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Economic valuation of coastal water quality and protest responses: a case study in Mitilini, Greece

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Abstract

The aim of this study was to evaluate environmental benefits resulting from the construction of a Sewage Treatment Plant (STP) in Mitilini, Greece. The main benefits identified were the improvement of the coastal water quality and subsequent impacts on citizens' activities. The valuation was conducted using the Contingent Valuation Method (CVM) through the elicitation of individuals' willingness to pay (WTP). Due to the significant amount of zero and protest responses, different measurements of mean WTP were calculated and the need for further research on social factors which influence individuals' valuation is emphasized.

JEL Classification: Q26, Q50, Q53

Keywords: Contingent Valuation, Willingness to Pay, Protest Responses, Distrust, Greece

1. Introduction

The Contingent Valuation Method (CVM) is regarded as the main method for the valuation of environmental goods. It was proposed by Ciriacy – Wantrup (1947) and was first applied by Davis in 1963 (Mitchell & Carson, 1989). Since its first application the method has rapidly expanded leading researchers to use it for the valuation of several other public goods such as cultural (e.g. Papandrea, 1999; Harless & Allen, 1999; Willis, 2002; Finn et al., 2003; Tohmo, 2004) and goods related to the health sector (e.g. Philips et al., 1997; Diener et al.,1998; Bishai & Lang, 2000; Sach et al., 2004; Hackl & Pruckner, 2006).

The application of the method consists of the construction of a hypothetical market through which the public good is provided. This hypothetical scenario is included among other elements in a questionnaire which is distributed to the population concerned. The other elements of the questionnaire are several questions concerning attitudes towards the good being valued and also a valuation question. The latter takes the form of either a willingness to pay (WTP) or a willingness to accept (WTA) a certain amount for an improvement or degradation in the quality of an environmental or public good. Through the elements investigated in the questionnaire, the researcher may design a function and a curve which explains the main indicators influencing the valuation of the individual and, in addition, results in a mean amount of the sample which can be generalized to the population and is regarded as the final valuation. The majority of CVM studies evaluate the benefits, through a WTP question, that derive from an improvement in the quality of an environmental good.

During the application of a CV study the researcher should be informed of the several biases which may occur (see Freeman, 1986; Mitchell & Carson, 1989). Nevertheless, there is extensive literature concerning ways that these biases may be avoided (e.g. Bateman & Turner, 1995; Mitchell & Carson, 1989) thus securing to a large degree the reliability of CVM studies. One common problem during the investigation of the WTP for the valuation of a public good is how to handle the data arising from individuals who are unwilling to pay any amount for the good being valued. In such circumstances, some individuals do not value certain public goods or are unable to declare any amount due to budget constraints. On the other hand, such attitudes may be attributed to ‘strategic’ behavior or even ‘protest responses’ towards some element of the scenario (Freeman, 1986; Mitchell & Carson, 1989).

In the case study presented, the primary aim was to evaluate the benefits deriving from the improvement of the sea water quality around the city of Mitilini due to the construction of a Sewage Treatment Plant (STP). Consequently, future use values were evaluated as the results from such a project will not be visible until a few years after the completion of the STP. Due to a high percentage of respondents who were unwilling to pay any amount, a second aim of the study was to extract a valid willingness to pay by utilizing different econometric methods. In addition the need for further research on the possible social factors which influence the valuation of individuals, and consequently the application of the CVM, is highlighted.

The article is divided in four sections. The first part constitutes a description of the research area and the good being valued, while in the second section, the methodology and instruments used are presented. In the third part, attitudes towards the STP and environmental issues are briefly described and also the level of acceptance of the scenario and protest responses, are analyzed. Finally, the fourth section deals with the various techniques for the extraction of a valid amount of average WTP, the bid equation of the model selected and the aggregate valuation of the environmental good.

2. The Research Area

Mitilini is the capital of Lesvos, the third biggest island of Greece, and is located in the Northeast Aegean Sea. Over the last decades, the population of Mitilini has greatly increased to its present level of approximately 30,000 inhabitants. The change in the population resulted in an increase in the production of sewage which was not however accompanied by new sewage treatment facilities, both for domestic and industrial purposes. Instead, a large percentage of the sewage was discharged unprocessed in the sea area near the city. In order to confront the decreasing quality of the sea water and to comply with Regulation 91/271 of the European Union, the construction of a new drain system and a STP began in 1988. Up until now, the construction of the project has not been completed, mainly due to financial difficulties and delays caused by archaeological discoveries during the construction. Through the study we attempted to evaluate the possible benefits deriving from the construction of such a project for the citizens of Mitilini. Specifically, the improvement of the sea quality around the city and also the potential benefits (e.g. recreational activities) which derive from this improvement, have been measured.

3. Methodology of the Survey

3.1. The questionnaire

The application of the CVM is realized in several stages (see Hanley & Spash, 1993; Bateman & Turner, 1995). As mentioned in the introduction, the main instrument of the method is the distribution of a questionnaire to a certain population in order to evaluate the public good. The questionnaire is usually divided in sections starting with some general questions in order to investigate attitudes and beliefs, mainly concerning environmental problems and to reveal the attitudes about the particular good being valued.

In our study, the questionnaire consisted of four sections. Two sections dealt with the attitudes of the respondents towards environmental problems of the city of Mitilini, the STP and their knowledge on the current situation. In particular, the questionnaire included two general questions regarding the most important problems of the city (GNPR1, GNPR2) and two questions investigating the most important environmental problems of Mitilini (ENVPR1, ENVPR2). Concerning the sea quality, respondents were asked to identify the most important pollution factor of the coastal area (POLT), their anticipation of an increase in recreational activities after the construction of the STP (ANTIC) and their justification of the necessity to invest for the improvement of the coastal area (INV). The preferences of the respondents regarding the importance of the STP (IMP) and their knowledge of the current situation (CURR) were also recorded. In the valuation section of the questionnaire, apart from the scenario and the willingness to pay question, the reason for their willingness (ACCPT) or refusal to pay (REFUS) was investigated. Finally, demographic data was collected in the last section of the questionnaire.

3.2. The hypothetical scenario and the payment vehicle

The construction of the hypothetical market may be regarded as one of the most important stages during the application of the method (Brookshire & Crocker, 1981). In the hypothetical scenario, the respondents are presented with general information concerning the good and with the principle that the population should pay or accept an amount for the improvement or degradation of the quality of the good. The description of the good in the scenario and the provision of information might influence respondents (Brookshire &

Crocker, 1981; Arrow et al., 1993). This indicates the importance of the construction of the hypothetical market (Hoevenagel & Van der Linded, 1993) which should be as plausible as possible (Mitchell & Carson, 1995). The main purpose is to include all necessary information and to clearly describe the way that the payment will be realized (Mitchell, 2002). The efficacy of the scenario depends to a large extent on the payment vehicle. In order to achieve its goal, the payment must be convincing, plausible, well presented (Arrow et al, 1993; Blamey, 1998; Garrod & Willis, 1999; Bishop et al., 1995) and similar to a real type of payment (Jakobsson & Dragun, 1996). Several payment vehicles have been presented in the relevant literature with the most common being taxes (e.g. MacMillan et al. 2004) or extra charges which are included in existing bills for the provision of public goods and services (e.g. Whittington et al. 1990a,b, 1993; Altaf et al., 1993). In addition, in some studies respondents have been given the opportunity to choose the payment vehicle they prefer (e.g. Hadker et al., 1997; Zhongmin et al., 2003).

In the scenario of our study, respondents were presented with the current situation and the progress of the project. They were informed that in the future, additional funds would be needed in order for the project to be completed and maintained and were introduced to a hypothetical situation should the citizens be compelled to contribute to these expenditures. During the pre-test of the questionnaire, we observed that the scenario was well understood by the respondents (as Arrow et al., 1993 propose). The payment vehicle chosen was the water bill issued every few months. It was regarded as the most appropriate payment vehicle as it is plausible and familiar to the population investigated. It is similar to the existing supply system and is compatible with the institutions of the particular community (Jakobsson & Dragun, 1996). Other forms of payment, such as taxes, were not regarded as appropriate, as there may be a negative predisposition from the citizens towards such type of payments.

3.3. The valuation question

The valuation question can take two basic forms. The “willingness to pay” question (WTP) and the “willingness to accept” compensation (WTA) for a change (improvement or degradation) in the quality of an environmental good (Mitchell & Carson, 1989: 30). Most commonly, researchers use the “willingness to pay” question because individuals tend to declare higher amounts when compensation is used (Bishop & Heberlein, 1986; Mitchell & Carson, 1989; Zhao & Kling, 2001; Horowitz & McConnell, 2002, 2003). In the valuation

conducted in this study, we chose the WTP format. From the several ways for eliciting the WTP (see Mitchell & Carson, 1989: 97) the open-ended formal was used: "*Assume that every household in the city of Mitilini will pay the average amount of money which will be selected by this survey, regardless of the amount that you declare. What would be the maximum amount of money you would be willing to pay every 4 months for the next 4 years in order for the Sewage Treatment Plant to be completed and maintained?*".

The WTP question was followed by a budget constraint question (as proposed by Arrow et al., 1993) which reminded respondents that the declared amount would consequently reduce some other household expenditure. The respondent was given the opportunity to change the declared amount after reconsideration of the budget constraint.

3.4. The sample

Stratified random sampling was utilized in order to select our sample. Specifically, we divided the city into three divisions (strata) and a representative sample from within each area was randomly selected. The division of the city was based on the different stages of construction of the STP in different areas, a fact which may influence the willingness to pay of individuals. The response rate was 70% resulting in a relatively small sample size. Nevertheless, the sample was representative compared to the real population data, according to the 2001 national census. The completion of the questionnaires was accomplished through personal interviews. We chose not to conduct the research through telephone interviews due to our experience in the pre-test study where a significant percentage of the respondents showed signs of distrust. The sample size was 140 including 76 female (54.3%) and 64 male (45.7%) respondents. The average age of the respondent was 36 years old and the average number of years of education was 11.

4. Empirical Findings

4.1. General attitudes

The questionnaire examined, among other factors, the attitudes of citizens towards the city's environmental problems, coastal water quality and the benefits that would derive from the operation of the STP. All these variables were included in the investigation of factors influencing willingness to pay. The problems which occur due to the inadequacies of the present STP appeared to be well-understood by the citizens of Mitilini. This was apparent in

their responses concerning the two most important environmental problems of the city, which were both connected to the decreasing quality of the coastal area. Another finding was the importance of the coastal area and the functioning of the STP for the citizens. In particular, 95.7% of the sample declared that the improvement of the coastal water is extremely or very important and similarly, 98.6% of the respondents stated that the functioning of the STP is extremely or very important. Concerning the expectation of benefits after the completion of the project, 97.1% replied positively and indicated "the increase in recreational activities" and "the cleaner harbour without unpleasant odours" as most important.

4.2. Acceptance of the scenario

As was previously mentioned, the WTP question was open-ended. In addition, respondents justified their answer irrespective of their acceptance or rejection of the scenario (as proposed by Arrow et al., 1993). The percentage of individuals who accepted the scenario was relatively low (46.4%). The main reason for being willing to pay a certain amount was the improvement of the natural environment followed by the necessity of the STP to be completed (Table1).

Table 1. Reason for accepting the scenario

Reasons for accepting the scenario	%
Improvement of the natural environment	53.8
Faster completion of the STP	27.7
Improved environment for the next generations	13.8
Importance of individual contribution	4.6
Total	100

4.3. Reasons for rejecting the scenario and protest responses

Of the respondents, 53.2% did not accept the scenario and were not willing to pay any amount of money. Although the high percentage of refusal is not rare in contingent valuation studies (e.g. Alberini et al., 2005; Dziegielewska & Mendelsohn, 2005; Kenyon, 2001; Halvorsen, 1996), it was regarded as essential to distinguish respondents who were regarded as true zeroes from the protest respondents who declared a zero although their real valuation was higher (Freeman, 1986).

Although there are no absolute criteria to distinguish protest bids from true zeroes (Jorgensen et al., 1999), we decided to regard answers which were connected with some

aspect of the scenario as protest responses. A widely used technique is to add debriefing questions which can, to some extent, distinguish protest bids from true zeroes (e.g. Hadker et al., 1997; Ryan et al., 2004). This technique was employed in this study, as the respondents were asked to justify the reasons for rejecting the scenario. It is noteworthy that the majority of the statements are related to the fact that the state was involved in the scenario, a fact which is also emphasized by Meyerhoff & Liebe (2006). Of the zero respondents, 56.8% said that it was the responsibility of the state to pay for the STP, while the remaining 28.4% said that they did not regard governmental management as reliable (Table 2).

Table 2. Reasons for rejecting the scenario

Reason for rejecting the scenario	Responses	% of responses
The government should pay	54	56.84
I cannot afford it	1	1.05
I do not have faith in the government to effectively manage this project	27	28.42
I disagree with the payment vehicle	2	2.1
I disagree with the construction of the STP	0	0
I don't regard the consequences on the environment as important	0	0
I don't care	0	0
Other	8	11.57
Total	95	100

Individuals who refused to pay declaring: "The state should pay", "I do not have faith in the government to effectively manage this project" and "I disagree with the payment vehicle" were regarded as protest responses. On the other hand the answers: "I cannot afford to pay any amount", "I don't regard the sewage treatment plant as important", "I don't think that the consequences on the environment are important" and "I don't care" were regarded as true zeroes. Consequently, as seen in Table 2, the majority of the negative responses in our study were classified as protest bids.

5. Valuation of the Benefits of the Sewage Treatment Plant

Sample summary statistics of the data set are presented in Table 3. The mean WTP of the respondents who stated a positive amount was € 26.86. Additionally, for contingent valuation data, Carson (1991) proposes the use of an α-trimmed sample mean, where α is set at a predetermined percentage. An α-trimmed average is essentially a weighted average that attaches a weight of zero to the largest t and lowest α ×100 percent of the observations, effectively disregarding them (Carson, 1991). We provide four summary statistics: (a) the mean WTP, (b) the 5%-trimmed mean WTP, (c) the 10%-trimmed mean WTP and (d) the 20%-trimmed mean WTP (Table 3). For example, 5%-trimmed mean is calculated by first dropping the lowest and highest 5% of the observations and then calculating mean WTP based upon the remaining 90% of the observations. The median is a 50% trimmed mean. According to Carson (2000), mean WTP is the traditional measure used in benefit-cost analysis while median WTP corresponds to the amount approved by most researchers.

By utilizing trimmed means high outliers from the resulting sample mean WTP are discarded. For our data sample, the maximum reported WTP value of €300 is an outlier, thus excluding the specific value from the analysis significantly reduces mean WTP. By observing Table 3, we clearly notice the reduction of mean WTP using the 5%, 10% and 20% trimmed mean from €26.86 to €20.17, €18 and €15.18, respectively. Finally, the median WTP – which essentially corresponds to the 50% trimmed mean – is €15. Additionally, from Table 3 it is observed that the median WTP is significantly lower compared to the mean WTP. This is due to the fact that typically WTP distribution is positive asymmetric, mainly because of the asymmetry of the sample's income distribution and also because there is often a sizable part of the population that is fairly indifferent to the environmental good and a smaller group that care a great deal about its provision (Carson, 2000).

Table 3. WTP of the sample

N	65
Maximum WTP	€ 300
Minimum WTP	€ 1
Mean WTP	€ 26.86
5% trimmed mean WTP	€ 20.17
10% trimmed mean WTP	€ 18
20% trimmed mean WTP	€ 15.18
Median WTP (50% trimmed mean WTP)	€ 15
Standard Deviation	€ 43.43
Range	€ 299

5.1. Utilizing Regression Analysis for Derivation of WTP Estimates

As an alternative to the typical average WTP and the trimmed averages of WTP derived from the sample, different types of statistical analysis can be utilized for the estimation of the mean (population) WTP value. In addition, through this estimation the most statistically significant predictors for mean WTP estimation can be indicated. Statistical regression models expressing relationships between WTP and other variables assumed to have an influence on the former variable are commonly known as bid curves. Three different bid curve models are applied in order to compare their results. Namely, a multiple linear regression model, an exponential model and a multiplicative model are fitted, where the WTP question is the dependent variable. Specific econometric analysis was performed using the SPSS statistical package (Norusis, 2006). For this initial estimation of the WTP only positive WTP responses were included which is a common practice in CVM studies (Alvarez-Farizo et al., 1999). Nevertheless, as will be analyzed in following paragraphs (section 5.2), alternative techniques exist which provide different ways of dealing with zero responses.

First, the mean WTP using OLS multiple regression is estimated. Initially, a total of 23 variables obtained by the questionnaire were entered as predictors (independent variables) for the WTP. The model's R^2 value including all initial predictors was approximately 0.8, indicating that the model explains a large proportion of the variability of the WTP values and the fit of the model is good. However, not all 23 variables were found to be significant predictors, thus a model selection method was utilized in order to obtain the best possible regression model having the optimum combination of statistically significant predictor variables, excluding variables not statistically significant. Similarly, we proceeded with the estimation of the exponential and the multiplicative model. R^2 values for both models was approximately 0.7.

The estimated coefficient parameters of the derived models are shown in Table 4 along with the associated p-values. As can be seen in OLS (Table 4), most parameters are significant at a 5% and 1% except for the coefficient of variable 'second environmental problem' (ENVPR2), which is significant at a 10% significance level (p-value<0.1). Ten variables were included in the OLS model: The most important and second most important problem of the city (GNPR1 and CNPR2), the second environmental problem of the city (ENVPR2), most important pollution factor (POLT), the anticipation of an increase in recreational

activities (ANTIC), the reason respondents regarded the investment as essential (INV), the importance of the STP (IMP) and the knowledge of the current situation (CURR). From the demographic data, the number of household members (HSH) and occupation (OCP) were included in the model.

In the exponential model nine variables were regarded as significant: The most important problem of the city (GNPR1), the second environmental problem of the city (ENVPR2) which was negatively related to WTP, the reason for the necessity to invest money (INV), and the reason for accepting to pay (ACCPT) where also the coefficient estimate had a negative sign. Five variables concerning social characteristics were also included in the exponential model: gender (GND), household members (HSH), occupation (OCP), education (EDU) and age (AGE). Finally, in the multiplicative model the variables included in the model where comparatively few. In particular, four variables were included all of them referring to social characteristics: gender (GND), household members (HSH), occupation (OCP) and age (AGE).

All of the estimated coefficients shown in Table 4 are found to be statistically significant in the prediction of WTP, thus estimation of mean WTP value should be based on these variables. The estimated mean WTP for the multiple linear regression model is €24.25 with a standard deviation of €21.19. Mean WTP was calculated substantially lower from the other two regression models. In the exponential model, the mean WTP is €15.10 with a std. deviation €1.83 and finally in the multiplicative model the estimate of mean WTP is €14.67 with a std. deviation of €1.85.

Table 4: Parameter estimates for the OLS, Exponential and Multiplicative models excluding outliers

	OLS		Exponential		Multiplicative	
Predictor	**Parameter Estimate**	**p-value**	**Parameter Estimate**	**p-value**	**Parameter Estimate**	**p-value**
Constant	-98.16	0.002***	- 1.67	0.104	-2.83	0.059**
Most important problem of the city (GNPR1)	2.49	0.009***	0.11	0.012*	-	-
Second most important problem of the city (GNPR2)	2.85	0.01*			-	-
Second environmental problem of the city (ENVPR2)	-2.32	0.061**	-0.10	0.063**	-	-
Most important pollution factor of the sea area (POLT)	19.46	0.023*	-	-	-	-
Anticipation of increasing activities after the construction of the STP (ANTIC)	-25.01	0.045*	-	-	-	-
Reason for the necessity to invest for the improvement of the sea area (INV)	9.01	0.001***	0.20	0.088**	-	-
Reason for WTP (ACCPT)	-	-	-0.27	0.044*	-	-
Level of importance of the STP (IMP)	12.48	0.021*	-	-	-	-
Knowledge of the current situation of the STP (CURR)	-17.92	0.006***		-	-	-
Gender (GND)	-	-	0.66	0.013*	0.69	0.071**
Number of members in the household (HSH)	5.25	0.015*	0.32	0.002***	1.04	0.000***
Occupation (OCP)	4.88	0.000***	0.19	0.003***	0.49	0.013*
Education (EDU)			1.53	0.051**	-	-
Age (AGE)	-	-	0.04	0.002***	0.98	0.017*

(*) Coefficient is significant at a 5% significance level
(**) Coefficient is significant at a 10% significance level
(***) Coefficient is significant at a 1% significance level

5.2. Utilizing the Tobit Model for Derivation of WTP Estimates

As mentioned above, a large percentage of the sample stated a zero response. This kind of behaviour is not unusual in CVM studies. As a result, reported WTP values are not normally distributed since WTP values are truncated at zero. The main problem which occurs in such circumstances is the difficulty in analyzing the data of the survey (Jorgensen et al., 1999). The most common solution to this problem is either to reject the refusals from the analysis or to include them by using mainly econometric techniques (e.g. Haab & McConnell, 1997; Kristrom, 1997; Amigues et al., 2002). In addition, protest responses may be distinguished from true zeroes in order to be rejected from the statistical analysis (Mitchell & Carson, 1989).

Since traditional techniques (for instance regression analysis) may produce biased results, an alternative approach to the standard regression modelling for dealing with the zero WTP values is the Tobit model (Tobin, 1958). The specific econometric modelling technique, which is called Tobit because it was first proposed by Tobin (1958), and involves aspects of Probit analysis, has been widely used in environmental valuation studies (e.g. Amigues et al., 2002; Carlsson & Johansson-Stenman, 2000; Goffe, 1995). In this study, three alternative Tobit models were estimated. In order to fit a Tobit model for the estimation of the mean WTP the variables found to be statistically significant in the OLS model were used (Table 4). Estimation of the parameters of the Tobit model is performed using the module of R-package (Venables & Smith, 2002) survival, and specifically the *survreg* function. All responses, both negative and positive, were initially included in the dependent variable. The estimated mean WTP is € - 5.20 with a std. deviation € 12.52 (Table 5). In the second alternative Tobit model, all negative responses were excluded. In this case the mean WTP was €22.01. In the final model, all positive and true zero responses were included and a mean WTP of €16.84 was estimated. The results of the three Tobit models are presented in Table 5 from which it is observed that mean WTP estimates are consistently larger than the median WTP estimates.

Finally, from the mean WTP amounts derived by the three regression models and the three Tobit models (Table 6) we regard the most reliable estimation to be the mean WTP of €16.84. This is due to the fact that protest responses cannot be regarded as true revealed

values and consequently it would be false, in our opinion, to include them in the valuation process.

Table 5. Descriptive statistics for estimated WTP from Tobit models

Tobit models			
	WTP including all responses	WTP>0	WTP>0 and true zeroes
Mean WTP (€)	**-5.20**	**22.01**	**16.84**
Standard Error	1.07	1.84	1.83
Median WTP(€)	-5.50	20.19	16.02
Standard Deviation	12.52	14.59	15.65
Sample Variance	156.84	212.91	244.78
Range	90.55	65.46	69.96
Minimum	-56.60	-8.03	-12.45
Maximum	33.94	57.43	57.50
Sum	-712.16	1.386,5	1229.56
Count	137	63	73

Table 6. Estimated mean WTP and standard deviations from the six models

MODEL		**MEAN WTP (€)**	**STANDARD DEVIATION (€)**
OLS	Linear	24.26	21.19
	Exponential	15.11	1.83
	Multiplicative	14.67	1.85
TOBIT	WTP>0	22.01	14.59
	All responses	-5.20	12.52
	Positive responses and true zeroes	16.84	15.65

5.3. Bid equation and explanatory factors of the WTP

The purpose of the bid equation in a CVM study is to indicate the most significant variables

influencing the WTP (Bateman & Turner, 1995; Bishop et al., 1995). The most commonly used for this purpose, is the Linear Regression equation where the dependent variable is the WTP and independent variables refer mainly to knowledge and attitudes for the good being valued, the financial situation of the individual and several demographic characteristics such as age, gender, occupation and family size (Bateman & Turner, 1995; Hanley & Spash, 1993). The proposed bid equation for the WTP of the STP was based on the OLS model which produced WTP value of €16.84. The resulting equation is expressed as:

$$\begin{aligned} WTP^{*} &= -78.48 + 1.80 \times GNPR1 + 0.86 \times GNPR2 - 1.75 \times ENVPR2 + \\ &+ 4.61 \times POLT - 18.37 \times ANTIC + 5.67 \times INV + 13.72 \times IMP + \\ &+ 3.36 \times OCP - 1.30 \times HSH + 18.17 \times CURR \end{aligned} \qquad (1)$$

where WTP^{*} denotes the unobserved (latent) willingness to pay and

$$WTP = \begin{cases} 0, & if \quad WTP^{*} \le 0 \\ WTP^{*}, & if \quad WTP^{*} > 0 \end{cases}$$

is the respondent's actual WTP amount.

Ten variables were included in equation (1). Firstly, attitudes towards the main problems of the city and environmental problems (GNPR1, GNPR2, ENVPR2). Secondly, variables concerning the knowledge of the pollution of the coastal area (POLT, CURR). Thirdly, attitudes towards the importance of the STP (IMP), the necessity to invest (INV) and the anticipation of an increase in recreational activities in the future (ANTIC) and finally social factors (HSH, OCP). From the parameters' signs in the equation it is observed that individuals who rate highly the importance of the STP and the necessity to invest money for its construction, offer higher bids. The effect of household members on WTP is negative, indicating that an increase in household members results in a decrease in the WTP. Finally, although income was statistical significant as an explanatory variable for estimating WTP in the OLS model with outliers, nevertheless it was not significant in the final model (Table 4) and consequently was not included in the bid equation.

A final stage for the completion of the CVM is the estimation of an aggregate valuation (Hanley & Spash, 1993). In this study, the aggregate valuation was based on the mean and median values from the Tobit bid equation which included positive and true zero responses and estimated a mean WTP of € 16.84. Taking into consideration the total household population of Mitilini we conclude that aggregate WTP was €208,294.55 whereas the median WTP yielded an aggregate WTP of €182,842.04.

6. Conclusions and Discussion

In conclusion, this study attempted to evaluate the benefits resulting from the construction of a STP in the city of Mitilini in Greece. Using the CVM we estimated that the residents of the city were willing to pay €16.84 every four months over a period of four years. This amount is regarded as the most credible from the six estimated as it includes true zeroes and excludes protest responses. Nevertheless, although the valuation of the benefits that derive from the STP was achieved there was a contradiction among the stated level of importance of the STP and the zero responses. Consequently a major issue remains due to the large percentage of protest responses and the means via which protest responses could be avoided from the beginning.

The main obstacle in overcoming the problem of protest responses is that their motives and causes have not been adequately explored (Meyerhoff & Liebe, 2006). Some studies have mentioned as a cause of the protest, the payment vehicle (Morrison et al., 2000), the disagreement for moral reasons with the context of the valuation and the survey (Soderqvist, 1998) and also issues of fairness (Jorgensen et al., 2001). In the study of Meyerhoff & Liebe (2006), the authors attempted to further investigate the motives of protest bids and concluded that protest bids could be reduced if the scenario did not include elements such as the involvement of the state. The possibility of using an alternative hypothetical market was examined in this study. It was concluded that a different payment vehicle would have resulted in a false valuation, due to the fact that the majority of such projects in Greece are constructed and managed by the state.

During this study most protest responses were connected to the belief that the state is responsible for such payments and also to distrust of governmental management. The results from other valuation studies in Greece present similar problems. The percentage of acceptance of the scenarios ranged from approximately 51% to 84% of the sample in previous Greek studies (Oglethorpe & Miliadou, 2000; Damigos & Kaliampakos, 2003; Kontogianni et al., 2003; Birol et al., 2006; Togridou et al. 2006; Pavlikakis & Tsihrintzis, 2006). According to these studies the main reasons for protest responses were political distrust and the notion that the government should pay, as it should be responsible for such initiatives. Pavlikakis and Tsihrintzis (2006) in particular, state that 45% of the sample

refused to participate in the management project "mainly due to distrust of the state". Finally it appears that the sample included a large percentage of non-residents of the community (mainly tourists) in studies where a high percentage of positive answers was observed (e.g. Togridou et.al., 2006; Birol et.al., 2006).

These results are in accordance with the general tendency in Greece where there is a highly interventionist state (Tsoukalas, 1987), trust towards political institutions is relatively low (Lyberaki & Paraskevopoulos, 2002), and incidents of corruption are often (Transparency International, 2005). Specifically, high levels of distrust lead to a negative behavior of individuals towards scenarios such as the one introduced in this study and, on the other hand, the traditionally interventionist state leads respondents to regard it as the only responsible for the management of public goods. Both of these factors generate a high occurrence of protest responses and cause significant problems during the valuation of an environmental good. In the example of this study, although individuals realized the extent of the sea pollution and regarded the Sewage Treatment Plant as essential, their tendency to state a value was low. We assume that several social factors not included in the questionnaire may be regarded as explanatory for both the WTP and protest responses.

Nevertheless, these are only preliminary assumption. Further research is essential for the influence of other elements, such as trust and community social capital, on the tendency of individuals to valuate an environmental good. This investigation may lead to an improvement of the hypothetical market and the payment vehicle while providing the researcher with important information to understand the outcomes of the research.

Consequently, problems occurring from the missing indicators provoking protest responses may be reduced.

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