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A procedure to analyse the strategic outliers and the multiple motivations in a contingent valuation

A case study for a concrete policy purpose

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Abstract

Purpose – The purpose of this paper is to describe a methodological approach to analyse the strategic outliers and the multiple motivations in a contingent valuation used for a real policy case study.

Design/methodology/approach – The used approach rationalises the cross comparison of the overall different information levels obtained by the survey to outline a qualitative-quantitative pattern of the relations between the rationale and other motivations of preference behaviours.

Findings – The paper found that no assumption or investigation tool used alone was sufficient to explain the respondents elicited preferences. The results confirm that those who are willing to pay also hold significant motives other than the rationale ones influencing their decisions.

Research limitations/implications – The approach allows to reasonably rule the sharing-out of true zero values from “protest zeros” avoiding the risk of arbitrarily excluding valid data from the CV analyses.

Practical implications – The approach may overpass the reasons behind the provision point mechanism; hence, the authors suggest to extend this procedure to divergent environmental contexts to verify the generality of the methodology.

Originality/value – The adopted procedure shows that the use of monetary estimates of ecological services to support sustainable decision processes can be acceptable if coupled with the multiple motivations that hold them.

Keywords WTP, Consequentiality, Contingent valuation, Attitudes, Outliers, Free-riders, Motivation (psychology)

Paper type Case study



I. Introduction

In the last decades several methods have been developed in order to determine the economic value of ecosystem services, with the declared aim of incorporating them in the decisional processes (Adams, 1993; Hanemann and Kanninen, 1999). Indeed, planning and policy makers rarely consider these aspects in an adequate way (TEEB, 2009; Millennium Ecosystem Assessment, 2003, 2005).

The contingent valuation (CV) method elicits the willingness to pay (WTP) for goods that do not have a real marketplace. Critiques of the CV includes the fact that is based on behavioural mechanisms which are adaptive, causing:

- a strategic attitude; and
- a weakening of the consequential theoretical assumptions of the standard economic model, i.e. that preferences are complete, pre-existing, invariant, and transitive (Harrison and Kristrom, 1996).

Early literature has grouped the potential biases in the use of CV as follows: starting-point bias (due to wrong built of the query); free-riding (due to strategic attitudes by respondents); scenario rejection (due to respondents being unable to answer or to accept the proposed scenario). For the counteractions to the starting-point bias, the scenario:

[. . .] must be informative; clearly understood; realistic by relying upon established patterns of behavior and legal institutions; have uniform application to all respondents; and, hopefully, leave the respondent with a feeling that the situation and his responses are not only credible but important (Mitchell and Carson, 1989).

Free-riding due to respondents' strategic attitudes is an important source of uncontrolled bias which not only may reduce the sample size if removed, but may also inflate the variance and depress the WTP established value if considered. Hence, free-riding has been taken into account in several early studies (Desvousges *et al.*, 1983) and is usually handled by proposing a follow up filter-query to the no-bidders (who do not want to pay any bid) and censored from the sample (Clinch and Murphy, 2001; Jakobsson and Dragun, 2001; Strazzera *et al.*, 2003). However, some authors suggest to keep them into the analyses because even their responses contain valuable information (Jorgensen and Syme, 2000; Meyerhoff and Liebe, 2006a, b).

The provision point mechanism is yet another method to make more credible the payment mechanism. This method tries to statistically set a threshold over that the payment cannot be used to preserve the good but can trig not-cooperative processes (Groothuis and Whitehead, 2009; Rose *et al.*, 2002; Poe *et al.*, 2002).

The above-mentioned biasing factors rely to the hypothetical nature of the market. Two lines of research have been followed regarding the consequences of the hypothetical nature of the market on the economic standard theory basics in interpreting WTP. One line tries to demonstrate that if the survey is consequential, that is if the respondents believe that their responses influence an agency's action and that this action influence them, then the standard economic model can be applied (Carson and Groves, 2007). The second line tries to demonstrate that it is necessary to consider other motivations by the respondents, besides those assumed in the individual utility philosophy that supports the standard economic model (Spash *et al.*, 2009; Ryana and Spash, 2011). The existence of these biases has been the reason why policy makers have been reluctant in explicitly using values derived from CV applications.

Here we describe a step by step procedure used to correct the CV biases in a real public policy case. In particular, we explore how treating strategic answers. The exercise also allowed drawing some remarks on the standard economic model assumptions. The context of this application is a public agency in Europe (Rome County, Italy) which

decided to make public (<http://websit.provincia.roma.it:8080/Benicomuni>) the non-market components of the total economic value (TEV) of three environments, i.e. rural landscape, woodlands and wetlands. These three environmental types are widely available to people in the studied region, and have had a strong cultural and economic role in the local human society (PTPG, 2010), thus making the data given here relevant also for the theoretical expectations highlighted above. These values should be used as benchmarks to trigger all the negotiation/transaction processes among private and/or public actors.

II. Materials and methods

II.1 Method basics

An independent survey was carried out for each of the systems considered: rural landscape, wetlands, and woods. A total of 124 respondents were interviewed to test the survey instrument. A total of 1.612 respondents were interviewed in the survey.

To maximize the performance homogeneity and to reduce interviewee weariness, we adopted face-to-face interviews with trained interviewers (Dilman, 1991; Moser and Dunning, 1986; Tolley and Fabian, 1998). We used focus groups to test the questionnaires so as to avoid procedural invariance (Kahneman, 2003). The questionnaires (Table I) were structured in four sections to reduce the starting point and the scenario biases following reference guidelines (i.e. Alberini and Cooper, 2000; Arrow *et al.*, 1993; Bateman *et al.*, 2009; Mitchell and Carson, 1989; Pagiola *et al.*, 2004) and selected literature on the CV method (Hanley *et al.*, 2001; Jakobsson and Dragun, 2001; Udziela and Bennet, 1997; Venkatachalam, 2004) or on its specific aspects. Ecological services and respective benefits were classified according to classifications widely used in literature (Costanza *et al.*, 1997; Millenium Ecosystem Assesment, 2003, 2005) and provided in the questionnaires as statements carefully edited so as to be easily understood. Respondents were then asked to judge each statement on a four level agreement scale (Table I). In this way we provided a clear starting point for the WTP questions and for each respondent in activating personal cognitive maps. To avoid double accounting in the case of systems that actually produce harvested direct value goods in the County (woods, rural landscape) we excluded in Section 2 the statements regarding marketable goods, entered in the TEV as current market prices. In Section 3 we used close ended format (Bishop and Heberlein, 1979) to simplify the answering process with an incentive compatible mechanism (Alberini *et al.*, 1997). To avoid hypothetical delayed payments problems (Carson *et al.*, 2001) we proposed an abrogative polls about a (hypothetical) tax safeguarding the considered ecosystems, and tuning a robust bid also by mean of a pre-test. We used as pre-test bid the average value of the same kind of real paid taxes to avoid problems of unfamiliarity and cost extent of the proposed good (Schläpfer, 2007). We systematically asked for a follow up question to all respondents in order to obtain information about motivation and beliefs.

In Section 4 we collect the demo-socio-economic and geo-spatial variables of the respondents, grouped and ordinally transformed to be used as independent variables: age (17-30, 30-44, 45-64, > 64); schooling (none, lower school, junior high school, high school, Bachelor's degree, Master's degree, PhD); employment (housewife-student-unemployed, workman-pensioner, white collar, manager. self-employed – professional); income (t €/year: 0-10, 10-20, 20-30, 30-40, 40-60, > 60); respondents' family (1, 2-4, > 4); association belonging (none, other, rural union, environmental, fishing-hunting); sex; respondents'

Section 1

Wetlands

This survey is part of a wider research project on the of the Rome county and the Lazio Region.

Wetlands are low depth water areas like lagoons, deltas, marshes, ponds, etc

Woodlands

This survey is part of a wider research project on the woodlands of the Rome county and the Lazio Region

Woods are larger than one hectare with a canopy cover higher than 10 per cent and mature trees at least high 5 meters, which include forest lane or other little clearing, wooden strips larger than 20 meters and forestry plantation

Rural landscape

This survey is part of a wider research project on the rural landscape of the Rome county and the Lazio Region

One of the typical Roma rural landscape is that of mixed crops (more permanent crops than arable) grasslands, groves and old agricultural layout (embankments, terracing, dry masonry)^a

Section 2

Express your opinion about these statements

Wetlands

- | | |
|--|---|
| 1. Wetlands are important as water reservoirs and circulation control | Total agreement; agreement; I do not know; total disagreement |
| 2. Wetlands contribute to control green house gases based on C (like CO ₂) and climate change sequestering organic matter (that is plant, animal, litter, sediments) | Total agreement; agreement; I do not know; total disagreement |
| 3. Wetlands contribute to reduce environmental risks acting as a barrier against wind, waves, fires and erosion | Total agreement; agreement; I do not know; total disagreement |
| 4. Wetlands have a water purifying function | Total agreement; agreement; I do not know; total disagreement |
| 5. Wetlands contribute to biodiversity offering a habitat of several plants and animals (fishes, shellfish, water birds, mammals, reptilians) | Total agreement; agreement; I do not know; total disagreement |
| 6. Wetlands have a recreational function (visits, wildlife watching, and game) | Total agreement; agreement; I do not know; total disagreement |
| 7. Wetlands yield several categories of economic goods (wood, cane, fish, game, etc.) | Total agreement; agreement; I do not know; total disagreement |

Woodlands

- | | |
|---|---|
| 1. Woods are important to regulate water circulation and water reservoirs recharging | Total agreement; agreement; I do not know; total disagreement |
| 2. Woods contribute to control green house gases based on C (like CO ₂) and climate change sequestering organic matter (that is plant, animal, litter, sediments) | Total agreement; agreement; I do not know; total disagreement |
| 3. Woods contribute to reduce environmental risks protecting mountain slopes from landslides, erosion and hydro-geological instability, and improving soils fertility | Total agreement; agreement; I do not know; total disagreement |
| 4. Woods contribute reducing water and air pollution | Total agreement; agreement; I do not know; total disagreement |
| 5. Woods contribute to biodiversity offering a habitat to several plants and animals (insects, birds, mammals, reptilians) | Total agreement; agreement; I do not know; total disagreement |

(continued)

Table I.
Description of the first three sections of the questionnaires built for each of the ecosystem/landscape considered

6. Woods have a recreational function (tourism, visits, wildlife watching, and game)	Total agreement; agreement; I do not know; total disagreement
<i>Rural landscape</i>	
1. The observed rural landscape contribute to regulate water circulation	Total agreement; agreement; I do not know; total disagreement
2. The observed rural landscape contribute to control green house gas based on C (like CO ₂) and climate change sequestering organic matter (that is plant, animal, litter, sediments)	Total agreement; agreement; I do not know; total disagreement
3. The observed rural landscape contribute to reduce environmental risks protecting slopes from landslides, erosion and hydro-geological instability, and improving soils fertility	Total agreement; agreement; I do not know; total disagreement
5. The observed rural landscape contribute to biodiversity offering a habitat to several plants and animals (insects, birds, mammals, reptilians)	Total agreement; agreement; I do not know; total disagreement
6. The observed rural landscape has a recreational function (tourism, visits, wildlife watching, and game)	Total agreement; agreement; I do not know; total disagreement
Section 3	
The region has approved an act to maintain these environments. The act financing it is based on a yearly tax of €85,00. A referendum has been proposed to abrogate this act. If the referendum should be overtaken you would vote	Yes: you would pay less tax but you should renounce to the preservation of these environments No: you would contribute to the preservation of these environment, continuing to pay the tax

Note: ^aIn this case the popular definition was supplied of a four photographs set of the rural landscape considered

Table I.

residence (urban, urban fringe, rural); distance of the respondents' domicile from the considered environment (0-24, 25-44, 45-59, 60-100, > 100 km).

Variables were selected to account for:

- the standard model theoretic expectations (like scope provision, costs for using the good, availability of substitutes and individual's income constraints (Bateman *et al.*, 2009); and
- demo-socio-economic and cultural effects on ecological knowledge (Section 1) and stated preference.

In case (1) we:

- directly asked for the income;
- used the two geo-spatial variables (residence, distance) to detect a possible cost of use; and
- assumed as redundant in this research the scope expectation.

Instead, we did not consider consistent the substitute assumption as long as the overall ecosystem functions/benefits can be physically "substituted" only by other equivalent ecosystems. In case (b) we selected a minimum number of variables able to detect the communities' characteristics effect on the sample knowledge/awareness. This knowledge/awareness is expected to influence the nature of the attitudes toward of

the stated preference (Ajzen, 1991; Meyerhoff and Liebe, 2006a, b; Ryana and Spash, 2011; Spash *et al.*, 2009). The minimum number of variables was defined balancing the criteria of simplicity, clearness, and admissible interview time.

Internal reliability analyses concerned with the argument (for the building and submission to respondents phases) and structure (for the possibilities to compare estimates, and to verify expected correlations such as direct link between WTP and respondent earned income).

Statistical analyses were done with STATISTICA (StatSoft release 10), SPSS (release 10.0, SPSS, 1999) and logit functions in R (R Development Core Team, 2008).

II.2 Reasons and characteristics of the procedure

To support a policy that makes publicly available monetary threshold, the method used has to be sound both from the representative ness of the social capital represented and the econometric model(s) used, and robust, to transparently cruise on public debate. Robustness deals even with the assumption validation or with the kind of verifying. To pursue these aims in a concrete case we had to develop a procedure that:

- could systematically consider the possible interaction among the information influencing the CV robustness; and
- could represent robustness in a repeatable yet popularly accessible way for citizens' valuation.

After having obtained robust samples for the WTP estimate, we finally used different econometric models, pragmatically comparing their statistical result robustness (Official Research Report, available at: www.provincia.roma.it/sites/default/files/vta_roma_web_0.pdf) and using the most conservative ones.

For these reasons it was considered appropriate (with the Decision Makers) to define a repeatable – invariant procedure to rationalise the biases filtering on a step by step cross comparisons of choices, motivations/beliefs, awareness/knowledge of ecological functions/benefits, socio-economic profiles, and geo-spatial distribution of the respondents. Having established the frame of the expectations, we could pragmatically substitute some parts of the rationale of other kinds of verifying (Meyerhoff and Liebe, 2006a, b) with a popular (i.e. participative) system usable by citizens even on a common sense basis.

To establish the frame of the expectations, we set a reference criteria grid from selected literature (Buchli, 2004; Clinch and Murphy, 2001; Meyerhoff and Liebe, 2006a, b; Milon, 1989; Mitchell and Carson, 1989; Jakobsson and Dragun, 2001; Jorgensen *et al.*, 1999; Römer, 1992; Strazzeria *et al.*, 2003). This allowed us to group the respondents' motivations/beliefs into a ordinal variable ranked 1-8, with score 1 being the most certainly protest and score 8 being the most right based (Spash *et al.*, 2009) attitudes. A marginal category (scored 9) consisted essentially (78 per cent) of no-reply (Table II). Motivation scoring was related to the factors supposed to affect WTP: strategic – protest beliefs, right based beliefs, income limitation, environmental concern, social norms and dilemma concern (Meyerhoff and Liebe, 2006a, b).

Lastly, based on the above quoted literature assumption we expected that:

- (1) the true no-bidders unavailability to pay; and
- (2) free rider no-bidders strategic answers should correspond to respondents with:

Table II.
Expected influence among the grouped motivation vs the considered factors supposed to affect WTP, and WTP

Motivations	Ordinal scores	Strategic/protest beliefs	Right based beliefs	Factors supposed to affect WTP	Income limitation	WTP
				Dilemma concern		
				Environmental concern		
To pay is useless as money are not used by governments for what they say	1	+		+		-
There are too many taxes to pay	2	+				-
This is a governmental stuff	3	+				-
Nature has no price	4	+	+		+	-
It is sufficient as it is now; is too much as it is now	5	+		+		-
Ready to pay for the environment but the taxes are too many/I distrust institutions	6	+	+			±
Economic/income/family problems of the respondent	7				+	
The environment is so important that everything should be done for helping its management and giving a value to it	8		+			+
Other (aspects of the proposed scenario, generic distrust 20 per cent; do not reply 78 per cent; the law/tax does not exist 2 per cent)	9					

Notes: Symbols: + – positive correlation between motivation type and WTP; – – negative correlation between motivation type and WTP; ± – a priori not-presumable correlation direction; scores are ordered from negative to positive expected effect on WTP

- general knowledge of the ecological functions/benefits (correlated to schooling/job type) – or – very good knowledge of the ecological functions/benefits and complete knowledge about CVM mechanism – and/or – limited purchasing power (correlated to income/job type/family dimension); and
- good knowledge of the ecological functions/benefits (correlated to schooling/job type) – and – not limited purchasing power (correlated to income/job type/family dimension).

The procedure layout was:

- *Starting point testing*. Overall shared knowledge analyses (not reported here: see Official Research Report, online at: www.provincia.roma.it/sites/default/files/vta_roma_web_0.pdf).
- *Starting point and scenario acceptance testing*. Overall motivational sample analyses.
- *Free rider filtering*. Coherence analyses of no bidders' expected profiles and selection of free riders and "true no-bidders" (true 0 values).
- *Structure reliability*. Verifying and removing of the outliers (WTP vs income) and final samples filtering.
- *Starting point and scenario acceptance check*. Compared analyses of shared knowledge and motivation distribution in free riders and filtered samples.
- *Structure reliability of the filtered samples*. Compared analyses of the "scenario acceptance" profiles and motivations of the true no-bidders and the bidders.
- *Structure reliability of the filtered Samples*. Comparison of the elicited values and the observed behaviours reported in selected reviews (Cooper *et al.*, 2009; Tempesta, 2007; Turner *et al.*, 2003; www.evri.ca).

II.3 Statistical analyses

We used only non-autocorrelated parameters ($r < 0.70$) and dependent variable in logit models was calculated by a logistic regression backward procedure (uniband type) (Luiselli, 2006a). Model validation was performed with:

- $(-2 \log)$ likelihood test;
- goodness of fit (Pearson's χ^2 test);
- pseudo R^2 ; and
- per cent of correctly classified cases.

In the case of pseudo R^2 , the Nagelkerke test was used.

The relationships between respondent' income and WTP was investigated by regressing the intermediate value of the declared income interval and the mean value of the interval between the last proposed bid and the accepted one. Outliers were selected both through a statistical analysis of the residuals (SE of residuals, Mahalanobis distance, Cook distance) and a check of the profiles. Other conventional nonparametric tests were use when variables were not normal.

III. Results

The expected influences among the motivations and the various factors which were supposed to influence WTP are given in Table II. The distribution of the motivation scores appeared to be coherent with the expected influence on bidders (no-yes, no-no, yes-no abrogation answers) and no-bidders (yes-no) WTP and potentially strategic behaviors (Table III). No-bidders motivations consisted mainly of certainly protest statements (61 per cent, scores 1-3) and also by income limit motivations (32 per cent). Bidder motivations were distributed along their effective WTP. In the yes-yes answer category, those who chose for a lower-than-the-proposed bid concentrated the higher rate of protest (1-3) or income (7) motivations. In the no-yes category, those who chose for a higher-than-the-proposed-bid concentrated the higher rate of the motivation (score 8) expected to surely positively influence the WTP.

The income motivations, compared with the estimate of the actual purchasing power, was described by the job type vs the declared income to take into account the generalized attitude of the respondents to underdeclare the income category, despite anonymity (Table III). This allowed to verify that the yes-yes bidders category revealed even an actual lower purchase power (higher percentage in the lower income job category) or a greater underdeclaring trend (lower job/income rate in the higher job categories).

The “status quo” motivation showed a peak in those respondents preferring the first bid proposed. The right based and secondarily protest motivation (variable score 7 in Table III) was evenly distributed among the bidders categories but absent in the no-bidders category. The “nature has no price” motivation was negligible.

The results of the cross comparisons of motivations, awareness/knowledge of ecological benefits and respondents profiles to discriminate the free riders from true no-bidders is reported in Table IV. Free riders were inside the reported literature range (Halstead *et al.*, 1992; Römer, 1992; Bateman *et al.*, 2009) and the selected true zero bidders were around 6 per cent of the overall samples and around 32 per cent of the no-bidders category (Table IV). As expected, free riders corresponded to respondents not limited by awareness about benefits (as confirmed by the good schooling and on average ecological knowledge uncertainty) or by income limitation. This can be valued by the estimate of the actual purchasing power: against the evenly job class distribution emerged an increasing underdeclaring trend from lower to upper categories. This cultural distrust toward a “state” was coherent with the dominating certainly protest motivations. The wetland sample profiles (Table IV) were slightly different from the woodland and rural landscape samples. Indeed, comparing the free riders and the filtered samples, it resulted that motivations, income, job, and schooling were statistically (Wilcoxon test, $p = 0.05$) different from the free riders to the filtered samples in the case of woodland and rural landscape but not in the case of wetlands.

True no-bidders (Table IV) matched one side of the expected profile, having effective limits from the awareness or income point of view. This is evident from both the motivation and the estimated purchasing capacity. In the first case, there were lower schooling and higher benefit uncertainty (except in the case of woodlands), particularly in the case of functions requiring specific knowledge like environmental risk control, hydrogeology, climate change (Figure 1). In the second case, the higher income job categories were strongly underrepresented and the underdeclaring trend was not so evident. Only free riders were censored from the samples.

Answers to the abrogation poll	Variable score	No-yes Percentage of acceptance of higher bid 15	No-no Percentage of acceptance of the first proposed bid 49	Yes-yes Percentage of acceptance of a lower bid 19	Yes-no Percentage of the yes-no unavailability to pay 17
		Percentage of the no-yes subsample	Percentage of the no-no subsample	Percentage of the yes-yes subsample	Percentage of the yes- no subsample
<i>Motivations</i>					
To pay is useless as money is not used by governments for what they say	1	2	2	8	31
There are too many taxes to pay	2		5	9	12
This is a governmental stuff	3		3	10	15
Nature has no price	4				2
It is sufficient as it is now; is too much as it is now	5	5	41	21	1
Ready to pay for the environment but the taxes are too many/I distrust institutions	6	21	20	21	
Economic/income/family problems of the respondent	7	2	9	24	32
The environment is so important that everything should be done for helping its management and giving a value to it	8	65	21	2	1
Other	9	6	8	5	6
<i>Actual purchasing power estimate</i>					
Very low income job (housewife, student, unemployed)/very low (0-10 t € year-1)		9/12	23/25	23/29	31/45
Low income job (workman, retired)/low (10-20 t €, year-1)		21/16	35/38	34/51	43/37
Higher income job (white collar, manager, self-employed – professional)/higher (20-60 t € year-1)		70/72	42/37	43/20	26/18

Table III.
Motivational distribution of the positive and negative answers to abrogation (proposed bid) in the overall sample

Table IV.
Overall results of the cross comparisons among motivations, ecological knowledge/awareness and respondent profiles of the selected free riders and “true no-bidders” samples

	Wetlands		Woodlands		Rural landscape		Overall landscape	
	Free riders	True no bidders	Free riders	True no bidders	Free riders	True no bidders	Free riders	True no bidders
n. within samples	69	35	79	27	64	32	165	95
% within samples	12	7	9	5	9	6	10	6
Motivations (% within samples)								
Certainly protest statements (1-3)	85		94		94		90	
Nature has no price (5)	9		4		6		7	
Income limits (7)		86		93		88		87
Ecological knowledge/awareness (%)								
Uncertainty % within the sample	24	42	19	15	15	36	17	32
Uncertainty % within the samples filtered of the free riders	22		14		18		18	
Respondent profile (% within the sample)								
<i>Schooling</i>								
≤ High school	73	89	82	88	65	87	86	70
≥ High school	27	11	18	13	35	13	14	30
<i>Actual purchasing power estimate</i>								
Very low income job (housewife, student, unemployed)/very low (0-10 t € year-1)	28/42	43/53	14/45	39/51	33/43	34/47	25/37	39/57
Low income job (workman, retired)/low (10-20 t € year-1)	40/34	51/44	51/54	46/42	27/27	56/50	39/38	52/39
Higher income job (white collar, manager, self-employed – professional)/higher (20-60 t € year-1)	31/24	6/3	35/21	7/4	41/31	9/3	44/25	12/4

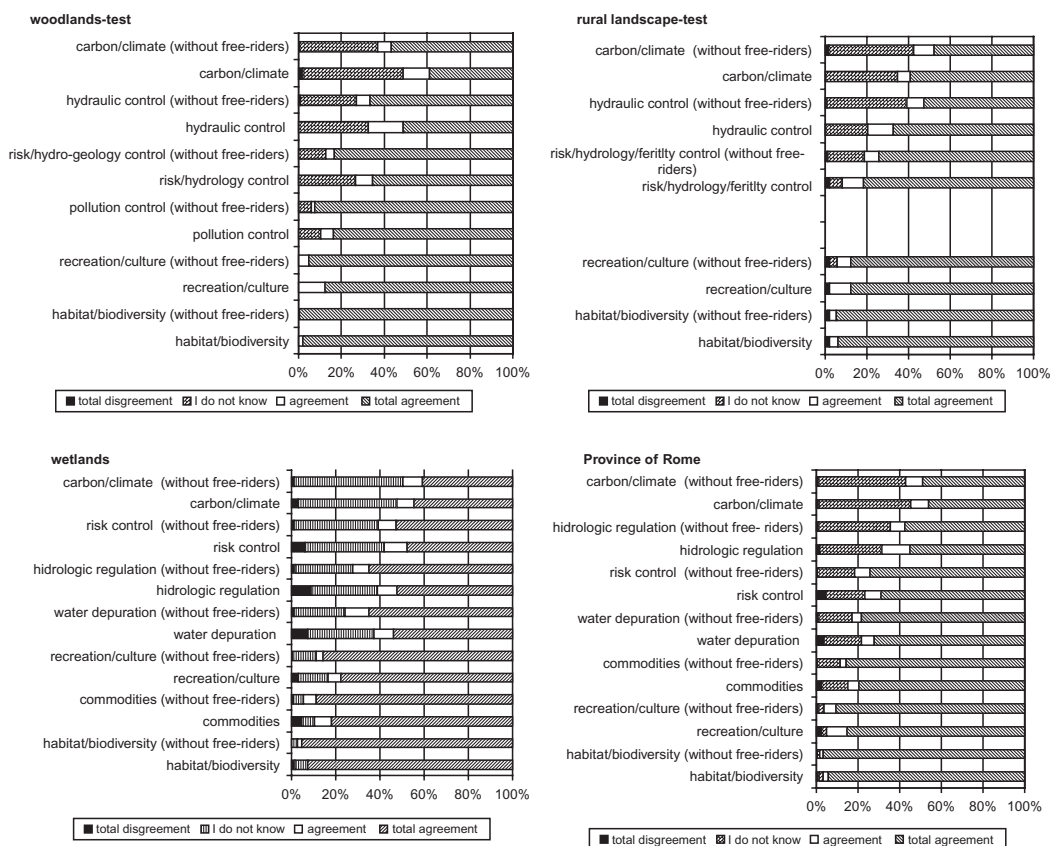


Figure 1. Comparison of the citizens' shared knowledge (measured by the agreement/disagreement per cent distribution) of the listed ecological services in the samples filtered and not filtered from the free riders

The free riders filtered samples showed too a remarkable dispersion across the lower income classes, and we used a profile analysis to support the statistical selection of the outliers (Figure 2). The dispersion was linked to:

- the already registered underdeclaring trend; or
- a declared income that did not match the actual purchase power.

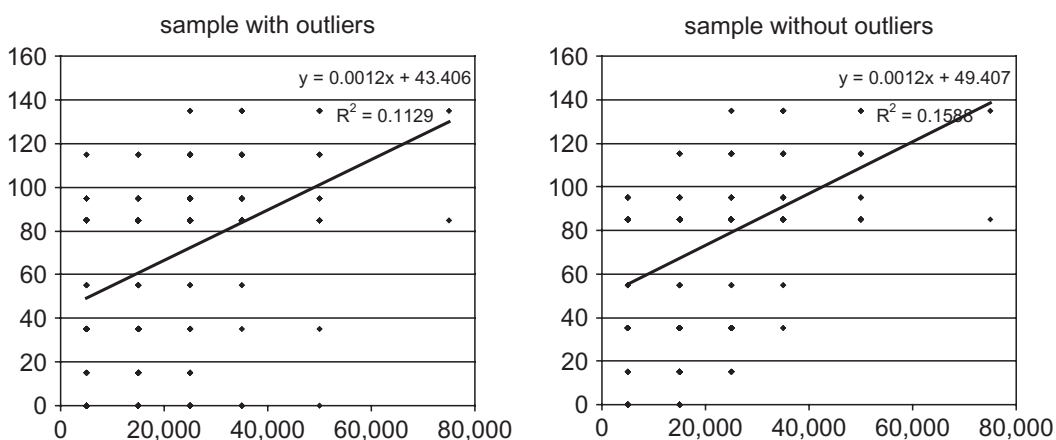


Figure 2. Linear regressions of WTP and income in the total sample filtered of the free riders with and without the selected outliers

This was the case of university students maintained by their families. These persons showed a clear knowledge about ecological benefits which could refer to a consequential utility allocation. We identified ten outliers of the first kind (jobs certainly not coherent with the declared income) and 8 of the second kind. Their deletion improved the linearity by about 10 per cent with consequent improvement of the logit performances.

To verify the structure reliability regarding the scenario acceptance of the filtered samples (true no-bidders and bidders), we analysed the abrogative answers rate, i.e. the refusal of the first proposed bid. The abrogation rate was significantly higher for wetlands ($\chi^2 = 6.484$, $gdl = 2$, $p = 0.039$), and the non-abrogation rate ranged from 84 per cent (wetlands) to 94 per cent (rural landscape). The “abrogation” respondent’s profile was the expected one, i.e. elderly people having low purchase power and schooling (Asciuto *et al.*, 2005; Balram and Dragičević, 2005; Dixie Watts *et al.*, 1999; Jim and Chen, 2006; Oguz, 2000; Tempesta and Maragngon, 2004). To deepen the analyses, we fitted the logit models regressing the abrogation positions with all the defined independent variables (Table V). The logit function was not significant for the agricultural landscape. Woodlands were characterized by a low percentage of “abrogating” respondents, thus indicating inverse relationships with associationistic attitudes (which underline a right based attitude). Wetlands showed a remarkable inverse relationship between abrogation positions and the spatial (distance) or cultural (residence) distance from.

The check of the free riders’ starting point and scenario acceptance is summarised in the discussion and in Figure 1, which shows how there were no significant differences between the knowledge/awareness of the ecological functions/benefits between the free riders and the filtered samples, but only between their surely strategic protests rate.

The comparative analyses of the elicited values with selected reviews (Cooper *et al.*, 2009; Tempesta, 2007; Turner *et al.*, 2003; www.evri.ca) was made on a mean respondent annual WTP basis. Results did not diverge from the reported ranges, so we made only qualitative comparisons.

IV. Discussion

This study highlighted several relationships between theoretical expectations and recorded data. To begin with, both the pre-test and the true test confirmed a clear understanding of the starting point with an almost total shared agreement (98 per cent on average) of the more popular (i.e. social norms and deontological driven) functions. Among these functions, we can cite the biodiversity/habitat – culture/recreational ones, whereas there was a growing uncertainty for those functions which are based on an increasing specialized knowledge, like risk control and hydrologic role, and climate change (respectively 15-30 per cent and 44 per cent on average). The starting point did not significantly differ between the selected free riders and the rest of the respondents as the scenario acceptance indicated the payment vehicle: two respondents out of 1.612 put in doubt the law/tax.

The motivational analyses allowed us to verify the absolute role of the considered good/services’ value in the community. Indeed, those who accept the proposed scenario are almost all of the county citizens and their registered attitudes are:

- declared acceptance of the proposed price (score 5);
- environmental concern (scores 6 and 8); and
- limited purchase power (score 7); but not of strategic protest kind (scores 1-3).

Variable	B	SE	Wald	df	Prob.	R	Exp(B)
<i>Wetlands</i>							
Residence	-0.5494	0.2057	7.1369	1	0.0076	0.0841	1.7322
Study degree	-0.2183	0.0924	5.5799	1	0.0182	-0.0702	0.8039
Distance	-0.5717	0.2354	5.8997	1	0.0151	-0.0733	0.5646
Constant	2.4925	4169	35.7450	1	0.0000		
-2log-likelihood = 601,564 Goodness of fit = 584.68 Nagelkerke $R^2 = 0.281$ % corrected cases = 74.95%							
g(x) = 2.4925 + 0.5494 × residence - 0.5717 × distance - 0.2183 × study degree							
<i>Woodlands</i>							
Assoc.	-0.2875	0.1301	4.8828	1	0.0271	-0.0684	0.7502
Constant	1.3980	0.5007	7.7954	1	0.0052		
-2log-likelihood = 500 Goodness of fit = 529.56 29Nagelkerke $R^2 = 0.296$ % corrected cases = 75.15%							
g(x) = 1.3980 - 0.2875 × association							
<i>Total sample</i>							
Income	-0.2966	0.1169	6.4418	1	0.0111	-0.0595	0.7433
Job	0.3144	0.1005	9.7869	1	0.0018	0.0788	1.3694
Constant	-0.9669	0.3837	6.3493	1	0.0117		
-2log-likelihood = 1,207.99 Goodness of fit = 1,564.644 Nagelkerke $R^2 = 0.296$ % corrected cases = 86.62%							
g(x) = 0.9669 + 0.3144 × job - 0.2966 × income							

Note: The statistics of significance and robustness of fit and the predictive capacity of the logistic equation modelled are described in the text

Table V. Summary of the results of the logit unimodal significant models of the “abrogative” answers as dependent variable and the selected predictors

The no bidder analyses allowed us to set rules and sound elements to discriminate true no-bidders from free riders in order to consider them into the CV analyses. Using the awareness/knowledge benefit analyses (Official Research Report, available online at: www.provincia.roma.it/sites/default/files/vta_roma_web_0.pdf) within the cross comparison procedure allowed us to find out that:

- The unwilling to pay of free riders did not correspond to a perceived null benefit value but in a communication strategy of the agent in pursuing an utility, which was apparently different from that recognised in the proposed scenario and linked to a “state” distrust and an actual purchasing power hiding.
- The unwilling to pay of “true no bidders” was based both on an actually limited purchasing power and on a lower awareness about those functions needing a more technical or experiential knowledge. The no-bidders rate was negligible. The no-bidder motivations do not invalidate the standard model assumptions (Carson and Groves, 2007) yet are coherent with other, more robust interpretative approaches (Spash *et al.*, 2009).
- When the ecological functions/benefits awareness/knowledge is lower (in this case, wetlands compared with woodlands or rural landscape) the propensity to strategic responses seems more spread among the respondent categories.

The procedure allowed us to confirm that protest as right-based motives have to be incorporated into the analysis as an attitude towards the behaviour of paying money for a public good. We found that the reasons to pay the proposed or higher bid did not depend on institution trust (scores 5 and 6), that is: even if the agents distrust the agency whose action should influence their utility in a consequential perspective (Carson and Groves, 2007). Therefore, from our findings the great part of the agent pursue his/her own utility choosing also on a right based attitude and not simply on a rational based preference of a consequence on his/her utility. Lower bid choices were based on similar motivations of the higher ones, with a difference on the marginal protest attitudes rate explained even by an actual lower purchasing power or by an increasing institutional distrust, indicated by the growing income underdeclaring trend. For these reasons, we confirmed that respondents who should refuse the bid because not applying consequential categories to their WTP are the most part of the sample (Spash, 2000; Spash *et al.*, 2009). Among them, those who base their positive WTP only on a distinctly deontological motive (motivation 6 and 8) are approximately 45 per cent of the filtered samples. Instead, those who explicitly refuse the market mechanism proposed represent a trivial population percentage. In fact the motivation “nature has no a price” should point a voluntary exclusion from the consequential model. All that considering, the warm glove factor (answers that do not reflect real economic preferences but personal moral satisfaction in doing something good) seems to lose its original usefulness in a context like the analysed one.

Verified the substantial acceptance of the proposed scenario, the socio-economic parameters related to the WTP for a lower bid were the expected ones (lower income and/or study level, higher age and not intellectual, professional or entrepreneurial job). Yet, the use of spatial variables allowed us to detect an increasing percentage of the “abrogation” option along the increasing distance from the wetlands.

Outliers appeared to be linked to behavioural attitudes affecting the reliability of the information given, thus significantly reducing the information potential of the statistical methods used.

Finally, the comparison of the final estimates confirmed their coherence with the up to date literature reference framework.

V. Conclusions

The robustness and clearness along all the CV process to be obtained in a popularly yet rigorously repeatable way forced us to consider simultaneously the critical aspects of the method. The proposed procedure allows to rationalise the cross comparison of the overall different information levels obtained by the survey and to organize a qualitative-quantitative pattern of the relations between:

- consequentiality and scenario acceptance; and
- rationale and other motives composition that enrich the preference process analyses and the standard model assumptions.

Our findings suggest that no assumption or investigation tool used alone seems to be sufficient to fully explain the respondents elicited preferences. Hence, no simple pattern of relationships should be expected between theory and true data. The implications of this evidence are two-fold:

- (1) more field-based research is necessary; and
- (2) the true value of the method employed here does not stand merely on the monetary estimation related to a-priori theoretical assumptions, but stands on the use of a social capital in a public decision process.

A strong aspect of the procedure adopted is that it allows to identify free-riding in a non-a-priori assumption matter, but with a selective approach which is adapted to the CV problems (format, goods type, external factors) and to the interpretation of the behavioural attitudes (Jorgensen *et al.*, 1999). This approach can allow to overpass the reasons behind the provision point mechanism (Groothuis and Whitehead, 2009) and to reasonably rule the sharing-out of true zero values from “protest zeros”, avoiding the risk of arbitrarily excluding valid data from the analyses (Jorgensen and Syme, 2000; Meyerhoff and Liebe, 2006a, b). In this case, free rider strategic behaviour was selectable due to the clear relationship between a undisputed protest attitude (“state” distrust) and a actual purchase power hiding. These citizens recognised their benefits but let the community to pay for the services. This cultural trend is strongly rooted in several European regions. Given that we were dealing with a public policy managing goods regarding the tax payer’s well-being, common sense was a criterion more robust than other theoretic assumptions in order to consider these free riders as an effective bias. Hence, it is therefore necessary to extend this procedure to divergent environmental contexts to verify the generality of our methodology.

Our results confirm that those who are willing to pay also hold significant right-based (Ryana and Spash, 2011; Spash *et al.*, 2009) and/or protest beliefs (Meyerhoff and Liebe, 2006a, b) other than the consequential rationale influencing their decisions. This finding is enforced by the fact that even if no one of the independent variable but the bids were selected in the very conservative and statistical robust WTP

estimates obtained, these were significantly different among the considered ecosystems which were characterised by a different pattern of motivations, attitudes and shared ecological knowledge (Official Research Report, available at: www.provincia.roma.it/sites/default/files/vta_roma_web_0.pdf).

From the methodological side, the adopted procedure confirms that the use of monetary estimates of ecological services to support sustainable decision processes can be acceptable if coupled with the multiple motivations that hold them.

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