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## HOW VIEWING A FOREST AFFECTS WILLINGNESS TO PAY OF USERS AND NON-USERS IN CONTINGENT VALUATION METHOD?

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**ABSTRACT:** In Contingent Valuation studies, users generally declare willingness to pay (WTP) higher than non-users. This study attempts to investigate if viewing the good during CV survey has a different impact on users' and non-users' WTPs. A framed field experiment was conducted in which users and non-users were surveyed in two locations – one with a view of the forest and the other without it. Our study showed that the WTPs of users were significantly higher than those of non-users only when respondents did not see forest during the survey. However, when the experiment was conducted in a location where the respondents could see the forest – the difference disappeared. Our results also show that the relationship between declared WTP and both the respondents' socio-demographic status and their environmental attitudes were weaker among respondents surveyed in a location with a forest view. We believe that the increase in WTP of non-users is temporary and represents a kind of bias. This in turn may be relevant in the design of CVM studies.

**KEYWORDS:** contingent valuation method, forest valuation, willingness to pay, user status, view of a good

## Introduction

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The growing scale of the environmental and climate crisis has made the economic value of environment the subject of numerous scientific studies but also of growing interest to policy makers. For this reason, economic accounts for the environment, including forests, have been developed and systematically expanded: at the international level within the System of Environmental-Economic Accounting (2014) and in the European Union as the European Framework for Integrated Environmental and Economic Accounting for Forests (Eurostat, 2002). Legislative work is currently underway to extend the European Environmental Economic Accounts by adding some new modules, including forests. While these environmental accounts currently focus on market transactions, there is a strong possibility of adding non-market environmental services as well. However, this would require more knowledge about the monetary valuation of these goods and services. The methodological issues related to the valuation of the environment have therefore become not only scientific matter, but also a matter of practical importance.

The Contingent Valuation Method (CVM) is a method used to value environmental goods based on stated preferences. One feature of the CVM is that the set of information possessed by the respondents affects their declared WTP. It is known that users generally declare higher WTP than non-users. First, users express both use and non-use value. Second, for users, the experience or familiarity with a good is generally higher than that of non-users. This has led us to the question if non-users who become familiar with the good under valuation (meaning they can see the good while taking the survey) still declare WTP lower than users. The environmental good in our study is a protected forest located in north-eastern Poland – the Knyszyn Forest. The following research questions have been formulated:

1. Is there a difference in the willingness to pay for the protection of the considered forest among users and non-users?
2. Does the user-status affect the WTP equally when the survey is conducted in a location with and without a view of the forest?
3. Does the level of WTP sensitivity to the socio-demographic profile of respondents change when the survey is conducted in a location with and without a view of the forest?

## Literature review

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The Contingent Valuation Method (CVM) is one of the stated preference methods that has been widely applied for the assessment of social preferences of goods in cases where market valuation is difficult or impossible. This often occurs with environmental goods. In the CVM a hypothetical scenario is constructed to show the respondents what they will receive in exchange for payment. The survey results are then usually generalized to generate estimates for WTP in general population.

In a CVM survey respondents declare their willingness to pay (WTP) for valued goods based on some set of information that may be endogenous or exogenous. Endogenous information comes from past experiences, like familiarity and personal behaviours while exogenous information is provided through the survey design (Cameron & Englin, 1997; Berrens et al., 2004). One feature of the CVM is that the set of information possessed by the respondents affects their declared WTP (Arrow et al., 1993; Bateman et al., 1993). Having direct experience with a good usually results in higher WTPs (Gilbert, 1992; Blomquist & Whitehead, 1998; MacMillan et al., 2006; LaRiviere et al., 2014).

Exogenous information (usually objective information) also has a proven impact on WTP (Blomquist & Whitehead, 1998; Bergstrom et al., 1990; Napolitano et al., 2008; Toma et al., 2012; De Steur et al., 2013; Lusk, 2004). But some authors, including Cameron and Englin (1997) claim that information in the questionnaire is not equivalent to previously acquired information especially for goods with a large component of use value. A similar conclusion can be drawn from the work of Whitehead et al. (1995) where respondents who had not initial information declared the lowest WTP and users declared the highest WTP, with people who possessed theoretical knowledge of the good in between.

The view of a good (or some of its characteristics) raises the WTP declared by respondents, which is often analyzed in the context of valuations in the real estate market (Xiao et al., 2016; Mittal et al., 2019; Lifang et al., 2020) or tourism (Weber et al., 2002), landscape preferences (Mittal et al., 2019; Bishop & Rohrman, 2003; Campbell et al., 2009; Sayadi et al., 2009). As a rule, in these studies respondents were provided with various visual materials (photographs, films, virtual tours) depicting the good in question in different versions. Providing such information increased respondents' valuations and the increment was even larger when those images were more attractive or were more realistic (Bishop & Rohrman, 2003; Shi et al., 2020), e.g. computer simulations and virtual reality presentations have a greater impact than photos (Kroh & Gimblett, 1992; Sevenant & Antrop, 2011; Xiang et al., 2021).

Physical proximity to a good is also a way of providing view of a good. According to literature (Sutherland & Walsh, 1985; Jørgensen et al., 2013; De Valck et al., 2018) it also increases the declared WTP. The impact of the physical proximity to a good on respondents' answers can be seen in studies that compare the answers of participants questioned at a good's location (on-site surveys) and those questioned in different locations (off-site surveys) (Bishop & Rohrmann, 2003; Shi et al., 2020; Xiang et al., 2021; Brown et al., 1989; Gyllin & Grahn, 2015). For example, in a study carried out by Xiang et al. (2021), the WTP of on-site respondents was higher than those of off-site participants. Studies comparing the preferences of on and off-site respondents were only carried out among users of goods (Xiang et al., 2021) or their status (user or non-user) was not taken into consideration (Bishop et al., 2003; Shi et al., 2020; Gyllin & Grahn, 2015). According to our knowledge, there have been no studies using CVM that consider how being able to see the good affects valuations of users and non-users.

Users usually include people who have had a direct experience with a good in question (Cameron & Englin, 1997; Sutherland & Walsh, 1985; Schaafsma, 2012; Jørgensen et al., 2013; Kniivilä, 2006). The user status may also be analyzed as a multidimensional continuum that considers a varying scale of experiences connected to a given good, for example, the number of years for which it had been used (Cameron & Englin, 1997) or way of using the good (Whitehead et al., 1995). Whitehead et al. (1995) assumed that the limited validity of assessments is the result of incomplete information and thus defined non-users as people who have no information about the good other than that obtained as part of the CVM study. Significantly, they found that non-users did not answer WTP questions in a theoretically predictable way. For example, they did not consider budget constraints. Therefore, WTP declared by on-site users was both more reliable and higher than WTP stated by off-site users and non-users. Next, Schaafsma et al. (2012) found that, compared to users, non-users' preferences are less sensitive towards the distance to the good. The demand of users declines faster the farther away they are from the good which can be explained by the greater impact of distance on the use value as compared to the non-use value.

Surprisingly, Kniivilä found no significant difference between users and non-users in their likelihood to support continued conservation in Finland (Kniivilä et al., 2006). This could have been caused by a change in the way the WTP questions were asked. Respondents were presented with two forms of WTP questions, one referring to personal utility and the other emphasizing the social benefits. Responses to the second version of the question showed that user and non-user responses could be similar.

## Research methods

Our study investigates the impact of two sources of information in a CV survey: the user status and the view of a good in question during the survey. A framed field experiment (Harrison and List, 2004) was conducted. The study was carried out in two towns: Supraśl (experimental group) and Tykocin (control group). Supraśl is located on the edge of the Knyszyn Forest and the survey was conducted in a location where this forest was visible. Tykocin is approximately 50 kilometers from the Knyszyn Forest and the survey was conducted in a location where respondents could not see this nor any other forest. We have chosen these towns as they are similar in terms of size, socio-economic profile and role in the regional economy, including tourism. As the basic method of our study was an experiment, we used a simplified form of CVM. As a result, we do not estimate the value of the forest based of the survey results but analyze the differences between the experimental group and the control group assuming that possible bias affect both groups in a similar way.

Our basic control variable was user status. We defined a user as a person who had made use of the given object in the past and, therefore, had directly experienced the good (similarly to Sutherland & Walsh, 1985; Schaafsma et al., 2012; Jørgensen et al., 2013; Kniivilä, 2006). In order to obtain a similar proportion of users and non-users and keep the relative homogeneity of the study groups we interviewed only tourists defined as people declaring a place of residence other than the town in which the survey was conducted.

**Table 1.** Composition of the research sample for implemented treatment options (including protesting respondents)

Types of respondents	Treatment options		Total
	with a view of the forest (experimental group)	without a view of the forest (control group)	
Users	123	120	243
Non-users	120	121	241
Total	243	241	484

Source: authors' work.

The empirical CVM application dealt with the Knyszyn Forest – a vast forest complex (about 1050 km<sup>2</sup>) located in the Białystok Upland within the Podlaskie Voivodship (North-Eastern Poland). The forest covers areas of the terminal moraine with the Supraśl River as well as its tributary, the Sokoła River flowing through them. Dominant species of trees include pine, spruce,

birch, alder, and oak. Since 1974 it has been a refuge to European bison. In 1988 the Knyszyn Forest Landscape Park, which includes 19 nature reserves, was established.

Data for the study was collected through paper and pencil interview (PAPI). The questionnaire consisted of 16 questions concerning (a) user status, (b) WTP, (c) control question of „protest zeros”, (d) environmental attitudes and (e) the respondents' socio-economic background. The first part of the questionnaire (a-c) was filled in by interviewers and part d-e, i.e. sensitive questions by respondents themselves.

We attempted to limit the scenario to 500 characters to balance the amount of information provided and the respondents' involvement and cognitive burden (Schaafsma et al., 2012; Rolfe et al., 2002). Respondents received general information about the Knyszyn Forest and were familiarized with threats to the functioning of the forest's ecosystems caused by the lowering of groundwater tables. Moreover, a general map of the Knyszyn Forest was shown.

The payment vehicle took the form of a one-time fee that would be added to the water bill. We decided that, considering the compelling arguments for the use of periodic instead of lump sum payments (Johnston et al., 2017); such a payment method would be more clear and acceptable to respondents. The fee would be transferred to a program that would preserve the natural qualities of the Knyszyn Forest.

We used a double-bounded dichotomous choice (DBDC) elicitation format (Hanemann et al., 1991; Johnston et al., 2017). The initial bid was set at 50 PLN (~11 €) with the bid vector of 50-100-200 PLN established per household. In cases where the respondent stated that 50 PLN was too high a vector of 50-20-10 PLN was used. The initial bid was selected based on a pre-survey.

The survey was carried out between September 19 and October 10, 2020. The total sample consisted of 484 people. Among them, 13.8% (68 interviews) were determined to be „protest zeros” (following e.g. Lo & Jim, 2015; Halstead et al., 1992). This reduced the total sample to 416 questionnaires.

Data analysis was conducted using statistical tests and multinomial regression models, aiming to compare each category of a dependent variable with a reference category. The general multinomial logistic regression model is shown in the equation below (Greene & Hensher, 2010; Long & Freese, 2014):

$$\text{Log} [\text{Pr}(Y=j)/\text{Pr}(Y=j')] = \alpha + \beta_k X_{k'} \quad (1)$$

where:  $j$  – the identified class,  $j'$  – the reference class,  $X$  – the asset of independent variables (or an independent variable).

The structural parameters of the models were estimated using the maximum likelihood method.

In the models, coefficients, standard errors and average marginal effects (AMEs) were presented (Williams et al., 2012). The structural parameters of the models were estimated using STATA 16 (StataCorp LLC).

## Respondents characteristics

Information on socio-demographic profile of the respondents was shown in Table 2. The experimental and control group had similar socio-demographic profile, which is a key issue in research conducted using the experimental method.

Table 2. Socio-demographic profile of respondents (including protesting respondents)

Location (%):			
– Supraśl	50.20	100	-
– Tykocin	49.80	-	100
Age – mean (SD)	42.68 (14.36)	42.56 (14.42)	42.80 (14.32)
Gender (% of females)	53.70	55.1	52.3
Education:			
– lower*	14.30	10.70	17.80
– upper secondary school	30.00	28.80	31.10
– higher education	55.80	60.50	51.00
Financial situation (%)			
– bad	14.30	11.10	17.50
– rather good	59.20	64.60	53.80
– very good	26.50	24.30	23.70
Parental status (% having children)	57.60	60.90	54.40
Sample size	484	243	241

\* lower secondary/basic vocational school or lower

Source: authors' work.

Additionally, Environmental Attitude Index (EAI) based on 6 questions (Table 3) was constructed (as recommended inter alia by the NOAA panel, Arrow et al., 1993). Respondents answered questions concerning their environmental behaviours as well as attitudes.

To verify the internal consistency of the scale, Cronbach's alpha was used. This measure is a function of the number of test items and the average inter-correlation among the items (Cronbach 1951). Cronbach's alpha for the

entire sample was 0.754 and exceeded the minimum required reliability coefficient of 0.7 as recommended by Nunnally and Bernstein (1994).

**Table 3.** Percentage of responses to Likert scale questions describing respondents' environmental attitudes

Statement	Percentage of responses to Likert scale					Descriptive statistics	
	1	2	3	4	5	Mean	SD
I reuse one-side printed sheets of paper	10.3	12.7	24.8	24.5	27.6	3.46	1.31
I use single-use plastic shopping bags <sup>2</sup>	11.1	26.7	31.3	27.0	3.9	2.86	1.06
I reprimand a person who litters in a public place	15.9	22.6	32.7	14.9	13.9	2.88	1.26
I worry about the climate change	4.3	20.7	27.4	26.2	21.4	3.39	1.17
I talk with people about topics related to environmental protection	8.4	21.6	33.2	23.3	13.5	3.11	1.16
I read information/watch programs connected to the state of the environment	4.3	20.2	35.4	24.8	15.2	3.26	1.09

<sup>1</sup> Likert scale: 1 – never, 2 – sometimes 3 – quite often, 4 – very often, 5 – always/constantly

<sup>2</sup> an inverted Likert scale was used: 5 – never, 4 – sometimes, 3 – quite often, 2 – very often, 1 – always/constantly

N=416 (protesting responders were excluded)

Source: authors' work.

## Results

### WTP of users and non-users

To address the first research question, the arithmetic mean WTP of respondents by user status was compared (Table 5).

In the first step, WTP was treated as a quantitative variable. The study indicated that users of the Knyszyn Forest declared a significantly higher WTP for its protection (on average 62.06 PLN, about 14€) compared to non-users (45.86 PLN, about 10.3€).

Next, due to its discrete character that is characteristic of DBDC studies, the WTP answers were grouped into three categories, where a respondent declared: 1 – less than the initial bid, 2 – the initial bid (no more and no less), 3 – more than the initial bid. According to the test for a difference in proportions, a significantly higher fraction of non-users ( $p < 0.01$ ) declared their WTP at a level lower than the initial bid (non-users – 47.76%, users – 30.23%). The difference results from the percentage of people declaring the lowest WTP (less than PLN 10). At the same time, the difference in the percentage of



respondents who agreed to pay the initial bid was not statistically significant. Generally, we observed that users of the forest declared higher WTP than non-users, which is the answer to our first research question. This result does not bring new knowledge, but confirms that participants responded as predicted by theory.

Table 5. WTP by user status

Definition	Unit	Distribution of answers			Differences between users and non-users (significance)
		Total sample	Users	Non-users	
WTP arithmetic mean (SD)	PLN	54.31 (2.77)	62.06 (4.27)	45.86 (3.36)	U-Mann Whitney <sup>1</sup> ***
Original bid vector:					In proportions:
10 PLN or less		26.87	13.95	20.19	***
20 PLN	%	20.90	16.28	18.51	-
50 PLN		34.83	42.33	38.70	-
100 PLN		11.94	21.40	16.83	***
200 PLN or more		5.47	6.05	5.77	-
Grouped answers					In proportions:
1 – less than the initial bid	%	38.70	30.23	47.76	***
2 – initial bid		38.70	42.33	34.83	-
3 – more than the initial bid		22.60	27.44	17.41	**
N – sample size	persons	416	215	201	

<sup>1</sup> The results of the Kolmogorov-Smirnov test showed that the variable does not meet the criteria of normal distribution

significance code: \*\*\* $p < .01$ ; \*\* $p < .05$ ; \* $p < .10$

Source: author's work.

## Factors influencing respondents' WTP

To understand which factors influence the WTP level a multinomial regression technique was employed (Table 6). We made the decision to distinguish three levels of WTP in order to meet the minimum sample size criterion in the models. User status as well as a view of the forest were considered as exogenous variables.

The analysis indicated that the probability of respondents declaring WTP below the initial bid depended on their user status, EAI, and financial situation. Specifically, an increase in EAI by one caused a 15% decrease in the probability that a respondent's WTP is below the initial bid. The probability

of users declaring their WTP below the initial bid fell by 10.6%. At the same time, the probability that people who declared a very good financial situation would not agree to pay the initial bid fell by 8.3%. This may suggest that people in bad or rather good financial situation accounted for their budgetary limits (Loomis et al., 1994; Choi & Fielding, 2013). It was also noted that the probability of  $WTP > WTP_{initial}$  was impacted only by EAI and this influence was lower than the probability of declaring a low WTP.

**Table 6.** Multinomial regression models of WTP for both locations (alternative base – initial bid)

Variable	WTP less than the initial bid			WTP more than the initial bid		
	Coef.	SE	AME	Coef.	SE	AME
User status	-.461*	.238	-.106**	.156	.281	.055
Location (a view of the forest)	-.251	.238	-.036	-.235	.275	-.020
Age	-.007	.011	-.001	.001	.012	.001
Gender	.201	.253	.047	-.081	.273	-.026
Parental status	-.237	.305	-.013	-.542	.350	-.068
Education:						
1 – lower secondary/ basic vocational school or lower (base)						
2 – upper secondary school	.437	.390	.085	.092	.532	-.014
3 – higher education	.231	.400	.033	.227	.513	.021
Financial situation:						
1 – bad (base)						
2 – rather good	-.614*	.364	-.129*	-.090	.511	.031
3 – very good	-.817*	.430	-.083**	.091	.554	.075
EAI	-.496***	.177	-.150***	.692***	.212	.141***
Cons.	2.471***	.639		-2.711***	.914	
N (in the model)	411					
McFadden's R2	.0844					
AIC	2.149					
BIC	-1433.833					

Coef. – coefficient, SE – standard error, AME – average marginal effect, AIC – Akaike Information Criterion, BIC – Bayesian Information Criterion.

Significance code: \*\*\*p<.01; \*\*p<.05; \*p<.10.

Source: author's work.

Generally, for the entire sample we observed that declared WTP was dependent on the EAI, the user status and the financial situation, as predicted and confirmed in the literature. We confirmed that the WTP sensitivity to the demographic characteristics and socio-economic status of respondents was different when the survey was conducted in a location with and without a view of the forest (third research question).

Table 7. Multinomial regression models of WTP (alternative base – initial bid)

Variable	Survey location with a view of the forest (Supraśl)						Survey location without a view of the forest (Tykocin)					
	WTP less than the initial bid			WTP more than the initial bid			WTP less than the initial bid			WTP more than the initial bid		
	Coef.	SE.	AME	Coef.	SE.	AME	Coef.	SE	AME	Coef.	SE	AME
User status	-.016	.349	-.007	.055	.390	.010	-.776**	.343	-.178***	.423	.426	.106**
Age	-.004	.015	-.001	-.003	.017	-.000	-.008	.015	-.003	.019	.020	.003
Gender	.358	.371	.076	.144	.414	-.006	.215	.362	.063	-.346	.448	-.061
Parental status	-.362	.428	-.039	-.547	.469	-.064	-.234	.454	.003	-.813	.565	-.099
Education: 1 – low (base)												
2 – upper	-.489	.605	-.106	-.076	.807	.028	.940*	.528	.185**	-.191	.754	-.073
3 – higher	-.880	.614	-.183	-.221	.789	.034	.963*	.564	.162*	.258	.728	-.015
Financial situa- tion: 1 – bad (base)												
2 – rather good	-.171	.571	-.044	.170	.758	.034	-.848*	.511	-.167*	-.071	.733	.052
3 – very good	.024	.684	-.053	.836	.841	.137	-1.431**	.588	-.261**	-.478	.784	.028
EAI	-.641**	.266	-.153**	.246	.309	.085*	-.523**	.257	-.172***	1.144***	.326	.191***
Cons.	2.818***	1.014		-1.315	1.348		2.486***	.897		-4.649***	1.423	
N	205						206					
McFadden's R2	.0545						.150					
AIC	2.365						2.144					
BIC	-486.664						-531.534					

Coef. – coefficient, SE – standard error, AME – average marginal effect, AIC – Akaike Information Criterion, BIC – Bayesian Information Criterion.

Significance code: \*\*\*p<.01,\*\*p<.05,\*p<.10.

Source: author's work.

In the next phase, we verified whether the impact of seeing the forest during the survey was the same for users and non-users. We used multinomial regression models instead of interactions for this purpose because we

also wanted to investigate whether or not it changed the impact of respondents' socio-economic characteristics on their WTP. We suspected that a view of the forest may affect the sensitivity of users and non-users differently in regards to other factors influencing their declarations (the third research question). The models are shown in Table 7.

Declaring WTP below the initial bid is more sensitive to respondents' socio-economic status when they do not see the forest (a statistically significant impact was noted with respect to user status, education, financial situation, and EAI). In cases when the respondents did see the forest while being surveyed, their declarations were considerably less dependent on the individual characteristics with only a weak influence of EAI noted. As a result, we see a significantly lower model fit ( $R^2$ ) in the forest view survey group. It shows that the WTP of respondents who could see the forest during the survey did not depend on those factors that usually influence respondents' declarations.

Secondly, when the respondents were able to see the forest while being surveyed, the difference between users and non-users became insignificant. In the group of respondents who were questioned with the forest not visible, the probability of WTP declarations below the initial bid was lower among users by 17.8%. This shows that viewing a good eradicates differences in the declared WTP between users and non-users. This effect also existed in the probability of WTP declarations that were higher than the initial bid, although it was less pronounced. On the other hand, when the survey was conducted in a location where respondents could not see the forest it was significant whether or not a person was a user of the forest, a factor that did not matter among people questioned while looking at the forest. So we concluded that the user status does not affect the WTP equally in these two situations (second research question).

## Discussion and conclusion

In the whole sample WTPs declared by users were significantly higher than that of non-users. These results correspond with the results of numerous studies e.g. Jørgensen et al., (2013), Choi (2013), or Tabi & del Saz-Salazar (2015). This is also consistent with the theoretical explanations and it likely is a result of the fact that users hold both use and non-use values (Smith, 1987; Shechter & Freeman, 1994).

Our research also confirmed the relationship between the strength of environmental attitudes and the willingness to pay for environmental programmes, which is consistent with the results obtained by, among others, Bartczak (2015) and Choi & Fiending (2013). A relationship between

respondents' self-assessed financial situation and declared WTP may suggest that people in a bad or rather good financial situation did account for their budgetary limits (Loomis et al., 1994).

However, the next stage of the survey showed that the relationship between respondents' characteristics and declared WTP differed when the survey was conducted with and without a view of the forest. Generally, when the respondents saw the forest, their answers were less dependent on the individual characteristics. They did not consider their budgetary constraints when stating their WTP. A similar reaction was recorded by Whitehead et al. (1995) who concluded that the WTP of non-users was less reliable. What is interesting, also user status did not matter among those who saw the forest during the survey. This shows that viewing a good eradicates differences in the declared WTP between users and non-users. We find this fact surprising, as users should assign the good an additional value resulting from its use. The view of the forest may compensate for a lack of familiarity for non-users. It is, in some way, an equivalent of its use.

From yet another perspective, a certain rise in the WTP of non-users surveyed in the location with a view of the forest is justified. First of all, the view of the forest provides a certain value in terms of aesthetic or mental experience. Familiarity is considered to be an important determinant of declared preferences (Tabi & del Saz-Salazar, 2015; Brouwer, 2012). A view of the good is a form of familiarity and this, in and of itself, generates a rise in WTP. It should be underlined that within the present study non-users are defined as people who have never before visited the considered forest. Comparing this with the methodology proposed by Whitehead et al. (1995) providing a view of the forest causes a person to become, in a way, a type of user, which is defined by these authors as an off-site user. It can also be argued that the experimental group (respondents who saw the forest during the survey) received more information (in a form of a view) about the good than the control group. It is, however, puzzling as to how the rise in the WTP of non-users was high enough to match that of users. This issue requires further study, however, we see two possible explanations for this phenomenon.

The first one assumes that when the survey was conducted in the location near the forest, non-users may have gained a potential use value of the forest because they could imagine its probable use (for walks, for example) as more likely. A basic use value of a protected forest is its recreational value. Being near a forest causes non-users to hold a potential use value that might be close to its 'real' use value. This explanation is in line with the results of the study by Kniivilä (2006) who revealed a significant difference between respondents who intended to visit areas in question in the near future and those who did not have such intentions. Moreover, an increase in the distance

from the good in question is associated with an increase in the number of available substitutes (Pate & Loomis, 1997). This, in turn, reduces the WTP of respondents (e.g. Hanley et al., 2003). Our results, in a way, provide a response to the questions raised in the conclusions of the paper by Liu et. al. (2021), who underline the importance of exploring whether there is a difference in the value of WTP between 'nature-based' tourists and 'general' tourists.

The second possible explanation is that the rise in the WTP of non-users who see the good in question is temporary and is the result of heuristics and cognitive errors. Non-users surveyed in a location where they could see the forest may be influenced by a heuristic effect which makes first assessment an emotional one. This in turn may be seen as the reason for ignoring the budgetary constraints which, according to Whitehead et al. (1995), may mean that their WTP is less reliable (Loomis et al., 1994). Another possible cognitive effect that may occur in this situation is availability heuristic – people who do not see a forest have to exert a greater cognitive effort to visualize the good in question and possible benefits from its use (Mitchell & Carson, 1988; Frör et al., 2008; Jia et al., 2017; Parsons et al., 2021).

This explanation may be supported by two observations. First, differences become apparent for respondents who declare their WTP at a level lower than the initial bid. Taking into account the structure of a DBDC survey the differences concern how the first question about WTP was answered. Studies conducted by Matel and Poskrobko (2019) indicate that in survey studies, especially in direct interviews, the first question is more susceptible to cognitive errors. This problem in CVM studies was addressed by Dupont (2003) who concluded that potentially active users are affected by question order to a greater extent than active users. This would explain the increase in WTP of non-users who saw the forest during the survey.

The second observation concerns a change in the sensitivity of non-users to their socioeconomic status, including budgetary constraints, when viewing the forest. Factors influencing the probability of agreeing to particular WTP values among people seeing and not seeing the forest while being surveyed were assessed separately. Generally, we anticipated a relatively low impact of respondent's characteristics on valuations in both groups since the forest is considered to be a good that is of large scale importance (according to Barrick and Beazley, 1990). Nevertheless, the study showed that the declarations of respondents, especially their refusals to pay the initial bid, were much more sensitive to a respondents' socio-economic status when they did not see the good in question. This may be an indication that higher assessments of non-users were mainly emotional in character.

Determining which of these two basic explanations remains valid is important from the perspective of CV studies involving forest services valuation, CV methodology in general and, more broadly, stated preference-based

research. This, however, requires further study. Moreover, forest is a specific subject of valuation, especially in the context of valuation of use and non-use values, which creates certain limitations in generalization of research results (Riera et al., 2012).

Further research would also be needed to assess to what extent our results are site and country specific, as the frequency of visits to forests in Poland is quite high compared to Western European countries (Bartczak et al., 2008; Giergiczny et al., 2021). The fact that forests are much more important for the economic welfare in Poland than in many other countries is important for the generalisation of our findings. We do not know whether the difference between WTP of users and non-users will be the same in other countries. Similar studies in other countries would be needed.

Other limitations relating to the generalisability of the results are due to the lack of control for hypothesis bias (Riera et al., 2012) which resulted from the assumption that this bias occurs to the same extent among users and non-users. Another limitation stems from the use of DBDC while several elicitation question formats are available. In DBDC investigators ask multiple valuation questions of each subject, which, according to e.g. Johnston (2017), may involve some bias. However, there is no reason to suspect that this impact differs between users and non-users (due to homogeneity of the groups compared). As a result, we believe that using DBDC format does not undermine the research findings. Nevertheless, it is reasonable to carry out further studies based on other question formats, such as single-binary choice question or payment card.

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## The contribution of the authors

Edyta Sidorczuk-Pietraszko – conceptualization, methodology, data acquisition and validation, analysis and interpretation of data, project administration, funding acquisition – 30%.

Anna Matel – conceptualization, methodology, data acquisition and validation, investigation, analysis and interpretation of data, funding acquisition – 30%.

Tomasz Poskrobko – conceptualization, methodology, analysis and interpretation of data, funding acquisition – 30%.

Dariusz Andrejuk – data analysis and interpretation, original draft preparation – 10%.

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