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The Contingent Valuation Method in Excavation/Preservation the Ancient Eleusinian Sacred Way in Greece

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Abstract: The aim of this study is to estimate externalities created round a cultural heritage preservation site. A research was conducted concerning the ruins of an ancient 'Sacred Way' (Iera Odos) located in Attica, Greece. The sample of the research was 200 citizens (interviewees). It is used the CVM (Contingent Valuation Method) and Logit model of the regression analysis. The preservation of cultural heritage is entailing excessive cost (paid by people through taxation) while is a source of additional income for both, the State and the people, due to tourism. Since the evaluation of this good cannot be in market terms, authors apply a modified version of the CVM (Contingent Valuation Method). The findings show there is strong evidence that at the 5% significance level, WTP (against WTA) is a better preferred course of action i.e., leaving the ruins situation as it is, performing only the necessary remediation, proceeding with radical restoration. All statistical processing of answers, obtained through a properly designed/circulated questionnaire, was carried out by Logit model regression analysis. The model gave significant (at 0.05 levels) dependence of WTP_{ar} (Willingness to Participation) on preferred course of action (i.e., leaving the ruins situation as is, performing only the necessary remediation, proceeding with radical restoration).

Key words: WTP, WTP_{ar}, externalities, cultural heritage, sacred way.

1. Introduction

Cultural heritage usually refers to the monumental remains that have been inherited from past generations to present society, which will hopefully take care of them for sake of the future generations. Moreover, the concept of cultural heritage has gradually enriched by including intangibles as well as ethnographic or industrial knowledge/know-how of the past. On the other hand, the works of both categories, art and everyday living in the community of the past, include (or/and refer to) political, socioeconomic, intellectual, philosophical or religious considerations. Since the preservation of cultural heritage, and especially of the monumental ruins, is entailing excessive cost (paid by people through taxation) while is a source of additional income for both, the State and the people, there is an increased interest for evaluating this non-marketable good.

The economic valuation of cultural heritage constitutes a scientific challenge since most studies estimate its economic effect as an external benefit or as a source of tourist attraction. The first application of the CVM (Contingent Valuation Method) in the field of cultural goods dates back to the 1980s [1]. Since there many studies in literature [1-3] applied and validated the CVM as a technique of the recently established scientific field of Experimental Economics. Several researchers applied CVM in many scientific fields such as historical buildings [2], museums [3, 4], archaeological sites [5], tourism economics [5, 6] and cultural goods [7]. CVM is basically subjective, attempting to acquire objectivity by extracting attitude and information from a stratified representative

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sample of interviewees, who are asked by means of a questionnaire to assign a value on a non-marketable (e.g., cultural or environ-mental, like a monument or a forest respectively) good or an externality (considered as 'transaction spillover' by *laissez-faire* economists like Milton Friedman and Friedrich Hayek) [7].

The evaluation of a benefit or a cost is not related to market values. The aim of the CVM is both to create a hypothetical market in which participants may state their maximum WTP (Willingness to Pay) for a variation of a good through answers of the questionnaires or to correspond to the minimum monetary amount which an individual would accept as compensation in order to relinquish this public good/service—WTA (Willingness to Accept) [8].

However, what happens if the interviewees are not asked to pay or to accept monetary units but are asked for voluntary work? The main answer which a researcher has to extract from questionnaires is the high of the opportunity cost of a day of a voluntary work for every single participant. Actually, the interviewees are asked for voluntary participation in a restoration of a monument of cultural heritage. The CVM (Contingent Valuation Method) is a survey—based technique, frequently used in Experimental Economics, especially useful for the valuation of non-market resources/goods/services, and cultural heritage objects (of aesthetic, historic, scientific or social value), such as conservation of monumental remains and preservation of the physical and anthropogenic environment.

This approach measures the maximum time which volunteers are willing to spend. So, this study is not a formal application of WTP method but it's actually a 'Willingness to Participate' research (WTP_{ar}) due to asking for voluntary work. According to above considerations, this study has the following structure. Section 2 contains a short historical review of the studying ancient monument called 'Sacred Way'. The methodology of the study is analyzed in section 3. Section 4 contains the empirical results of our study and the comparison with a previous study about the excavation of the ancient theatre of Lefkada island in Greece. Last but not least, in section 5 conclusions and proposals for further study are mentioned.The ancient Sacred Way is shown in Fig. 1.

2. 'Sacred Way' (Iera Odos) through time

The Sacred Way is the most ancient road in Greece. However, its emergence as a monument of classical antiquity with its corresponding historical value has not progressed. For 2,500 years, it remained the only national road connecting Athens with Northern Greece, Epirus and the Peloponnese. Its construction with infrastructure and asphalt was made in 1927. Since then it has the same form, with the only differentiation some widening. No other access to Athens existed until 1956, when the Avenue of Athens was built, which is located at the Holy Trinity at the height of the Daphni Monastery. The frame of Sacred Way is observed in Fig. 1.

The Sacred Way was in the ancient times the road connecting the city of Athens with Eleusis and Thriassius Pedio, where once a year were the famous (but still inexplicable about their exact character) Eleusinian mysteries. It was 22 km long, starting from the Holy Gate in the Kerameikos area, near Dipylos. Most of it followed the course of today's Sacred Way, crossing the area between the Mount Aegaleo and the Poikilos Oros, ending at the sanctuary of Demeter in

Fig. 1 The ancient sacred way.

Eleusina. In antiquity, any road linking the city with a regional sanctuary used to be called the 'Sacred Way'. The Athenian ancient Sacred Street is allegedly named 'Eleusinian'.

3. Methodology

During the last three decades, there has been growing interest in developing methods for assessing the preferences (of experts, stake holders, community/organization members, independent individuals) for environmental quality. Among them, the CVM (Contingent Valuation Method) is frequently applied to: (i) economic valuation of environmental projects or works/activities (planned or in operation) with a significant environmental impact and (ii) damage assessment after environmental accidents, i.e., after incidents that deteriorate environmental quality. This method is heavily relied on survey-based estimation of: (i) WTP (Willingness to Pay), which is the maximum amount of money that an interviewee would be willing to pay, sacrifice or exchange for a good, and (ii) WTA (Willingness to Accept), which is the minimum amount of money a person would be willing to accept in order to abandon a good. WTP is bounded by income while WTA is potentially unlimited. Whether WTP or WTA is appropriate, depends on the prior distribution of property rights and the direction of change under consideration.

In this work, it is considered the monuments of cultural heritage as a public good and the pollution as an external cost.

Consider an interviewee who formulates his WTP or WTA facing a trading opportunity in an experiment, knowing that the same good can be traded in the marketplace. To add structure, assume that an WTP (WTA) interviewee is one who must state a WTP (WTA) value in an incentive compatible institution. Let v be interviewee's own (uncertain) valuation of the public good, and let R be interviewee' s information about the market price of the good. That is, the interviewee does not know v or R with certainty, but knows their distributions. For simplicity, it is assumed that the interviewee can learn both v and R with certainty later (e.g., after the experiment). The personal willingness to pay is a function of the interviewee's own valuation about the good, v and his information about the same good, R.

$$WTP = F(v, R, d_1) \quad (1)$$

Where: d_1 denotes a group of other deterministic variables which can affect the WTP, like age, education level, etc..

Interviewee's valuation about the good v is directly affected by the opportunity cost of the monetary units OC_M.

$$v = F(OC_M, d_2) \quad (2)$$

Where: d_2 denotes a group of other deterministic variables which can affect v.

A combination of Eqs. (1) and (2) will lead to the fact that willingness to pay is a function of OC_M, R and other deterministic parameters with the Eq. (3):

$$WTP = F(OC_M, R, d) \quad (3)$$

Where: $d = d_1 + d_2$.

By asking the interviewees for their *'Willingness to Participate - $WTPar$'* in the restoration of the archaeological site, it is tried to measure the willingness for voluntary participation. So, the $WTPar$ function has the following form *ceteris paribus.*

$$WTPar = F(OC_T, R, d) \quad (4)$$

In order to estimate the Eq. (4), authors use a Logit model which has the Eq. (5):

$$f(z) = \frac{e^z}{e^z + 1} = \frac{1}{1 + e^{-z}} \quad (5)$$

Where: the variable z is usually defined as $z = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k$, while β_0 is the constant term of the regression and $\beta_1, \ldots, \beta_k$ are the regression coefficients of $X_1, \ldots, X_k$, respectively. The independent variables $X_j, j = 1,2, \ldots ,8$ stand for respondents' income, age, living distance from the monument, real estate ownership in the vicinity, membership in organization with cultural activities

(volunteering), extent to which the interviewee is informed about the history of the site (information), coming in the site as visitors/tourists before (previous visit) and education level, respectively.

It is also examined the affect of information to $WTPar$, *ceteris paribus.* It is applied a Kolomogorov—Smirnov test to secure that our data are normally distributed and then we applied a $t-$test for dependent sample to compare means. In last step of this study, it is compared $WTPar$ of the interviewees of the present study against the interviewees of a similar study to examine the effect of opportunity cost of their time and information at the same time.

In order to collect the data for this survey, we get a random sample of 100 Greek citizens (interviewees) of the city of Eleusis in Attica and ask them to complete a questionnaire before they get informed about the history of the Sacred Way and the same questionnaire after they read an attached informative text.

4. Results

In the first part of empirical analysis of data, which were lured from questionnaires, there is the analysis of variance (AN.O.VA.) and the logit regression analysis. In the second part, we create two new variables WTP_{ar1}, WTP_{ar2}. WTP_{ar1} represents the interviewees' willingness to participate to the restoration of the monument before they get informed in it. Following the first response, an informative text about the history of the monument was distributed to interviewees and they were asked about their willingness to participate again (WTP_{ar2}).

On the one hand of analysis it is created the WTP_{ar} regression which has the Eq. (5):

$$WTPar = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + u \quad (6)$$

Where: $X_1, \dots, X_8$ represent the independent variables which were determined in section 3.

On the other hand, it is examined the influence of the independent variables to the dependent one as a group, using the AN.O.VA. approach (Table 1).

The $F-$statistic was found equal to 58.147 and also, statistically significant to the 5% significance level (while the $p-$value is equal to 0.001). According to this result, it is assumed that this model is well-structure and the independent variables are appropriate to determine the behavior of the dependent variable.

It is estimated the Eq. (6) using a logit model analysis. The results of the regression can be seen in Table 2.

The estimated expression of Eq.(6) has the Eq. (7):

$$WTPar = 70.2 - 0.015X_1 + 0.018X_2 + 0.040X_3 + 0.016X_4 + 0.039X_5 + 0.032X_6 + 0.024X_7 + 0.062X_8 \quad (7)$$

As it is observed in Table 2 and Eq. (7), all variables have a statistically significant effect to the $WTPar$ variable. It is shown that volunteering, age, living distance, ownership, information, previous visit and education level have a positive influence to the interviewees' willingness to participate to the excavation/restoration of 'Sacred Way', while the income effect to same variable seems to be negative. Despite the fact that the effect of each variable seems to be low enough to change the maximum time of voluntary supply work of interviewees on its own, the

Table 1 Analysis of variance for dependent variable WTP_{ar} (AN.O.VA).

Source of variance	Sum of squares	df	Average sum of squares	$F-$statistic ($p-$value)
Regression	58.532	6	8.063	
Residuals	12.354	68	0.115	58.147
Total	62.854	91	–	(0.001)*

Table 2 Coefficients of logit regression.

Variable	Coefficient ($\boldsymbol{p}$ −value)
Income	-0.015 $(0.008)^*$
Age	0.018 $(0.037)^*$
Living Distance	0.040 $(0.018)^*$
Ownership	0.016 $(0.022)^*$
Volunteering	0.039 $(0.007)^*$
Information	0.032 $(0.000)^*$
Previous Visit	0.024 $(0.014)^*$
Education Level	0.062 $(0.002)^*$

Note: (*) denotes statistical significance at 5%.

Table 3 Descriptive Statistics for $WTPar1, WTPar2$.

Variable	$\boldsymbol{N}$	Mean	$\boldsymbol{SD}$	SE Mean	Min	Max
WTPar1	100	1.52	1.821	0.132	0.00	15.00
WTPar2	100	5.20	3.518	0.567	1.00	19.00

aggregate effect of all variables seems to be able to cause a statistically significant change on $WTPar$ time of interviewees.

It is created the WTP_{ar1} and WTP_{ar2} according to the procedure which was analyzed at the beginning of section 4. The descriptive statistics of these two variables can be observed in Table 3.

The mean of $WTPar1$ is equal to 1.52, while the mean of $WTPar2$ is more than three times higher and equal to 5.20. This result can also be visualized by the bar-chart. It is supposed that there is a significant difference between these variables. To validate this indication, it is provided a test to compare the means of $WTPar1$ and $WTPar2$ time of interviewees before and after they get informed about 'Sacred Way' monument. To choose a proper parametric or non-parametric test it is applied a Kolmogorv-Smirnov test in order to examine if these data are normally distributed. The test was positive, so it is chosen a t −test for dependent samples to compare means of $WTPar1$ and $WTPar2$ (Table 4).

In a previous survey, a sample of 100 interviewees was selected and their willingness to participate in the excavation of the ancient theatre of Lefkada Island in Greece is measured before and after a reading of an informative text about this monument (Table 5).

The important effect of opportunity cost in WTP_{ar} is obvious according to the above descriptive statistics. The interviewees with high opportunity cost are able to spend an average of half a day to the restoration of the monument against an average of 1.5 day by the interviewees with low opportunity cost of labor before information. A significant increase of these averages can be observed after the information, with 5.23 days and 5.56 days respectively. To examine if there are significant differences between the WTP_{ar} of interviewees of each group, we provide a t-test for independent samples before and after information (Table 6).

In the Table 6, it is provided evidence for significant difference between WTP_{ar1} for each monument which declares that the existence of opportunity cost of labor effects the willingness of interviewees to participate in restoration of these cultural heritage monuments.

Table 4 t −test for paired samples.

Pair of variables	Mean	Standard deviation	t −statistic	p −value	Decision
WTP_{ar1} - WTP_{ar2}	−0.83	0.196	−59.132	0.000*	Significant difference before and after information

Table 5 Descriptive statistics of WTP_{ar} in ancient theatre of Lefkada.

		WTP_{ar1}—Before information			
Monument	N	Mean	SD	Min	Max
Lefkada's theatre	100	0.50	1.451	0.00	6.00
		WTP_{ar2} – After Information			
Lefkada's Theatre	100	4.13	2.899	1.00	9.00

Table 6 t-test for independent samples for WTP_{ar} for two monuments before and after information.

		Before information			
Pair of Variables	Mean	Standard deviation	t −statistic	p −value	Decision
WTP_{ar1} (Theatre) - WTP_{ar1} (Sacred Way)	−1.00	0.528	−19.116	0.001*	Significant difference
After Information					
WTP_{ar2} (Theatre) - WTP_{ar2} (Sacred Way)	−0.51	0.039	0.912	0.486	No significant difference

5. Discussion

This study is trying to examine the willingness of interviewees to voluntary participate to the restoration of an ancient Greek monument called 'Sacred Way '. The research took place with filling of questionnaires by 100 randomly selected interviewees of the city of Eleusis in Attica. The questionnaires were filling two times by each interviewee, one time before he is able to read and informative text about 'Sacred Way' and after the reading of the text.

The interviewees' willingness to participate to the excavation/restoration of 'Sacred Way' is influenced by several parameters, as it comes of the analysis. Specifically, income, age, educational level, living distance, ownership, volunteering, information and previous visiting affect the willingness to participate. The interviewees with higher education level show a greater willingness to participate than those with lower education level. The older the interviewee is, the greater willingness to participate he has. The distance of permanent residence from the monument, the previous visits to the monument and the ownership of any kind of land around the monument have a positive influence to the willingness of interviewees. An extremely interesting result is the positive effect of information to the interviewees' willingness. There is a huge increase of their willingness after they got informed about the history of 'Sacred Way'. The negative income effect to the interviewees' willingness to participate is another interesting result of our analysis (Table 5).

The fact of negative income effect is explained through the refusing of interviewees with higher family income to participate to the restoration of 'Sacred Way'. It is a common knowledge that the higher income an interviewee has, the less sensitivity for public goods has. This statement derives from the preference of these interviewees to the evolution of the private market against the public sector. An absolute opposite effect to the willingness to participate derives from the previous volunteering and information. An interviewee with previous volunteering activity seems to be more sensitive to

take care of cultural heritage monuments.

The awareness of these interviewees about the level of usefulness of voluntary work tends them to always trying to offer more and more voluntary work. An extremely interesting and positive effect to the willingness is coming from the information of the participants. The more information that an interviewee has about a monument the higher willingness he has to participate to its restoration.

In a previous study of one of the authors, the willingness of interviewees to participate in the restoration of the ancient theatre of Lefkada Island in Greece was measured by common method. The alert difference between these two studies is the existence of opportunity cost in the first study and absents of same cost in the other. The comparison of results of these studies will declare the importance of opportunity cost to the willingness of people to participate in volunteering work.

According to the study of ancient theatre of Lefkada Island, the 58% of interviewees have previously volunteered in similar work, whereas 42% have not, the 36% of the interviewees have visited the site, while 64% have not, the 31.5%, 41% and 27.5% of the interviewees were aged between 18-22, 23-47 and 28-31 years old, respectively. The 3%, 22%, 31.5%, 22% and 21.5% of the interviewees have completed primary school, high school (1-3 class), high school (4-6 class), university or technological institution or postgraduate studies respectively.

The difference between the willingness to participate to voluntary work seems to be higher before the reading of the informative text by interviewees. The first part of the result is the fact that the existence of opportunity cost decreases the willingness to voluntary work. The second part is the increase of willingness to voluntary work after the interviewees get informed about the monument. The opportunity cost effect is eliminated by the information effect. This fact is an evidence of general sensitivity of Greeks to the restoration of cultural heritage monuments.

6. Conclusion

The output of the WTP approach is the demand curve of a non-marketable good. Our methodological modification leads us to extract a supply curve of voluntary work. This fact is extremely interesting but also a bit simple because the participants have no opportunity cost neither they get paid for their military services. Moreover there is not a transportation cost, because the interviewees are located *in situ.* This method can be more complicated by inserting opportunity cost of time and transportation cost of the volunteers. This add-ins can make this method more efficient due to using to many more groups of citizens.

The depreciation of antiquities caused by humans is an external economy, which is not corrected through any institution or market, if not intervene in politics. From the statistical analysis we see a path to stabilize the social costs of depreciation of cultural goods. External effects are observed when supply or demand impose costs or confer a benefit to others. More specifically, the external effect is the impact of the behaviour of a producer or consumer well-being of another, which is not reflected in market transactions. The external effect of the deterioration of cultural monuments is universal and appears as an external benefit borne by all of humanity through time.

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