

Consumers versus non-consumers' benefits from recovering an overexploited fish stock

Elena Ojea and Maria L. Loureiro*

*Elena Ojea, IDEGA-Universidade de Santiago de Compostela (USC), Spain. Phone:+34 981563100 ext. 14338. E-mail: elenaidg@usc.es

Maria L. Loureiro, IDEGA-Universidade de Santiago de Compostela (USC) and Economic Analysis Foundations Department, Faculty of Economics, USC, Spain. Phone: +34 981563100 ext. 14337, E-mail: maria.loureiro@usc.es,

Consumers versus non-consumers' benefits from recovering an overexploited fish stock

Abstract

Controversies exist in the Contingent Valuation literature about the role that respondents play when facing a willingness to pay (WTP) question. Referendum question format is seen to produce *citizen* like responses, instead of *consumer* like responses. In the present paper, the role of consumers versus citizens is further investigated. Real consumers are identified and WTP are assessed for two different levels of an environmental resource. Consumers are found to be sensitive to scope. However, when isolating non-consumers, the scope test criterion is not satisfied. Differences between consumers and non-consumers are further discussed with respect the valuation exercise. Policy implications based on these results are further discussed and analyzed.

Keywords: Contingent Valuation, consumers, citizens, scope test.

1 Introduction

The Contingent Valuation Method (hereafter CVM) is subject to a number of criticisms affecting its validity (Arrow *et al.*, 1993). One discussed aspect of the method is the role played by respondents in the valuation exercise. Large proportions of respondents in CV surveys do not interpret the valuation task as intended by the researcher (Svedsäter, 2003). Svedsäter (2003) claims that respondents can be motivated by a variety of considerations when assessing their willingness to pay (hereafter WTP), most of which might not be relevant according to theoretical assumptions. It is a fundamental assumption in the CVM that responses to the WTP questions may be interpreted as expressions of *consumer* preferences. However, there are a number of studies showing evidence of CV respondents acting as *citizens*, where altruistic considerations are considered instead of purely individual consumer preferences (Blamey *et al.*, 1995). Nevertheless, this interpretation has been questioned, particularly with the standard referendum format, recommended by the NOAA Panel (Arrow *et al.*, 1993). Stevens *et al.* (1991) present evidence showing that WTP for wildlife preservation is generated, at least in part, by ethical concerns, rather than by a view that wildlife preservation will yield any benefit for individual respondents. Ovaskainen and Kniivila (2005) agree by defending that, rather than individual consumer preferences, responses to referendum-style CV surveys on environmental goods may express citizen assessments that take into account benefits to others. The referendum model has more in common with voting (political choice) rather than with a consumer's market-place decisions (the pseudo-market setting). This may encourage respondents to express citizen values based on ethical and political judgements rather than pure consumer preferences over bundles of goods (Blamey *et al.*, 1995).

For Blamey *et al.* (1995), the problem arises when respondents take into account the benefits to others, which means, an altruistic motivation. If so, aggregate benefit measures may be double counting, undercounting, or meaningless (Blamey *et al.*, 1995). Mill *et al.* (2007) agree stating that if individuals adopt a citizen perspective, judging matters from the point of view of society as a whole in addition to personal private consumer preferences, WTP may not be an appropriate or reliable way to capture public preferences. Therefore, some studies put into question the conventional perspective that assumes individuals respond to contingent valuation questions as consumers rather than as citizens (Blamey, 1995; Johansson-Stenman, 1998; Sagoff, 1994; Stevens *et al.*, 1991) and suggest that a citizen role in CV exercises can be a source of bias causing not valid

estimates due to double counting (Blamey *et al.*, 1995; Mill *et al.*, 2007). However, when valuing non-market commodities, these goods may have elements of publicness which are not captured by the consumers frame (Sudgen, 2005). Individuals may hold altruistic preferences concerning others' consumption for goods such as health care (Sudgen, 2005). In this line, Nyborg (2000) states that in CV studies of environmental goods, the majority of respondents' reported WTP appears to be motivated by altruism or moral commitment, rather than by respondents' own use of the good. Vázquez and León (2004) provide such an example where they give attention to altruism in stated preferences for public health. They find that altruism arises as a motive of WTP for policies related to reducing air pollution, where individuals obtain benefits from being concerned of other individuals consuming a given environmental good (bad). This kind of altruism is named *paternalistic* and can be included in cost benefit analyses without the risk of double counting (Vázquez and León, 2004).

Based on this potential problem, different studies have attempted to distinguish between consumers and citizens CV values in their empirical exercises, as to show evidence of the respondent's role effect in WTP. These studies have designed specific WTP questions to obtain from respondents a citizen or a consumer view point in their valuation, by changing the question framing (Curtis and McConnell, 2002; Mill *et al.*, 2007; Ovaskainen and Kniivila, 2005), the valuation approach (Alvarez-Farizo and Hanley, 2006) or the payment vehicle (Martinez-Españeira, 2006). Curtis and McConnell (2002) found in a CV study that there was no difference in WTP between those individuals with citizen or those with presumably purely private consumer preferences. They described the results of an empirical model of neoclassical preferences with altruism in which they found no difference between WTP of respondents who profess citizen or altruistic preferences and that of respondents professing private or personal preferences. On the same line, Martinez-Españeira (2006) conducts a wildlife valuation study in which the payment vehicle explicitly made respondents to adopt a citizen role when answering the valuation question. He obtained no difference in most variables explaining WTP except from the income variable, which was not significant for this citizen sample. Van Rensburg *et al.* (2002) find that WTP is insensitive to whether it is estimated using consumer preferences or citizen preferences. They suggest that environmental goods vary depending on whether they are predominantly within the consumer domain or the citizen domain. In contrast, many other studies found that those differences empirically existed (Mill *et al.*, 2007; Ovaskainen and Kniivila, 2005). Ovaskainen and Kniivila (2005) compared WTP for a preservation program using different questions to distinguish consumers from citizens' orientations. They found that their citizen version resulted in higher mean and median WTP, suggesting that the framing information had a major effect on the expressed

preferences. In this line, Mill *et al.* (2007) investigated the effect on WTP in a CV study of visitors to an Irish forest. Respondents were asked about their WTP for the conservation of forests and about preferences for general forest attributes from both a consumer and a citizen viewpoint. Individuals expressed different preferences when adopting a social or citizen viewpoint to those expressed when adopting a consumer viewpoint, with forest attributes generally considered more important from a social than from a personal perspective. Blamey *et al.* (1995) suggest that CV provides useful information that can inform the political process when the focus is on public goods but, since citizen values are also derived from the exercises, this information should not be used in cost-benefit analysis. This argument is based on the idea that respondents holding a citizen view instead of an individual or consumer perspective may be paying for a different good, other than the one being valued.

Based on this theoretical and empirical evidence, we build up an empirical exercise where consumers are real consumers of the environmental good at hand. As such, following Martinez-Espiñeira (2006) recommendations, we are able to split the general population in only consumers or non-consumers sub-samples. This is a new frame for testing the consumer-citizen hypothesis where real consumers are differentiated from non-consumers as a way to approximate respondents to citizen and consumer roles. Moreover, we will test for the consistency of the empirical estimates on each sub-sample by conducting a scope test. The empirical exercise consists on a CV study for the recovery of an overexploited fish stock. This way, the role of real consumers in non-market valuation is assessed as well as their probability of passing a scope test.

This paper is structured as follows. Section 2 introduces a discussion about scope tests in valuation studies, where citizen and consumer respondents' roles are discussed in the probability of passing a scope test. Section 3 contains the empirical case study and data collection mechanism. Section 4 presents the empirical modelling formulation and results, and finally section 5 summarizes the main results and discusses the main policy implications.

2 Consumers, Citizens and Scope Test

Insensitivity to scope has been considered as a major problem for CVM exercises and much effort has been done in the literature to explain this inconvenience. When respondents either reject paying

for a good at any level of scope, or prefer less of the good than more of it, WTP responses might appear to demonstrate insensitivity to the scope for the public good change (Jorgensen *et al.*, 2001). Economic theory suggests that, while marginal WTP may decline with increases on the size of the good, as long as it remains positive, total WTP should increase as the size of the good increases (Bateman *et al.*, 2005). Under the standard consumer interpretation, in the absence of satiation, WTP is thus expected to increase with increases in size, although marginal value will decline (Loomis *et al.*, 1993; Rollins and Lyke, 1998). For Blamey *et al.* (1995), when citizens are responding to CV questions this will not be the case and increases in size are not expected to be associated with increases in WTP. Respondents will have some estimate of the socially optimal level of provision. They will be less willing to support provision levels that exceed that socially optimal amount. Following this argument, there is no reason to expect that citizen's stated WTP should be sensitive to scope. While a socially optimal amount of an environmental good can be fixed at a specific provision level, consumers' optimal size for an environmental commodity is expected to be maximum.

Sagoff (1998) subscribes that the CVM is exposed to the insensitivity to scope problem since individuals react to an amenity's symbolic meaning instead of to the specific levels of provision described. To solve this problem, he purposes the introduction of discursive and deliberative methods of valuation as a methodological innovation. Since preferences for environmental amenities are constructed, then the process of construction may also involve social learning. Following this idea, Álvarez-Farizo and Hanley (2006) combine choice experiment technique with the citizens' jury approach. Their approach consists on a valuation workshop, where a group of individuals are given information and are able to deliberate and discuss their answers to the valuation questions. As a result, they find that giving people more time to think and the opportunity to discuss changes the contingent values, and they point to a change from individual perspective to a collective perspective during this process. However, it is not clear from these approaches whether or not forcing individuals to behave taking into account a collective choice (or a citizen perspective) deals with more accurate estimates. As Álvarez-Farizo and Hanley (2006) state, "whether citizen or individual values are more appropriate for social decision-making is, though, not something which economists alone can resolve".

From this literature it remains unknown what the role respondents need to take is when asking valuation questions. Based on this problem, the contribution of this paper is on assessing to what extent, for respondents to a CV study, being consumers or non-consumers is affecting their

sensitivity to the level of the environmental good proposed. This way, we will have more information about the expectancy of the values at passing a scope test depending on the role respondent's take. Two main hypotheses are tested here. First of all, to see to what extent WTP values derived from consumers are different from values derived from the general population, and from values derived from non-consumers. The second hypothesis is to analyze which differences can be found between citizens and consumers in terms of sensitivity to scope.

3 Case Study

Current analysis is centred on the recovery of an overexploited stock: the Norwegian lobster. The European Commission has recently approved a new regulation for recovering Norwegian lobster (*Nephrops norvegicus*) stock in South Atlantic waters (Regulation EC/2166/2005). This paper distinguishes between the preferences exclusively subjected to consumers of this marine product from the preferences of the general population and non-consumers. This different value perspective provides an innovative framework to further understand scope test results and to provide new evidence on the citizen-consumer debate, where the validity of the citizen perspective is questioned by authors when using CV surveys for policy analysis and decision making.

The collapse of the Norwegian lobster fishery

Norwegian lobster is a pelagic species commonly fished by the Galician trawl fleet (Northwest Spain). Southern *Nephrops* stocks have been decreasing by 85% for the last two decades, descending from the 4,000 tones of stock during the 1980's to the current 700 tones estimated stock at sea (ICES, 2005). Norwegian lobster landings in Galicia have also decreased, dropping from 1,000 tones in the 1980's to 160 tones in the year 2003 and reaching a practically zero level in 2006. Landings in the Atlantic Iberian waters (ICES Division IXa) are however constant over time as shown in Table 1, and do not decrease in spite of serious scientific concerns. The ICES recommended stopping captures of Norwegian lobster, suggesting a zero fishing target from 2002 and onwards. As the data show, such target has not been fulfilled and nowadays this species is critically collapsed and seriously damaged. Due to the recent collapse on the stock, the European Regulation EC/2166/2005 is now proceeding to recover this trawling species on South Western Community waters (ICES Divisions VIIIc and IXa), from January 2006. The objective of this regulation is to rebuild the stock to safe biological limits within 10 years. This recovery plan was

designed to be revised each year and contains the following measures: determining annually the TACs, reduction of fishing effort, temporal restrictions on catches, monitoring, inspection, and surveillance.

Valuation Scenario and Questionnaire Design

As the valuation scenario, a recovery program was designed based on the EU regulation (Regulation EC/2166/2005) described above, explaining its main points and objectives. Two versions of the questionnaire are considered for the purposes of the current analysis, differentiated in the proposed recovery level. Following the official recovery program and based on conversations with experts, the first recovery level is identified at 1,500 tones. People were told that reaching this specific stock was needed to keep the species out of collapse. In the second version, a higher recovery target was set at 4,000 tones. Respondents were told that, at this higher stock level, fishing would be allowed in the future. Both survey versions were randomly distributed among municipalities.

Consumer vs. Citizen Sample

Given the questionnaire design, from the respondents we were able to detect those individuals that consume Norwegian lobster and differentiated them from the rest. This was done by establishing the median consumption of Norwegian lobster and splitting the sample in two, whether individuals consume under or above the median. From the final total sample of 484, lobster consumers are 318 and non-consumers are 166. Table 2 presents socio-economic characteristics of the sub-samples of consumers and non-consumers. Consumers have better knowledge of the overexploited status of the resource and have higher mean income. This can be expected since Norwegian lobster is a very precious and expensive fish.

This exercise differs from others in that consumers have been identified from direct questions about consumption in the CV exercise. Thus, consumers are real consumers of the resource, while the general population is composed of both consumers and non consumers. The non-consumer sub-sample is assumed to be composed of respondents acting as citizens, as an approximation to the citizen as a way of acting where mainly altruism and existence values are the only values that can be taken into account.

4 Data Analysis and Results

Estimation of Willingness to Pay

As suggested by the NOAA Panel (Arrow *et al.*, 1993), socio-economic variables are being commonly used as explanatory variables to control individual heterogeneity in the WTP regression, while ethical and attitudinal variables have been less employed by environmental economists to explain environmental preferences. In the citizen role, different motivations affect WTP decisions, including ethical and moral considerations that are based mainly on a citizen's perspective rather than on a consumer's perspective. Following Blamey *et al.* (1995), 'consumer variables' (income, prices), 'citizen variables' (knowledge) and 'mixed' variables (coast) were included. Explanatory variables are summarized in Table 3.

Logit models were estimated to analyze binary responses to the WTP question. Explanatory variables include the *bid* amount (in its log form), and a series of indicator variables representing respondent's socio-economic characteristics that are suspected to affect individual preferences for the conservation program at hand. These socio-economic variables include the *coast* variable, which denotes whether the individual lives by the coast; *knowledge*, indicating previous knowledge of the overexploited status of the resource and *income*, a linear variable denoting the monthly household income. Other socioeconomic variables such as age or gender were not included into the empirical specification due to their lack of statistical significance. *Logit* models were estimated to analyze the responses to the WTP questions framed above, such that:

$$(1) \text{Prob}(WTP_i = 1) = \frac{e^{\beta'x_i}}{1 + e^{\beta'x_i}},$$

Where $\beta'x_i = \beta_0 + \beta_1 \ln bid + \beta_2 coast + \beta_4 knowledge + \beta_3 income$

Following Hanemann (1984), the median¹ WTP was computed with the following expression:

$$(2) \quad WTP = \exp\left(\frac{-\alpha}{\beta_1}\right)$$

¹ Mean WTP could not be estimated using the log-logit method from Hanemann (1984) because it is not identified.

where α is the grand constant and β_1 is the bid associated coefficient. The grand constant is defined as the sum of the cross products of all explanatory variables (except the bid amount) times their respective mean levels. Table 4 shows the results from the *logit* regressions for each sub-sample of respondents. All variables carry the expected signs and are statistically significant for at least one of the models. Having a common specification permits comparisons among sub-samples although specification has better fit for the second level of stock.

Results

From Table 3 we can verify how WTP estimates are sensitive to scope, both for the entire sample as well as for the only consumers sub-sample. Values range from 16.09€ per household for the first recovery level to 25.91€ for the higher recovery level, showing scope sensitivity as WTP increases with quantity and no confidence intervals overlap. The same is true for the consumers sub-sample. This result points to the fact that isolating consumers doesn't change WTP in a meaningful manner, neither influences WTP sensitivity to scope.

A third sub-sample contains respondents acting as non-consumers. For this sample, WTP estimates increase with the recovery level although no statistical significance exists between both levels leading to insensitivity to scope estimates. If respondents to the WTP question are non consumers of the resource, it is understandable that benefits derived from the recovery of an overexploited stock are dependent on the species survival and non on the *use* values of the resource. Since recovering lobster to the minimum viable, set at 1,500 tones, there are no incentives for non-consumers to bid higher for an upper recovery level. As expected, *non use* values might be the only ones non-consumers can expect from this recovery program. If non-consumers are considered to act as citizens in the valuation task, it is true that their estimates are non scope sensitive, in line with Blamey et al. (1995) findings. However, altruism can be a motivation for such respondents where they increase their utility knowing that other people improve. As stated by Vázquez and León (2004), this motivation can be expected without contradicting economic principles of stated preference valuation.

Explanatory variables vary also between sub-samples. The *bid* variable is significant almost in all cases with higher bids leading to lower probability of paying. The variable *coast* is found to have a negative effect, where individuals from the coast are less likely to pay. This only happens for consumers and for the entire sample indicating that there might be a relation between being from

the coast, consuming lobster and purchase additional costs for the resource. *Knowledge* is in all cases a significant and positive variable explaining WTP for the higher recovery level. Individuals that are aware of the overexploited status of the resource are more likely to pay for the higher recovery level. *Income* is also significant for the higher recovery levels, where valuation of the good is related to option values.

5 Conclusions

In this paper, respondents to a Contingent Valuation survey have been split into consumers and non-consumers in order to study potential differences in responsiveness to scope. Given the discussion in the literature about consumer *versus* citizen perspectives, consumers have been identified from a sample of respondents valuing the recovery of an overexploited fish stock. A dichotomous choice elicitation format was employed in face to face interviews. Results show how the entire sample of respondents, as well as only consumers are sensitive to scope, where a higher stock recovery level is valued significantly higher. This finding evidences that for this exercise there are not meaningful differences between the general population and consumers of an environmental good in terms of WTP estimates or sensitivity to scope. However, for non-consumers the scope test is not satisfied and WTP for the recovery level that satisfies existence of the resource is not significantly different from a higher level that provides future consumption. This result evidences that this particular set of respondents are placing a value on the level that guarantees survival but have no incentives to value higher an upper level of stock over this minimum. We conclude that individuals acting as citizens might be valuing the existence value of a resource and might be motivated by altruism. The fact that their valuations are not sensitive to scope is not seen as a failure of the method but as a consequence of their preferences towards the resource.

Previous studies have linked the dichotomous choice format to a citizen way of responding to the CV questionnaires. However, respondents to the CV exercises are seen here to respond in an economically rational manner where value estimates are sensitive to scope. Further research is needed in order to understand the links between the type of good and the role respondents are taking when facing WTP questions, as well as the importance of altruism in each of the possible cases.

6 References

Alvarez-Farizo, B. and N. Hanley, 'Improving the Process of Valuing Non-market Benefits: Combining Citizens' Juries with Choice Modeling', *Land Economics* 82(3), 465-78 (2006).

Arrow, K., R. Solow, P. R. Portney, E. Leamer, R. Radner and H. E. Schuman, 'Report of the NOAA panel on contingent valuation', *Federal Register* 58, 4601-4614 (1993).

Bateman I.J., Cooper F., Georgiu S., Navrud S., Poe G.L., Ready R.C., Riera P., Ryan M. and Vossler C.A., 'Economic valuation of policies for managing acidity in remote mountain lakes: examining validity through scope sensitivity testing'. *Aquatic Sciences* 67, 274-291 (2005).

Blamey, R., M. Common and J. Quiggin, 'Respondents to Contingent Valuation surveys: consumers or citizens?', *Australian Journal of Agricultural Economics* 39(3), 263-258 (1995).

Curtis, J. A. and K. E. McConnell, 'The citizen versus consumer hypothesis: Evidence from a contingent valuation survey', *The Australian Journal of Agricultural and Resource Economics* 46(1), 69-83 (2002).

ICES, International Council for the Exploration of the Sea WGNEPH Report for 2005. Working Group on Nephrops Stocks (2005).

ICES, International Council for the Exploration of the Sea Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems(2007).

Johansson-Stenman, O., 'The importance of ethics in environmental economics with a focus on existence values', *Environment and Resource Economics* 11(3-4), 429-442 (1998).

Jorgensen B.S., M.A. Wilson and T.A. Heberlein, 'Fairness in the contingent valuation for environmental public goods: attitude toward paying for environmental improvements at two levels of scope'. *Ecological Economics* 36, 133-148 (2001).

Loomis J.B. M. Lockwood and T. DeLacy, 'Some empirical evidence on embedding effects in contingent valuation of forest protection'. *Journal of Environmental Economics and Management* 24, 45-55 (1993).

Martinez-Espineira, R., 'A Box-Cox Double-Hurdle Model of Wildlife Valuation: The Citizen's Perspective', *Ecological Economics* 58(1), 192-208 (2006).

Mill, G. A., T. M. van Rensburg, S. Hynes, C. Dooley, 'Preferences for multiple use forest management in Ireland: Citizen and consumer perspectives', *Ecological Economics* 60, 642-653 (2007).

Nyborg, K., 'Homo Economicus and Homo Politicus: Interpretation and Aggregation of Environmental Values', *Journal of Economic Behavior and Organization* 42(3), 305-22 (2000).

Ovaskainen, V. and M. Kniivila, 'Consumer versus citizen preferences in contingent valuation: evidence on the role of question framing', *The Australian Journal of Agricultural and Resource Economics* 49, 379-394 (2005).

Regulation EC/2166/2005, of 20 December 2005, establishing measures for the recovery of the Southern hake and Norwegian lobster stocks in the Cantabrian Sea and Western Iberian Peninsula. *Official Journal of the European Communities* 345, 5-10 (2005).

Rollins K. and A. Lyke, 'The Case for Diminishing Marginal Existence Values'. *Journal of Environmental Economics and Management* 36, 323-344 (1998).

Sagoff, M., 'Should preferences count?', *Land Economics* 70(2), 127-144 (1994).

Sagoff, M., 'Aggregation and Deliberation in Valuing Environmental Public Goods: A Look beyond Contingent Pricing', *Ecological Economics* 24(2-3), 213-230 (1998).

Stevens, T. H., J. Echeverria, R. J. Glass, T. Hager and T. A. More, 'Measuring the existence value of wildlife: what do CVM estimates really show?', *Land Economics* 67(4), 390-400 (1991).

Sudgen, R., 'Coping with preference anomalies in cost-benefit analysis: a market-simulation approach', *Environmental and Resource Economics* 32, 129-160 (2005).

Svedsäter, H., 'Economic valuation of the environment: how citizens make sense of contingent valuation questions', *Land Economics* 79(1), 122-135 (2003).

Van Rensburg, T. M., G. A. Mill, M. Common and J. Lovett, 'Preferences and multiple use forest management', *Ecological Economics* 43, 231-244 (2002).

Vázquez, M. X. and C. León, 'Altruism and the economic values of environmental and social policies', *Environmental and Resource Economics* 28, 233-249 (2004).

Annex. Tables

Table 1 Recommended catches, agreed TAC and landings for Norwegian lobster in south west Atlantic (2002-2007) (in tones)

<i>Nephrops Norvegicus</i>						
Year	(Division VIIIc)*			(Division IXa)*		
	ICES Advice	Agreed TAC	Landings	ICES Advice	Agreed TAC	Landings
2002	0	360	170	170	800	690
2003	0	180	110	50	600	720
2004	0	180	90	50	600	570
2005	0	160	80	50	540	690
2006	0	146	77	250	486	.
2007	0	.	.	250	.	.

*ICES advice, TAC and Landings are for the entire ICES areas VIIIc and IXa, corresponding to western Iberian waters and Cantabric Sea.

Source: ICES, 2007

Table 2 Education, age, gender and gross income of the sub-samples

	General population	Consumers	Non consumers
Education			
Primary school or less	39.54	38.57	41.05
Secondary school	26.71	25.60	28.42
Technical School	8.70	9.90	6.84
University degree (3 years)	12.01	12.63	11.05
University degree (5 years)	13.04	13.31	12.63
Gender			
Women	51.45	50.34	53.16
Men	48.55	49.66	46.84
Age			
0-19 ²	2.69	2.11	2.11
20-29	27.68	28.16	28.42
30-39	20.04	23.47	14.73
40-49	15.29	16.33	13.69
50-59	8.47	7.82	9.47
60-69	11.78	9.87	14.74
> 70	14.05	12.24	16.84
Family monthly income			
Less than 425 €	3.10	2.55	3.95
426-600 €	6.42	6.18	6.78
601-1000 €	13.72	9.82	19.77
1001-1500 €	21.90	18.91	26.55
1501-2000 €	26.33	28.73	22.60
2001-2500 €	13.27	14.91	10.73
2501-3000	7.08	9.09	3.95
More than 3000 €	8.19	9.82	5.65

² Only population over 18 was sampled

Table 3 Dependent variables included in the model for consumers

Variable	Description	Means		
		General population	Consumers	Non-consumers
<i>Inbid</i>	Bid logarithm (15-30-50-75-100-125-150-175-200-400€)	4.31	4.30	4.32
<i>coast</i>	Respondent lives in a coastal municipality (1), rest (0)	0.54	0.53	0.55
<i>knowledge</i>	Knew the over exploitation status for the fish stock (1), rest (0)	0.15	0.17	0.11
<i>income</i>	Monthly gross income; numerical (€2006)	1629.64	1714.88	1467.89

Table 4 WTP estimates for the general population sample, consumers and non-consumers

	General population				Consumers				Non-consumers			
	1.500 tones		4.000 tones		1.500 tones		4.000 tones		1.500 tones		4.000 tones	
	Coef. (S.E)	t value	Coef. (S.E)	t value	Coef. (S.E)	t value						
<i>lnbid</i>	-0.4076 (0.1778)	-2.29*	-0.6972 (0.1814)	-3.8***	-0.3219 (0.2250)	-1.43	-0.7835 (0.2281)	-3.43***	-0.5811 (0.3011)	-1.93*	-0.6192 (0.3182)	-1.95*
<i>coast</i>	-0.5493 (0.3017)	-1.82*	-0.2596 (0.3097)	-0.84	-0.6290 (0.3706)	-1.70*	-0.4086 (0.3877)	-1.05	-0.2794 (0.5398)	-0.52	-0.3187 (0.5795)	-0.55
<i>knowledge</i>	0.2916 (0.4544)	0.64	0.8329 (0.3413)	2.44*	0.1605 (0.5665)	0.28	0.6843 (0.3776)	1.81*	0.4675 (0.7763)	0.60	1.6712 (0.8128)	2.06*
<i>income</i>	0.0001 (0.0002)	0.25	0.0006 (0.0002)	3.00**	0.0000 (0.0003)	0.03	0.0008 (0.0003)	3.02**	0.0001 (0.0004)	0.19	0.0002 (0.0004)	0.58
<i>constant</i>	1.2120 (80.8878)	1.37	0.9448 (0.8134)	1.16	1.0363 (1.1425)	0.91	1.1149 (1.0200)	1.09	1.6440 (1.4472)	1.14	1.2045 (1.4497)	0.83
Median WTP	16.09		25.91		15.15		28.35		18.13		24.95	
90% CI	[14.77 – 17.40]		[21.22 – 29.59]		[13.38 – 16.91]		[24.38 – 32.32]		[16.50 – 19.75]		[15.88 – 34.03]	
N	212		237		136		158		76		79	
Log likelihood	-129.00		-127.54		-85.01		-83.90		-43.41		-42.23	
LR chi²	10.95		30.82		5.33		24.55		6.37		8.99	
Prob. > chi²	0.027		0.000		0.2549		0.0001		0.1734		0.0612	
Pseudo R²	0.0407		0.1078		0.0340		0.1276		0.0683		0.0962	

(***) it indicates statistical significance at $\alpha=0.001$; (**) it indicates statistical significance at $\alpha=0.01$; and (*) indicates that the variable is statistically significant at $\alpha=0.1$.