COMPARISON OF TAKE-IT-OR-LEAVE-IT AND TAKE-IT-OR-LEAVE-IT WITH FOLLOW-UP ELICITATION FORMATS – CASE STUDY OF CZECH NATIONAL PARKS

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Received: August 31, 2012

Abstract

ANTOUŠKOVÁ, M.: *Comparison of take-it-or-leave-it and take-it-or-leave-it with follow-up elicitation formats – case study of Czech national parks.* Acta univ. agric. et silvic. Mendel. Brun., 2012, LX, No. 7, pp. 19–26

This paper focuses on comparison of two different elicitation formats commonly used in the Willingness-to-pay method. It compares the difference in influence of chosen respondents' characteristics on their willingness to pay for evaluated non-market good applying the take-it-or-leave-it (single-bounded choice) and take-it-it-or-leave-it with follow-up (double-bounded choice) elicitation formats. The good evaluated in the presented article is recreation in nature-based areas. The research is conducted in two primer nature-based recreational areas in the Czech Republic (National Park Sumava, National Park Podyji). The data sources are gathered from a tourist survey carried out in both the studied areas. A logistic regression is used for evaluation of the results. Based on the analysed method, two models are developed. The binary model elaborates the take-it-or-leave-it approach and the ordinal model elaborates the extended approach – take-it-it-or-leave-it with follow-up. The influence of personal and socioeconomic tourists' characteristics on their willingness to pay is predicted in both models and consequently compared. The predictors analysed include sex, age, education, frequency of visitation of studied areas, and total costs spent during the actual visit.

nature-based tourism, willingness-to-pay method, binary model, ordinal model, take-it-or-leave-it question, take-it-or-leave-it with follow-up question

Economists have struggled with evaluation of environmental public goods for decades and have developed several methods to estimate economic values of these goods, known as non-market valuation methods (Dumitras *et al.*, 2011). Samdin *et al.* (2010), pointing out that the application in the field of recreation issues started when there were concerns about recreation, and thus also a need to put a monetary value on it arose. Huhtala (2004) published that the analysis of a monetary value of the use of recreation services is motivated by the need for information enabling allocation of governmental resources and understanding the users of recreational sources. Dumitras *et al.* (2011) adds that the economic value of natural areas represents useful information for decision makers in developing environmental policies, plans and strategies.

Several methods have been developed in order to evaluate a monetary value of non-market goods. One class of techniques that economists use to elicit the individuals for non-market evaluation of goods is known as Stated Preference methods. Among Stated Preference methods, which typically require individuals to provide responses to hypothetical questions, belong: Contingent Valuation Method, Conjoin Analysis and Contingent Behaviour Model. A comparative analysis of non-market valuation techniques was provided by Ellingston and Seidl (2007). Consequently, Dumitras et al. (2011) conducted a comparative analysis of other commonly used methods for recreational value

evaluation: Travel Cost Method, Contingent Valuation Method and Choice Experiments Method.

The commonly used method for evaluating recreational value in nature-based recreation areas is the Contingent valuation method (CVM). The CVM was originally proposed by Ciriacy-Wantrup in 1947 who estimated the side effects of soil erosion (Venkatachalam, 2002). Even though CVM has been used since the middle of the last century, it is still widely employed (Mathews *et al.*, 2001). In theory, CVM respondents are expected to consider and answer the willingness-to-pay (WTP) question in a way that coincides with the economic theory (Lienhoop, Macmillian, 2007). Testing CVM results alongside the economic theory should create two conditions. Firstly, the percentage of respondents willing to pay a particular price should fall as the price increases. Secondly, the percentage of respondents willing to pay a particular price should increase as the demand for the good increases (Carson *et al.*, 2000). Ellingson and Seidl (2006) add that CVM is among few methods available to measure the economic value where there is no market information, although it is not a perfect substitute for having revealed preferences information and it does not provide all the answers for environmental monitoring.

Pek *et al.* (2011) points out that WTP is influenced by many factors. Income has usually a positive and significant effect on WTP, while age has usually a negative effect. The value of WTP is also influenced by the information which respondents receive. The respondents should have proper information about the evaluated element. The type of elicitation format may also influence the result of WTP in a significant way.

Elicitation effect

The elicitation technique used in CV studies can be divided into four main categories: *bidding game*, *payment card*, *open-ended* and *dichotomous choice*. The dichotomous choice can be further divided into two types: single-bounded (take-it-or-leave-it) choice and double-bounded dichotomous (take-it-or-leave-it with follow-up) choice. An extended version of the double-bounded dichotomous choice, the triple-bounded dichotomous choice, has also been used in some studies (Venkatachalam, 2002).

The above mentioned categories have evolved through practical application. Until recently, the oldest and most widely used technique was the bidding game (Mitchell, Carson, 1989). The advantage of these methods can be viewed as providing better results than market-like situations and the researcher can obtain a maximum willingness-to-pay value. The problems associated with the bidding game method are higher costs (the interviewers have to be present) and the determination of a starting point (Venkatachalam, 2002).

The *payment card* approach was developed by Mitchell and Carson for estimating national freshwaters benefits in 1984. The payment card approach contains a range of WTP values for the public facility in question, from which individuals have to choose their maximum WTP value (Venkatachalam, 2002).

The *open-ended technique* involves asking what maximum price the respondents would be willing to pay. Desvouges (1993) pointed out that this method leads to a number of zero responses or protest bids because the respondents may find it difficult to answer the question or provide truthful answers.

Addressing this issue, Bishop and Heberlein developed the *take-it-or-leave-it method* in 1979. In this method the respondents are asked only "yes" and "no" questions to the bid (Horowith, McConnell, 2002). The modified approach *take-it-it-or-leave-it with follow-up*, was introduced by Hanemann in 1984. This approach involves assigning one more bid to the initial bid. This approach is statistically more efficient than the single-bounded dichotomous choice. In terms of the methods used for evaluating WTP, logit models are commonly used (Mitchell-Carson, 1989).

Summarising the knowledge about elicitation formats in the Willingness-to-pay method, the question whether there is a difference in the results gained by different elicitation formats was raised up. The research question dealt with in the present paper is: "What is the difference in the influence of the respondents' characteristics on their willingness to pay using different elicitation formats?"

MATERIAL AND METHODS

In order to study the difference in results gained by different elicitation effects, the take-it-or-leave-it and take-it-it-or-leave-it with follow-up approach are studied. To estimate the influence of respondents' characteristic, the logistic regression function is used (see Bestard-Nadal, 2007; Hakim, 2010; Font 2000). Using this approach, the probability of saying "Yes" to a bid at different levels of independent variable is estimated as:

$$P = (1 - e^{-x})^{-1}, \tag{1}$$

where $\underline{x}$ is the estimated logit regression equation and $\underline{P}$ is the probability of accepting the price.

Depending on the dependent variable, several main types of models are distinguished: binary logit model, ordered (ordinal) model, multinomial logit model. The binary model is the simplest probability model based on only two categories of the response variable. The ordered logit models are an extension of the binary response model, when an ordinal response is estimated. Finally, a multinomial logistic regression allows for estimating the unordered categorical response (Hilbe, 2009).

The take-it-or-leave-it method corresponds to a binary model. The tourists are asked if they accept

the offered bid. Accepting or rejecting the offered bid forms the categories of dependent variable.

The take-it-it-or-leave-it with follow-up method suppose an additional question to accepting/rejecting the initial bid. This process forms the intervals in dependent variable, so ordinal models are applicable. If there is only one additional bid, then four intervals are created and the probabilities for these sequences are given as follows:

- "no" then "no":

$$P = \text{Prob} \ (W_n < k_{nl}) = \Phi \ ((k_{nl} - W)/\sigma)$$

- "no" then "yes":

$$P = \text{Prob} \ (k_{nl} < W_n < k_n) = \Phi \ ((k_n - W)/\sigma) - \Phi \ ((k_{nl} - W)/\sigma)$$

- "yes" then "no":

$$P = \text{Prob} \ (k_{nl} < W_n < k_{nu}) = \Phi \ ((k_{nu} - W)/\sigma) - \Phi \ ((k_n - W)/\sigma)$$

- "yes" then "yes":

$$P = \text{Prob} \ (W_n > k_{nu}) = 1 - \Phi \ ((k_{nu} - W)/\sigma),$$

where

$\underline{W_n}$....represents the true willingness to pay of person $\underline{n}$,

$\underline{k_n}$......a prompt,

$\underline{k_{nu}}$..... the second prompt if the person answers "yes",

$\underline{k_{nl}}$.....the second prompt if the person answers "no",

$\underline{\Phi (.)}$..standard cumulative normal function.

Data collection

The tourists' survey was conducted in 2012 (June–September) in pre-selected locations in the NP Podyji and NP Sumava. In order to avoid possible misunderstanding, face-to-face interviews were conducted. The interviewer made sure that the respondent was familiar with the subject to be evaluated and had a good understanding of what to expect in the visited area. Tourists without proper knowledge of the valuated subject were excluded from the interviewing process.

Before asking valuation questions, respondents were ensured that the survey served only for academic purposes. To evaluate their stay, respondents were asked: "What maximum amount are you willing to pay for being in this area and still having the same utility from the visit?" The initial bid will be CZK 100 per day. If the respondent rejected, he/she was offered a second bid at a half of initial amount (CZK 50). A similar process was applied if the respondent accepted the initial offer. In this case they were offered the double amount of the initial bid (CZK 200).

Finally, a series of socio-economic questions were asked, including the respondent's gender, age, educational level, spending during their visit. In total, 491 observations were elaborated.

Logit model specification

In order to analyse the chosen elicitation format and answer the research question, two models were developed:
1. Binary logit model, based on the accepting/rejecting the initial bid (CZK 100).
2. Ordinal model, based on the extension of the respondents' answer by using follow-up questions. The cut points of the ordinal model were given by CZK 50, CZK 100, CZK 200. This made it possible to create five intervals of willingness-to-pay answers: CZK 1–49; CZK 50–99; CZK 100–199; CZK 200 and more.

The independent variables in proposed models correspond to the factors that may influence tourists' decision about their willingness to pay (sex, age, education, frequency of visit and total expenditures per actual visit). The general model function is characterised as follows:

$$\ln (p/ (1 - p)) = \alpha + \beta_1 \ (\text{sex}) + \beta_2 \ (\text{age}) + \beta_3 \ (\text{level of education}) + \beta_4 \ (\text{frequency of visit}) + \beta_5 \ (\text{total expenditures per visit}) + e,$$

where

$ln \ (p/(1 - p))$ ...logit or log odds ratio of the dependent variable,

α ....a constant,

β ....dependent variable coefficient,

e ....error term.

The independent categorical variables are subsequently coded according to the studied variables. Sex is coded as: m – man, the reference category being women. Age is coded as: age group 0–19 (1); age group 20–29 (2); age group 30–39 (3); age group 40–49 (5); age group 50–59 plus (6). The reference category of age is the age group 60 plus. The parameter of education is coded as: without education (1); elementary education (2); high-school education (3); technical institute/college (4). The reference category for education is tourists with a university degree. The frequency of visits to studied areas is coded as: monthly (1); yearly (2); less often (3). The reference category is being there for the first time. Expenditures, which stand for total expenditures per actual visit, are considered to be a continuous variable.

The binary model is tested by Chi – square test – 2 log likelihood ratio as a measure of how well the estimated model fits the likelihood. There are used also tests that explain variability of the dependent variable – Cox & Snell R Square and Nagelkerke R Square. Cox & Snell R Square, Nagelkerke R Square and – 2 log likelihood are for guidance only since they can take moderate or low levels, even when the estimated model could be appropriate and useful, due to the fact that the dependent variable is categorical (Pardo and Riuz, 2002). Finally, the Hosmer and Lemeshow test is applied. The ordinal model is tested by Chi – square test, Cox&Snell R Square and Nagelkerke R Square and McFadden test.

RESULTS AND DISCUSSION

Tourists coming to the studied areas are mainly in the age category 20–29 years (38.1%), 40–49 years (22.3%) and 30–39 years of age (11.4 %). The research shows that most tourists have at least high-school education (75%), from whom 20% of tourists have obtained a university degree. There are only 0.7% of tourists without any education. 35.6% of respondents were in the studied areas for the first time, 12% come there monthly, 23.8% come yearly and 28.4% come less often. Tourists spent CZK 1,832 per their visit. The highest costs are spent for accommodation and boarding. There are 20.9% of tourists who are not willing to pay any hypothetical entrance fee. 10.7% of tourists are willing to pay up to CZK 49. 24.7% of tourists are willing to pay more than CZK 50 and less than CZK 99. 33.3% of tourists are willing to pay in the interval CZK 100–149. Only 2.7% of tourists are willing to pay between CZK 150 and CZK 199, and 7.5% of tourists are willing to pay more than CZK 200.

Binary model

Tourists' preferences and their willingness to pay the entrance fee to studied areas by using the take-it-or-leave-it approach, asking them to accept or reject the admission fee at the level of CZK 100, reveal the following binary model function:

Logit (CZK 100) = 0.331 + 0.001 expenditures – 0.24 sex (m) – 1.690 Age (1) – 1.923 age (2) – 1.441 age (3) – 1.437 (4) – 1.324 (5) + 22.298 education (1) + 0.873 education (2) – 0.133 education (3) – 1.380 education (4) + 0.782 frequency of visit (1) – 0.163 frequency of visit (2) + 0.159 frequency of visit (3)

Chi-square (sig.)	0.014
- 2 Log Likelihood	170.835
Cox&Snell Square	0.173
Nagelkerke R Square	0.234

Hosmer and Lemeshow Test (sig.)	0.205
Percentage of right prediction	62.4

The binary model reveals that expenditures are a statistically significant parameter. However, the exp (B) coefficient is 1, so the chance that by increasing CZK 1 in expenditures the tourist will be more likely to pay CZK 100 for entrance is 50:50. Therefore, no strong relation can be proved between tourists' total expenditures per actual visit and their willingness to pay. The parameter of sex is not statistically significant in the designed model but it shows that men tend to be less likely to pay CZK 100 for entrance than women. The analysed model also shows that all tourists younger than 60 years of age are less likely to pay CZK 100 for entrance than those aged 60 plus. The only statistically significant age group are tourists in 20–29 years of age. These tourists are 1.17 less likely to pay CZK 100 for entrance than those older than 60 years of age. The predictor of education is not statistically significant in the model, nor is the predictor of frequency of visits. Detailed values of predictors are shown in Tab. I.

Ordinal regression model

Extending the willingness-to-pay question by one additional question enables to develop the ordinal model. Exponentiating the estimates, the odd ratios of the predicted model show that men have 2.12 times higher odd to be in lower payment category than women, while other variables in the model are held constant. The age category is also a statistically significant variable in the proposed model. Comparing to the tourists in the age category 60 years of age and older, tourists in the age category 0–19 are 1.043 times less likely to be in a higher payment category, tourists in the age category 20–29 are 1.041 times less likely to be in a higher payment category, tourists in the age category 40–49 are

I: *Binary model results*

	B	Std. Error	Wald	df	Sig.	Exp(B)
Expenditures	.001	.000	9.652	1	.002**	1.000
Sex (m)	–.024	.398	.004	1	.952	.976
Age (1)	–1.690	1.271	1.768	1	.184	.184
Age (2)	–1.923	1.011	3.619	1	.057*	.146
Age (3)	–1.441	1.035	1.939	1	.164	.237
Age (4)	–1.437	1.072	1.796	1	.180	.238
Age (5)	–1.624	1.057	2.362	1	.124	.197
Education (1)	22.298	28.547	.000	1	.999	48.419
Education (2)	.873	.677	1.663	1	.197	2.394
Education (3)	–.133	.431	.095	1	.758	.876
Education (4)	–1.380	.842	2.684	1	.101	.252
Frequency of visit (1)	.782	.748	1.095	1	.295	2.187
Frequency of visit (2)	–.163	.536	.093	1	.761	.849
Frequency of visit (3)	.159	.463	.118	1	.731	1.173

**Statistical significance $\alpha = 0.05$
*Statistical significance $\alpha = 0.1$

1.057 times less likely to be in a higher payment category, and finally tourists in the age category 50–59 are 1.039 times less likely to be in a higher payment category. Nevertheless, all the mentioned age categories have odds ratio close to 1, which indicates that the probability of being in a higher payment category is close to 50:50. Therefore, there cannot be indicated any strong relation between the categories measured. Nevertheless, there is a strong relation between the age category 30–39 and 60 plus. Tourists aged 30–39 are 3.164 times less likely to be in a higher payment category than tourists in the oldest age category.

Focusing on the parameter of education, there are only two statistically significant categories. The tourists with elementary education are 12.158 more likely to be in a higher payment category that those with a university degree. Likewise, tourists with high-school education are 1.879 times more likely to be in a higher payment category than those with a university degree.

The analysis of the frequency visit parameter reveals only one statistically significant predictor. Tourists visiting the national park once a year are 2.588 more likely to be in a higher payment category than tourists being there for the first time. Details of the ordinal model are shown in Tab II.

Chi-square (sig.)	0.006
- 2 Log Likelihood	589.769
Cox&Snell Square	0.142
Nagelkerke R Square	0.151
McFadden	0.055

CONCLUSIONS

Comparing the take-it-or-leave-it and take-it-it-or-leave-it with follow-up methods proves that there is a difference in results obtained by each method. The binary and ordinal models are both statistically significant, however not all studied parameters are statistically significant. Especially the binary model shows less statistically significant parameters that the ordinal model.

Both the models prove that there is a positive relation between total expenditures spent during the visit and willingness to pay. However, both the models prove that this relation is not strong, because the exp (B) coefficients are close to 1.

Analysing the parameter of sex, both the models prove that men tend to be less willing to pay the offered (or higher interval) price for entrance than women do. The predictor of age also shows similar tendencies in both the models. Comparing to the age category 60 plus, all younger tourists are more likely to show lower tendencies to pay the offered/higher interval entrance fee. Even though the tendencies are similar in the designed models, the predicted values differ.

Nevertheless, the parameter of age is not similar in the estimated models. While the ordinal model shows that less educated tourists are more likely to pay the offered (or higher interval) admission fee than those with a university degree, the binary model proves this relation only for tourists with no or just elementary education. Those with high-school or college/technical institute education show a lower tendency to pay CZK 100 for entrance than tourists with a university degree.

II: *Ordinal model results*

		Estimate	Std. Error	Wald	df	Sig.
Threshold	interval (1–49)	–3.232	1.03	9.846	1	0.002
	interval (50–99)	–2.302	1.022	5.076	1	0.024
	interval (100–199)	0.383	0.994	0.149	1	0.7
	interval (200–)	0.675	0.996	0.459	1	0.498
Location	Expenditures	0.002	0.001	5.274	1	0.02**
	Sex (m)	–0.619	0.336	3.394	1	0.065*
	Age (1)	–3.149	1.23	6.555	1	0.01**
	Age (2)	–3.077	0.979	9.867	1	0.002**
	Age (3)	–2.681	0.987	7.374	1	0.007**
	Age (4)	–2.906	1.028	7.991	1	0.005**
	Age (5)	–3.276	1.031	10.1	1	0.001**
	Education (1)	2.498	1.446	2.984	1	0.084*
	Education (2)	0.469	0.59	0.631	1	0.427
	Education (3)	0.631	0.371	2.887	1	0.089*
	Education (4)	0.401	0.58	0.477	1	0.49
	Frequency of visit (1)	–0.411	0.638	0.414	1	0.52
	Frequency of visit (2)	0.951	0.461	4.262	1	0.039**
	Frequency of visit (3)	0.195	0.395	0.243	1	0.622

**Statistical significance $\alpha = 0.05$
*Statistical significance $\alpha = 0.1$

Finally, the parameter of frequency of visits shows different tendencies in both the studied models. Comparing to the reference category (tourists being in the studied areas for the first time), the tourists being there monthly and less often have a positive tendency to pay CZK 100 in the binary model (tourists being there yearly stating a negative tendency). In the ordinal model, only the parameter of being less often in the studied areas has the same tendencies as in the binary model. Other categories show opposite tendencies.

The results prove that choosing the appropriate method and elicitation effects is essential for getting meaningful results of WTP evaluation. In this particular study, using the ordinal model is more suitable than using only the binary model. That gives more statistically significant parameters and better information about the willingness to pay for entrance in the studied nature-based recreational areas. However, it is essential to be aware of the fact that tourists were asked hypothetical questions, so there is no proof that they will really act as they said if the situation would come true.

SUMMARY

The willingness-to-pay method is a method commonly used for evaluating public goods and it also enables to reveal respondents' preferences for an evaluated good. Several elicitation formats are commonly used to reveal respondents' preferences and their willingness to pay. This raises the question whether there is a difference in results applying different elicitation formats. The presented paper focuses on comparison of results using two different elicitation formats, take-it-or-leave-it (single-bounded choice) and take-it-it-or-leave-it with follow-up (double-bounded choice). It specialises on comparison of the influence that the respondents' characteristics may have on their willingness to pay. The good evaluated in the research project is nature-based recreation, because this is still considered to be a public good. The research is conducted in nature-based recreation areas in the Czech Republic (National Park Podyji, National Park Sumava). The necessary data are gathered by asking respondents about their willingness to pay a hypothetical entrance fee to the national park. The studied factors that may influence the tourists' willingness-to-pay answer are sex, age, education, frequency of visits to the studied area and total costs per visit.

To answer the research question, the logistic regression is used and two models are developed. The binary model analyses the take-it-or-leave-it approach, in which the respondents were asked to accept/reject the initial bid. The extension of this approach by asking respondents the follow-up question is elaborated by the ordinal model. The extension of the question consists in asking respondents' to accept/reject the half/double of the initial bid.

The comparison of the results gained by the binary and ordinal models shows that there is a difference in influence which the chosen predictors have on respondents' willingness to pay. While the variables of total expenditures, sex and age have similar effects compared to the reference categories, the variables of education and frequency of visits have different effects. Even though the tendencies are similar, the strength of the relation between variables is different in developed models. Nevertheless the main difference in the studied variables is their statistical significance, which is definitely higher in the ordinal model. While the binary model revealed only two statistically significant parameters; the ordinal model revealed ten of them. Results of the presented contribution revealed e.g. that tourists visiting the national park once a year are 2.588 more likely to be in a higher payment category than tourists being there for the first time, or that tourists with high-school education are 1.879 times more likely to be in a higher payment category than those with a university degree.

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