded respondents showing a zero WTP, reflecting their protest against paying for the project. Respondents who gave a zero valuation for the good in question raised a crucial issue for the CV researchers, who have to deal with this in their analysis (Strazzera et al. 2003a, b) because zero bids, if not treated properly, can affect the reliability and validity of the obtained bids and undermine aggregate results. In the survey 37 out of 200 (18.5%) were identified as 'protesters' and came from all versions of the questionnaire. None of these 'protesters' were related to the payment mode employed. The final overall sample, after the above eliminations, totalled 155 observations, of which 85 were visitors and 70 were residents.

For the analysis of the data, statistical and econometric methods were employed. Chi-square tests, Fisher's exact test and the Wilcoxon-Mann-Whitney test, tests that examine the difference in means and proportions were also used, along with parametric probability models. In particlular, following Akter et al. (2009) and Champ and Bishop (2001) an ordered probit model was employed to relate the uncertainty responses to socio-economic and other relevant variables. According to Greene and Hensher (2008) accomodating heterogeneity is a major concern in cross-section data of this nature and as a result an attempt to count for that was made. The assumption of parallel constants was tested and not rejected making it reasonable to assume that the same thresholds apply for each individual. Another issue that was considered was whether a zero mean homoscedastic error, can be expected to satisfactorily accommodate the likely amount of heterogeneity in the underlying data. Different specifications of heteroskedasticity were considered but none of the Heteroskedatic Ordered Probit Models showed any strong evidence. However, evidence of heterogeneity in the parameters suggested a full random parameters approach. As a result, the use of an ordered probit Random Parameter Model (RPM) revealed heterogeneity in respondents' preferences as reflected in the statistically significant standard deviations of the random parameters. A small number of studies have used a Random Untility Maximization (RUM) framework to incorporate uncertainty and have included uncertainty direclty in the response options to the valuation questions rather than adopting a 'follow-up' strategy (Alberini et al. 2003; Ready et al. 1995, 2001; Wang 1997; Welsh and Poe 1998). Shaikh et al. (2007) gives an overview and empirical application of five approaches from the literature for incorporating respondent uncertainty in order to examine its impact on CV responses in a RUM setting.

For identifying the bid curve, different approaches were followed but Tobit corrected for heteroskedasticity (Greene 1993) and the Cragg (1971) model seemed to perform better. The Cragg model suggests a two equation system treating the two behavioural functions separatly. The first equation determines whether the individual participates and the second concerns the level of participation. Table 1 presents the definition and coding of the variables considered. For the different payment modes and species sequence dummy variables were included. NLOGIT 4.0 software was used for the analysis.

Table 1 - Variables included in the analysis

Variable specification	Description and coding
Ordinal categorical dependent variable	Respondents' uncertainty for the turtle/seal: 5=positively yes, 4=probably yes, 3=not sure, 2=probably no, 1=absolutely no
Continuous dependent variable	WTP for the turtle/seal
Age	Age in years
Gender	1=male, 0=female
Education	Education level, 1=max third level education, 0=max secondary level
Income	Individual's personal Income, 1=less than €6000 to 8=over € 60000
Environmental concern	Being environmental concerned, 3=yes, 2=not sure, 1=no
Beach control (Turtle)	Controlling number of visitors on specific beaches, 3=in favour,1=not in favour,2=not sure

New parks (Seal)	Creation of more protected areas where necessary, 3=in favour,1=not in favour,2=not sure
Frequency of visits	Frequency of visits on the island
Knowledge of species	Did you know about the presence of the turtle/seal? 1=yes, 0=no
Order	Order used, 1=turtle-seal, 0=seal-turtle
Payment visitors	Payment mode for visitors, 0=donation, 1=landing fee

We should note that the econometric analysis presented concerns only the sample of visitors as the resident sample did not reveal any significant and robust results worth commenting and therefore is omitted due to space concerns. Considering the limitations of this survey before presenting the results it should be stressed that the emphasis was placed on the patterns in the estimated coefficients rather than their precise values.

7. Results

7.1 Explaining respondent certainty and exploring the effect of different payment vehicles on the probability of payment

Initially, two-way tabulations were used between the response variable and the payment modes for each sub-sample, taking account of the species sequence. Although we tried the Chi-square and Fisher's exact test (as some of the cells had an expected frequency of five or less) no significant relationship was identified. We also used the Wilcoxon-Mann-Whitney test. As far as this last test is concerned, the null hypothesis of identical distributions in the residents' sample – for the seal – under taxation and donation, was rejected at 5%

significance level (z = -2.024, Prob > |z| = 0.0430), when the seal was second in sequence, suggesting different preferences towards the payment mode. In addition, we conducted a two-sample test of proportion and specific degrees of uncertainty were examined as no significant results were revealed when all degrees were considered. The following tables (2 and 3) present the significant differences, in percentages, for different degrees of certainty/uncertainty and different samples. The order with which species were presented was counted for.

Table 2 - Degree of uncertainty and payment mode for **turtle**

Residents – Turtle second			
Positively yes	Frequency	%	Number of observations
Donation	3	17.65	17
Taxation	8	44.44	18
Pr(|Z| < |z|) = 0.0879, Pr(Z > z) = 0.0439			
Visitors – Turtle first			
Positively yes	Frequency	%	Number of observations
Donation	5	25	20
Landing Fee	11	45.83	24
Pr(Z > z) = 0.0763			

From Table 2, in the case of the turtle, we can see that residents expressed a higher certainty under taxation than under donation. Visitors showed a higher certainty under landing fee than

under donation. In the case of the seal (Table 3) in the sample of residents the results provide an indication that there is higher certainty for a 'Positively yes' answer under taxation than under donation when the order is seal-turtle. However, when seal comes second, it seemed that taxation collected more negative responses, with a high degree of certainty (Absolutly no).

Table 3 - Degree of uncertainty and payment mode for **seal**			
Residents – Seal second			
Absolutely no	Frequency	%	Number of observations
Donation	1	5.26	19
Taxation	4	25	16
$Pr(\|Z\| < \|z\|) = 0.0965$, $Pr(Z > z) = 0.0482$			
Residents – Seal first			
Positively yes	Frequency	%	Number of observations.
Donation	4	23.53	17
Taxation	9	50	18
$Pr(Z > z) = 0.0526$			
Residents – Seal first			
Absolutely no	Frequency	%	Number of observations
Donation	5	29.41	17

Taxation	1	5.56	18
Pr (Z < z) = 0.0306, Pr(|Z| < |z|) = 0.0613			

An ordered probit model was used to explain certainty and examine if payment mode is one of the its determinants. Table 4 presents the results for the 'turtle' and 'seal' for the visitors' sample. At this point we should make clear that by testing structural stability it was not suggested that pooling the subsambles could be a good strategy. Findings from the ordered probit models (1) show evidence that payment mode has an impact on stated uncertainty and hence landing fee variable has a positive significant coefficient. That means that a landing fee payment mode increases the probability in the higher cell that is the probability of observing an 'Positively yes' response for the conservation of the turtle. This result coincides with evidence from Table 2. Furthermore, people with 'environmental concern', have prior knowledge of the species, are in favour of conservation measures, are male and at an older age will increase the probability of high certainty for the conservation of the species. However, pleople in the high income range decrease the probabilty of high certainty concerning their contribution. Our results agree with findings by Loomis and Ekstrand (1998) who showed that informed respondents are expected to experience lower uncertainty and Champ and Bishop (2001) who noted the impact of attitudinal variables related to the proposed programme in our case reflected in the suggested measures to increase protection such as 'beach control' for the turtle and 'creation of a new park' for the seal. Summary of the marginal effects for the significant variables are presented in Appendix A in order to demonstrate the variation in the sign.

Table 4 - Ordered probit regression and random parameter model results for stated uncertainty levels.

	Turtle (T)			**Seal (S)**	
	Ordered probit model	Random parameter ordered probit model		Ordered probit model	Random parameter ordered probit model
Age	0.037 (0.002)	0.051 (0.000)		0.049 (0.000)	0.068 (0.000)
Gender	0.928 (0.001)	1.190 (0.000)		0.971 (0.000)	1.685 (0.000)
Education	0.408 (0.165)	0.487 (0.150)		0.267 (0.353)	0.194 (0.564)
Income	-0.126 (0.039)	-0.174 (0.013)		-0.145 (0.022)	-0.262 (0.001)
Environmental concern	0.291 (0. 099)	0.397 (0.048)		0.271 (0.120)	0.446 (0.037)
Beach control (T) / New park (S)	0.677 (0.008)	0.866 (0.003)		1.097 (0.066)	1.096 (0.157)
Knowledge of species	1.019 (0.017)	1.262 (0.081)		0.811 (0.051)	1.577 (0.007)
Frequency of visits	0.037 (0.653)	0.057 (0.562)		0.043 (0.600)	0.143 (0.127)

Order	-0.263 (0.306)	-0.227 (0.424)		-0.228 (0.379)	-0.045 (0.881)
Payment mode	0.472 (0.086)	0. 713 (0.029)		0.264 (0.320)	0.626 (0.047)
Standard deviation of random parameters					
Payment mode		1.330 (0.000)			1.968 (0.000)
Gender		0.875 (0.035)			2.649 (0.000)
Environmental concern		0.213 (0.000)			
Model fit					
Log likelihood	-95.897	-95.583		-95.871	-94.305
McFadden Pseudo R-squared	0.16			0.16	
LR chi square	37.338			37.105	
N	85	85		85	85
P - values are given in parentheses.					

Furthermore, a random parameter ordered model[4] was estimated, presented as well in Table 4, in an effort to explore individual heterogeneity. Different specifications and underlined distributions were tried. The results show a positive and significant mean and variance for the

payment mode variable. That indicates that although respondents under landing fee are more likely to participate with higher certainty, their certainty level varies and some of them are more likely to express high certainty than others. Hence, all respondents did not place the same weight on payment mode when declaring certainty/uncertainty levels. That result is the same for both species' conservation though it was not the case for the seal in the ordered probit model. Other findings show that although men are more likely to participate than women, with a high certainty, some of men (and women) are more likely to participate with a high certainty than others. The same for people that are labbleled 'environmental concerned', at least for the case of the turtle.

7.2 The effect of different payment vehicles on stated WTP

In this section different tests were used to demonstrate whether the mean bids were sensitive to how the payment vehicle was specified. The first test examined whether there were differences in the mean WTP for each species and for both samples, under the two payment vehicles, using a two-sample t-test. In addition, Mann-Whitney's two-sample statistic was applied in order to test if the two samples, presented in Table 5, came from the same population. This hypothesis was rejected for the residents as shown in Table 6.

Table 5 - Descriptive statistics for WTP under different payment modes [a]

	Visitors		**Residents**	
	Turtle	**Seal**	**Turtle**	**Seal**
Turtle – Seal	Landing Fee	Landing Fee	Taxation	Taxation

[4] Uniform distributions and Halton draws were used and a total of 125 simulations were conducted to estimate each model.

Mean	13.64	14.27	28.93	29.87
St. Deviation	12.44	12.19	33.42	34.30
Median	10	10	20	20
Min	0	0	0	0
Max	50	50	100	100
Number of zeros	3	2	4	5
N	24	24	16	16
	Donation	Donation	Donation	Donation
Mean	15.70	15.20	27.10	28.68
St. Deviation	16.29	16.22	24.62	29.94
Median	10	10	20	20
Min	0	0	0	0
Max	50	50	100	100
Number of zeros	4	4	1	2
N	20	20	19	19
Seal – Turtle	Landing Fee	Landing Fee	Taxation	Taxation
Mean	12.04	12.40	35.55	50.27
St. Deviation	8.75	9.40	48.26	59.07
Median	10	10	20	30
Min	0	0	0	0
Max	35	35	200	200

Number of zeros	2	2	3	1
N	22	22	18	18
	Donation	Donation	Donation	Donation
Mean	22.52	20.94	32.05	32.64
St. Deviation	30.90	25.49	56.73	56.65
Median	10	10	10	10
Min	0	0	0	0
Max	100	100	200	200
Number of zeros	4	3	5	5
N	19	19	17	17
[a] All values are in 2003 (€).				

Before we examined the effect of the payment vehicle on the WTP in each sub-sample, we observed from Table 5 that under donation when the order of species was first turtle and then seal, visitors were willing to pay less (a mean of €15.70) for the turtle, compared with the residents (WTP is €27.10): ($t = -1.7138$, $Pr(T < t) = 0.0475$, $Pr(|T| > |t|) = 0.0949$). The same was true for the seal ($t = -1.7606$, $Pr(T < t) = 0.0433$, $Pr(|T| > |t|) = 0.0866$). On the other hand, when the order of species was first the seal and then the turtle, there were no significant differences for both species between the two samples.

Focusing on visitors' sample (Table 5), when the order of the species was first the seal and then the turtle, respondents were willing to pay more for the turtle and the seal under

donation (for turtle mean WTP is €22.52 and for seal is €20.94) than under landing fee (turtle mean WTP is €12.04 and seal is €12.40 respectively). Statistical significance is presented in Table 6. This result was not confirmed when the order of the species was the opposite. In the case of residents, no significant differences were detected.

Table 6 - Payment effect tests [b]

	Two Sample t-statistic	Mann-Whitney Z statistic (P > |z|)
Seal – Turtle		
$WTP^{r}_{s,d(32,64)}=WTP^{r}_{s,t(50,27)}$	t = -0.9002 Pr(T < t) = 0.1873 Pr(|T| > |t|) = 0.3746	-2.029 (0.0425)
$WTP^{v}_{t,1\ (22,52)}=WTP^{v}_{t,2\ (12,04)}$	t = 1.5242 Pr(T > t) = 0.0678	0.185 (0.8535)
$WTP^{v}_{s,1\ (20,94)}=WTP^{v}_{s,2\ (12,40)}$	t = 1.4623 Pr(T > t) = 0.0758	0.435 (0.6635)

[b] v=visitor, r=resident, t=turtle, s=seal, 1=Donation, 2=Taxation or Landing Fee. Numbers in parentheses are the means of the sample

Another way of testing our hypothesis is to cross-tabulate responses across payment vehicle to see if there is any difference in the proportion of respondents reporting a zero bid for each

payment vehicle[5]. When we tested this hypothesis some significant differences were revealed in the residents sample, where taxation gathered the higher frequency of zeros when the order was turtle - seal, see Appendix B. On the other hand, the visitors' sample showed no significant differences for this test and hence results are not reported. Finally, we would like to note that although Table 5 offers the opportunity for testing the hypothesis of a species 'order effect' on the magnitude of the offered bid, it is not the focus of this paper[6].

An empirical analysis of the 'bid' function was conducted, following similar steps as in other studies of OE data analysis (Alvarez-Farizo et al. 1999; Goodwin et al. 1993). Hence, we tried the OLS regression as well as a Tobit model. OLS is a standard regression technique used traditionally for analyzing OE bids, which, however, ignores the censoring implied by zero bids. For that reason and in order to account for information relating to the censoring at zero, we ran a Tobit model using the same sample. Following this model, we assumed that zero responses were generated from the same process as the positive bids. However, no difference in the performance between these two models was revealed.

For our data, the best performers were a Tobit model corrected for heteroskedasticity and a Cragg specifation. According to the latter it is assumed that the structure of the decision-making process of respondents with a positive WTP is different to the structure of the decision of whether the respondents have a positive WTP or not (Halvorsen, 1996). Different truncation strategies were explored and we decided to use, as an upper truncation, the maximum bid offered, which was €100. Furthermore we seriously suspect that respondents

[5] We note again, that the zero bids were true zeros and are regarded not to be a protest against the payment vehicle.

overstated their WTP and therefore we kept the €100 as a maximum limit. However, the results are sensitive to the upper truncation limit.

The Ordered Probit Model is the same as in 7.1 section and is only repeated for convenience. We should note that our five level ordinal dependent variable precedes the OE valuation question and as a result we did not include it as an explanatory variable in the WTP function. In the truncated models, variables with mostly economic values were included and according to the results modest differences were revealed with respect to the significance of some of them. Hence, although age, gender and income were significant in respondents' decision-making process for participation in the conservation of the species, they were not significant in the determination of the actual amount offered. As commented previously our variable of interest 'payment mode' was statistically significant and positive for turtle conservation revealing that when the payment vehicle was landing fee respondents were more likely to report a high degree of certainty of WTP. However, a negative and significant coefficient in the truncated regression indicated that under landing fee they reported a smaller bid than under donation. This result confirms our previous non-parametric findings too.

Table 7 – Corrected TOBIT model and Cragg specification, for **turtle**'s conservation.

	(1) Cragg specification			(2) Corrected TOBIT model	
	(a) Ordered probit model	(b) Truncated model		(a) E(WTP)	(b) σ_i=var$_i$
Constant		-13.291		-0.043	

[6] For more on this issue see Kaval et al. (2009).

		(0.517)		(0.994)	
Age	0.037 (0.002)	0. 058 (0.857)		0.167 (0.054)	-0.028 (0.002)
Gender	0.928 (0.001)	10.055 (0.2083)		2.870 (0.463)	0. 518 (0.023)
Education	0.408 (0.165)	19.142 (0.044)		6.815 (0. 023)	0.585 (0.009)
Income	-0.126 (0.039)	0. 660 (0.704)		0.865 (0.092)	0. 034 (0.466)
Environmental concern	0.291 (0. 099)				
Beach control (T)	0.677 (0.008)				
Knowledge of species	1.019 (0.017)				
Frequency of visits	0.037 (0.653)				
Order	-0.263 (0.306)	7.195 (0. 342)		-0.392 (0.891)	0.102 (0. 638)
Payment mode	0.472 (0.086)	-14.147 (0. 088)		-2.061 (0.642)	-1.019 (0.000)
<u>Model fit</u>					
Log	-95.897	-257.771			-303.439

likelihood					
McFadden Pseudo R-squared	0.16				
LR chi square	37.338				
Variation in the WTP (σ^2)		18.837 (0.000)			34.640 (0.004)
N	85	70			85
P - values are given in parentheses.					

Table 8 – Corrected TOBIT model and Cragg specification, for **seal's** conservation.

	(1) Cragg specification			(2) Corrected TOBIT model	
	(a) Ordered probit model	(b) Truncated model		(a) E(WTP)	(b) σ_i=var$_i$
Constant		-7.344 (0. 754)		-3.520 (0.657)	
Age	0.049 (0.000)	-0.013 (0.971)		0.249 (0.036)	-0.037 (0.000)
Gender	0.971 (0.000)	7.248		4.433 (0.267)	0.511 (0.008)
Education	0.267 (0.353)	19.131 (0. 089)		8.754 (0.000)	0. 196 (0.362)
Income	-0.145	-0.076		0. 858	0.114

	(0.022)	(0.970)		(0. 134)	(0.021)
Environmental concern	0.271 (0.120)				
New park (S)	1.097 (0.066)				
Knowledge of species	0.811 (0.051)				
Frequency of visits	0.043 (0.600)				
Order	-0.228 (0.379)	3.055 (0. 721)		-0.322 (0. 908)	0. 218 (0. 274)
Payment mode	0.264 (0.320)	-16.405 (0.104)		-3.138 (0.487)	-1.090 (0.000)
Model fit					
Log likelihood	-95.871	-272.592			-306.4731
McFadden Pseudo R-squared	0.16				
LR chi square	37.105				
Variation in the WTP (σ^2)		21.340 (0.000)			38.920 (0. 007)
N	85	73			85

P - values are given in parentheses.

Finally, we applied a corrected TOBIT model which revealed that although the payment mode had a negative, but not significant effect, on the expected WTP it had a negative and significant one in the variation in the WTP answers (for both species). Other significant findings, for both species, show a positve impact of age and education on the expected WTP while a negative and positive impact respectively in the variation in WTP responses. The week results of the TOBIT without correction for heteroskedasticity are presented in Appendix C.

8. Discussion

In this paper apart from the elicitation of the monetary WTP values of two endangered species in Greece, we attempted to explain respondent certainty/uncertainty as well as to explore the sensitivity of CV method to the chosen payment mode.

For the testing of the methodological issues different tests and econometric approaches were followed. As a result, evidence that the payment mode impacts respondent participation was found, at least for turtle conservation, when an order probit model was applied. In particular, a higher and positive certainty level (Positively yes) was associated with the landing fee option showing as well that payment mode consideration is a determinant of respondent uncertainty level. Other determinants, using the same model, were socioeconomic variables and attitudinal variables. In addition, prior to the questionnaire knowledge of species presence on the island had a positive impact. Furthermore, by runnning a random parameter

order probit model and counting for individual heterogeneity the impact of the payment mode on respondent uncertainty was established for both species revealing as well that the impact on stated uncertainty of payment mode, gender and environmental consiousness varied among respondents.

The payment mode effect on the stated WTP was tested in different ways. By comparing the mean WTP under the two payment vehicles in each sample, it was revealed that visitors reported a significant and higher bid under donation than under landing fee, for both species when considered in a particular species sequence. In addition, a cross-sample comparison, regardless of the different distributions of socio-economic characteristics between the samples, showed that residents had a higher and significant WTP for both species under donation than that of the visitors.

When the payment mode was econometrically tested through the application of a Cragg model and a heteroskedasticity-corrected Tobit model, it was shown to be negatively associated in the estimation of the offered-bid curve for turtle conservation. Hence, visitors were more likely to participate, with a high certainty, under landing fee but with a smaller bid amount compared to donation. Furthermore, counting for heteroskedasticity Tobit revealed a negative effect of of payment mode (landing fee) on the variation in the WTP answers for both species conservation.

Although we are aware of the limitations of this study, we suggest that the findings represent the tendency of people's WTP, which is an important indication for the sustainable operation of the NMPZ. Furthermore, the observed pattern of the results favour the validity of the CV,

as a stated preference method, revealing its sensitivity to the payment mode employed and at the same time it gives some further insight on the underlaying driving forces of respondent uncertainty.

9. Conclusion

From a policy point of view the elicitation of WTP estimates, showed a positive indication for internal funding and sustainable management of the NMPZ, whose operation is of crucial importance and whose funding resources are not secure. We should mention that the limited number of the other empirical applications of the CV method for the conservation of the same species in Greece (Kalfagianni 2000; Langford et al. 1998; Togridou at al. 2006), provide a measure of comparison. Table 9, adapted from Kaval et al. (2009), presents the WTP values from all studies in Greece related to these two species with varied payment modes and samples.

Table 9 - CV studies whose subject is the valuation of loggerhead sea turtle Caretta caretta and of the monk seal Monachus monachus, in Greece.

Study	Mean WTP Turtle	Mean WTP Seal	Payment Mode
Kalfagianni (2000)	€62		One – off payment (residents)
	€49 (average mean)		Five - year scheme (residents)

Togridou et al. (2006)	€ 6.15		Park admission fee (visitors)
Stithou (2009)	€29.60	€30	Donation (residents)
	€32	€40	Taxation-lump sum (residents)
	€19	€18	Donation (visitors)
	€13	€13	Landing fee (visitors)
Langford et al. (1998, 2001)		€34 - €65	Two year rise in water rates

The above studies provide a positive indication for species' conservation, offering different options of finance. As referred in Kaval et al. (2009) interesting management suggestions for the already established Marine Park, from an economically-sustainable point of view are, the landing fee, with a mean of €13 and median of €10 and/or, a Park admission fee, with a mean of €6.15 and median of €5. It is interesting to note that such sources could substantially contribute to the interior funding of the NMPZ. For the conservation of the monk seal the results are encouraging too. In an international context, other studies that have demonstated strong public support for Caretta caretta conservation are Whitehead's (1992) study with an average dollar amount offered by residents in a Trust Fund is US$33.22 per household per year); again Whitehead (1993) with a WTP of about US$11.10 per household per year and Mhawej's (2001) CVM applied in Lebanon that showed that median WTP values were US$37 per individual for visitors to the Palm island nature reserve and US$52 per individual for people surveyed in other Lebanese regions.

Greece could realise the potential of policies such as ecotourism, to support nature conservation. Considering the case presented in Tisdell and Wilson (2005), visitors to a sea turtle-based ecotourism site (Mon Repos) in south east Queensland, Australia, pay an entry fee for the possibility of viewing turtles and for the use of facilities during the turtle season. The facilities at this site include, not only informative programmes conducted by wildlife rangers and volunteers on the beach (activity similar to the NMPZ), but they also include visitor centre displays and an amphitheatre for film presentations and talks conducted by staff. An important finding of Tisdell and Wilson (2005) study is the fact that ecotourism experience was found to have positive and statistically-significant impact on the visitors' stated desire and intended behaviour towards protecting sea turtles. This finding confirms Togridou et al. (2006) suggestion for the provision of environmentally oriented educational programs by the NMPZ that could act as feedback through word-of-mouth information and hence influence visitors' WTP. Trying to make a comparison with our results, the knowledge of the presence of the species on the island was found to have a positive impact on the visitor's decision to participate with a high certainty in the suggested conservation scheme.

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Appendixes

Appendix A Summary of Marginal Effects for Ordered Probability Model (probit) - **Turtle**					
Variable	Y=00	Y=01	Y=02	Y=03	Y=04
Age	-0.0034	-0.0022	-0.0052	-0.0041	0.0148
Gender	-0.0795	-0.0488	-0.1189	-.01085	0.3556
Environmental concern	-0.0262	-0.0167	-0.0402	-0.0314	0.1145
Beach control	-0.0610	-0.0387	-0.0935	-0.0729	0.2662
Knowledge of species	-0.1770	-0.0697	-0.1147	0.0295	0.3320
Income	0.0114	0.0072	0.0174	0.0136	-0.0495
Payment mode	-0.0448	-0.0273	-0.0644	-0.0469	0.1834
Summary of Marginal Effects for Ordered Probability Model (probit) - **Seal**					
Variable	Y=00	Y=01	Y=02	Y=03	Y=04
Age	-0.0044	-0.0025	-0.0062	-0.0061	0.0192
Gender	-0.0821	-0.0456	-0.1111	-0.1295	0.3683
New park	-0.0974	-0.0561	-0.1365	-0.1357	0.4257
Knowledge of species	-0.0468	-0.0308	-0.0854	-0.1518	0.3148
Income	0.0129	0.0074	0.0181	0.0180	-0.0564

Appendix B

Proportion of residents reporting zero WTP under different payment mode.

Turtle-Seal		
	Turtle	**Seal**
Taxation	4 (16)	5 (16)
Donation	1 (19)	2 (19)
	z = 1.6623 Pr(|Z| < |z|) = 0.0965 Pr(Z > z) = 0.0482	z = 1.5269 Pr(Z > z) = 0.0634
Seal-Turtle		
	Turtle	**Seal**
Taxation	3 (18)	1 (18)
Donation	5 (17)	5 (17)
	z = -0.8975 Pr(Z < z) = 0.1847 Pr(|Z| < |z|) = 0.3695	z = -1.8716 Pr(Z < z) = 0.0306 Pr(|Z| < |z|) = 0.0613

Appendix C

Uncorrected TOBIT model for species' conservation.

	Turtle	**Seal**
Constant	4.342 (0.649)	-0.348 (0.966)
Age	0. 227 (0. 240)	0.290 (0.084)
Gender	6.618 (0.150)	7.186 (0.071)
Education	8.694 (0.067)	8.486 (0.039)
Income	-0.582 (0.567)	-0.231 (0.792)
Order	-1.303 (0.769)	-0.419 (0.913)
Payment mode	-5.495 (0.216)	-4.170 (0.278)
Model fit		
Log likelihood	-330.021	-326.531
Variation in the WTP (σ2)	19.913 (0.000)	17.283 (0.000)
N	85	85

P - values are given in parentheses.

Table Footnotes	
[a]	See Morrison et al. (2000) on tests that can be used to detect payment vehicle bias
[b]	We should note though that the current conservation status for each of the species is different as well as the suggested change in their provision. In the case of the loggerhead turtle, the money would be spent for 'extra activities needed to fully enforce the Park regulations' while in the case of the seal, for 'a creation of a protected area in the North West of Zakynthos' area outside the borders of the existing NMPZ. For more information see Kaval et al. (2009).
[c]	Protesters are also respondents that either object to valuing the environment for ethical reasons or they object to the method of payment. If any of these or some other was the reason for their 'protest bid' they were given the chance to express it using their own words in the 'Other reason' option.
[d]	Uniform distributions and Halton draws were used and a total of 125 simulations were conducted to estimate each model.
[e]	We note again, that the zero bids were true zeros and are regarded not to be a protest against the payment vehicle.
[f]	For more on this issue see Kaval et al. (2009).