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Environmental Quality
Sensitive to Financial
Funding Schemes? Evidence
from a Marine Restoration
Programme in the Black Sea**

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Summary

This paper uses a non-market valuation study to elicit consumers' preferences for a marine restoration programme in the Black Sea aiming to reduce the level of public health risk from bathing and improve water quality and the overall level of marine biodiversity. In this context, we administer a stated choice experiment in coastal settlements in Ukraine and Turkey and employ two tax revenue reallocation schemes as payment vehicles. One proposes the financing of the marine restoration programme by the reduction of the public budget for renewable energy and the second by the reduction of the public budget on training for civil servants. We examine the stated preferences and the subsequently derived economic value estimates in the two treatments with the aim to investigate whether the trade-off implied by the funding scheme has implications for the valuation outcome. Results reveal that preferences and marginal rates of substitution between the non-price attributes under consideration differ significantly. In the civil servants' budget reallocation scheme, the reallocation coefficient is positive, implying that ceteris paribus redistribution of public financial resources from this source is utility-enhancing. The magnitude of the results differs in the two considered countries mirroring their heterogeneity in political and cultural dimensions.

Keywords: Non-Market Valuation; Stated Choice Experiment, Payment Vehicle, Tax Revenues Reallocation, Marine Resources, Black Sea, Marine Biodiversity, Developing Countries

JEL Classification: Q22, Q28

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Are Preferences For Environmental Quality Sensitive to Financial Funding Schemes? Evidence from a Marine Restoration Programme in the Black Sea

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Abstract

This paper uses a non-market valuation study to elicit consumers' preferences for a marine restoration programme in the Black Sea aiming to reduce the level of public health risk from bathing and improve water quality and the overall level of marine biodiversity. In this context, we administer a stated choice experiment in coastal settlements in Ukraine and Turkey and employ two tax revenue reallocation schemes as payment vehicles. One proposes the financing of the marine restoration programme by the reduction of the public budget for renewable energy and the second by the reduction of the public budget on training for civil servants. We examine the stated preferences and the subsequently derived economic value estimates in the two treatments with the aim to investigate whether the trade-off implied by the funding scheme has implications for the valuation outcome. Results reveal that preferences and marginal rates of substitution between the non-price attributes under consideration differ significantly. In the civil servants' budget reallocation scheme, the reallocation coefficient is positive, implying that *ceteris paribus* redistribution of public financial resources from this source is utility-enhancing. The magnitude of the results differs in the two considered countries mirroring their heterogeneity in political and cultural dimensions.

Keywords:

Non-market valuation; stated choice experiment, payment vehicle, tax revenues reallocation, marine resources, Black Sea, marine biodiversity, developing countries

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1. Introduction

The importance of the payment vehicle selection in the stated preference literature has been acknowledged since the early contingent valuation studies and still presents a major challenge for stated preference practitioners (Cummings et al. 1986; Mitchell and Carson 1989; Bateman et al. 2002; Ivehammar 2009). Typically, specific taxes that aim to raise funds for the provision of a certain good have been employed as the payment vehicle in applications. However, payment biases that arise when respondents object to the payment mode proposed in a valuation scenario—in the form of either reacting strategically or protesting the valuation exercise itself—are often reported when mandatory schemes, such as taxes, are employed, cautioning for more attention on the selection of payment vehicles (Mitchell and Carson 1989; Morrison et al. 2000).

Responsively, alternative payment mechanisms have been applied including entrance fees, donations, increases in utility bills, and more recently tax reallocation schemes (Brown et al. 1996; Champ et al. 1997; Garrod and Willis 1999; Wiser 2007; Bergstrom et al. 2004; Kontoleon et al. 2005; Nunes and Travisi 2009). Especially in middle- and low-income settings of developing and transitional economies, high protest responses against new taxes are to be expected, given the limited ability of respondents to pay due to budget constraints but also feelings of unfairness when additional tax loads are charged to low income people (Bennett and Birol 2010).

In this paper a stated choice experiment is used to value a marine restoration programme in the Western Black Sea shelf. Research was designed to support the Governments of the countries bordering the Black Western Shelf of the Black Sea in

implementing the European Marine Strategy Framework Directive.¹ The experiment was conducted in coastal settlements of Turkey and Ukraine, two middle-income states that are, according to the World Bank, in a transition process of developing and updating their national policies towards sustainable marine resource management and environmental protection.² Given the middle-income context of our study, a tax revenues reallocation scheme is adopted as the payment vehicle to minimize strategic behavior and protest responses. Protest responses were a major concern at the designing stage since even recently in a contingent valuation study in Turkey conducted by Adaman et al. (2011) it is reported that one third of the sample refused to make any contribution in the form of additional taxes and for the large majority this was due to poor financial means.

Under a tax reallocation scheme, the good to be valued is financed through the reallocation of public money currently being spent on other public goods (Bergstrom et al. 2004; Kontoleon et al. 2005; Nunes and Travisi 2009). The economic value of the good in question is thus elicited by the survey as the amount that the respondent is willing to forgo in terms of the public provision of an alternative public good. This is analogous to the willingness to pay (WTP)—the amount of income the respondent is willing to forgo for an improvement in the provision of a good—elicited when payment instruments involving additional payments are employed. Given the

¹ Adopted in June 2008, the Directive aims to effectively protect marine resources by achieving good environmental status for European marine waters by 2020. In this direction, member states are highly recommended to cooperate with non EU-countries within marine regions. The Black Sea region presents such an example.

² The World Bank classification of countries according to gross national income (GNI) per capita is available at <http://data.worldbank.org/about/country-classifications/country-and-lending-groups>. Based on its GNI per capita, every country is classified as low-income, middle-income (subdivided into lower-middle and upper-middle), or high-income. Furthermore, according to the United Nations country grouping Turkey is a developing economy (sub-grouping: Asia and the Pacific) and Ukraine is an economy in transition from centrally planned to market economy (sub-grouping: Commonwealth of Independent States) (United Nations Statistics Division)

unpopularity of new taxes, a redistribution of existing tax revenues can be an appealing public policy instrument, and is often employed in real-world decision-making. Especially in light of the current financial crisis, the need to rationalize the allocation of public expenditures instead of imposing new taxes is often stressed. Finally, reallocation schemes are not subject to free-riding problems associated with voluntary payment schemes such as donations (Champ and Bishop 2001). The relative merits of a reallocation scheme as a payment instrument in valuation studies are even more pronounced in middle- and low-income countries, where valid welfare estimations may be confounded by budget constraints when payment vehicles that exert extra budget pressure on respondents are employed.

Although tax reallocation schemes yield several advantages over conventional payment instruments, their use is not widespread mainly because the rather limited literature has yet to adequately address validity issues. One major concern is the implication for the valuation exercise of the selection of the alternative public good selection, the budget of which will be cut to finance the good in question. So far the literature has refrained from naming the alternative good. The generic “all other public goods” has instead been applied (Bergstrom et al. 2004; Kontoleon et al. 2005). Nunes and Travisi (2009) were the first to test empirically the effect of specific tax-reallocation schemes on the overall valuation of the environmental good. The authors applied a stated choice experiment in a high-income setting, Italy, under two tax reallocation regimes: (a) a transport tax reallocation scheme, where consumers would have to trade off a part of the tax revenues that are currently spent on the public transport sector; and (b) an administration tax reallocation scheme, where consumers would have to trade off a part of the tax revenues that are currently spent on the

administration sector. The stated choice estimates are not found to be statistically different for the two proposed tax reallocation regimes, suggesting that, in their case study, the marginal value of public money does not depend upon the budget source. While their results suggest that preferences are not sensitive to the source of financing, the authors acknowledge that conclusions may be specific to the public goods considered in their study. Further investigation is thus in order.

In this paper, we argue that the insensitivity of stated preferences to the selection of the alternative public good in the reallocation task may fail when the experiment is conducted in developing and transitional economies. This may be due to a range of specific characteristics of these economies that can affect the valuation outcome (Teelucksingh and Nunes 2010; Mangham et al. 2009). One such characteristic is the lower, compared to the major developed countries, income setting. Even under a tax reallocation scheme that does not exert any additional tax pressure on respondents, budget constraints and inability to cover basic material needs are likely to influence respondents' priorities with respect to different public goods. Furthermore, less developed countries are highly dependent to natural resources and extremely vulnerable to environmental degradation (Georgiou et al. 1997; Barbier 2005; Narrain et al. 2008). This is also likely to influence the priority local communities attach to environmental goods relative to other public goods. Moreover, the prevalence of corruption and informal economies in developing and transitional countries can affect valuation results especially when government-funded public goods are traded-off in the reallocation exercise. The lack of democratic tradition and the predominantly state-ownership of natural resources in the former socialist countries may also have implications for the valuation exercise.

To formally test whether valuation estimates for marine restoration significantly differ under alternative financing options through the reallocation of existing government expenditures follow a split-sample approach. In particular, the stated choice experiment scenario for half the sample proposed that marine restoration would be funded by reducing expenses in renewable energy projects, whereas for the other half, the restoration would be financed by public money currently spent on civil servants' training. In identifying which alternative public goods to employ in the reallocation scheme, effort was spent to include policy relevant and meaningful goods. In particular, the countries under investigation are characterized by high corruption levels in the public sector and are at the same time called to draw up binding national programmes for renewable energy penetration. Consequently, there are currently hot public debates in both countries on these issues. In this light, exploring the trade-offs and perceived complementarities/substitutabilities between marine restoration, renewable energy and training of civil servants may be highly informative from a perspective. In particular, stated choice estimates under this study may inform the policy maker (1) on whether the marginal value of public money depends upon the budget source, and if yes, (2) on the rank of the alternative public budget sources according to their acceptance and, ultimately, on the role of budget sources in the financing of public goods.

Formal testing reveals that preferences for the restoration programme are affected by the budget source used to its financing. Although not manifested in the pre-survey focus groups, results also indicate that the training of civil servants exhibits public bad characteristics. That is, peoples' preferences are such that *ceteris paribus* redistribution is utility-enhancing. In the absence of a trade-off between tax revenues

reallocation and the attributes of the programme in question, the valuation task is incapable of eliciting the monetary value people attach to these attributes. However, marginal rates of substitution are estimated for the non-price programme attributes. Results suggest that for one of the non-price attributes the marginal rate of substitution is also affected by the financing source. Finally, differences in the order of the effects between countries have been also revealed.

The paper is organized as follows. The next section presents the case study background and the design procedure. Section 3 introduces the research hypothesis, whereas Section 4 accommodates the results of the estimation and the hypothesis testing. Speculations on the determinants of results are offered in Section 5. Section 6 concludes the paper.

2. The Western Black Sea Valuation Study

2.1. Stating the problem

The Black Sea is among the largest inland water basins in the world that sustains a unique ecosystem, providing a variety of goods and services with value to humans (BSC 2008; Remoundou et al. 2009). Its ecosystem has witnessed dramatic change in the past three decades due to pressures from human activities and natural processes (ESF 2007; Heileman et al. 2008; BSC 2009). The Black Sea is an almost entirely closed system, which has amplified the effects of climate change and anthropogenic forcing. Likewise, the benefits coastal populations derive from interaction with the marine environment have been reduced. Although there are signs of recovery mainly in response to the implementation of EU environmental policies, the state of the environment in the western shelf continues to be a matter of concern due to ongoing

degradation. The waters of the Black Sea are increasingly less transparent, and beach closures due to insufficiently-treated sewage discharge problems have become regular. Nitrogen and phosphorus loading mainly from agricultural practices also affect water quality. Although there is evidence that nutrient concentrations are decreasing in the Black Sea, elevated concentrations are observed along the West Coast due to excessive nutrient input from the Danube (EEA 2000; ESF 2007; BSC 2009).

Meanwhile, marine pollution from the transportation of oil and other hazardous substances constitute a threat to public health. There are currently 28 pollution hotspots in the Western Black Sea associated with high pollution levels, presenting a risk of contamination from waterborne diseases (BSC 2009). Several incidents of cholera, *E. coli* outbreaks, and hepatitis A and enterovirus infections have been reported in the countries bordering the Western Shelf (BSC 2008). Moreover, marine mammals such as dolphins and monk seals are critically endangered and small pelagic fish stocks have declined due to overfishing and destructive fishing practices. Finally, alien species, especially the jellyfish *Mnemiopsis leidyi* introduced through uncontrolled deballasting from ships, are still a major cause of native biodiversity loss (BSC 2008). The rate of alien species invasion reached a peak in the 1980s and 1990s, but steadily continues today (ESF 2007).

Governments in the bordering states are beginning to recognize the need to sustainably manage their marine resources, and various national and international research and monitoring programs are currently being carried out in the Black Sea.

Collaborative efforts under the auspices of international bodies such as the European Union have also been undertaken, which motivated the present case study.³

2.2. Data collection and experimental design

The stated choice experiment survey was administered to two random samples of residents in the western Turkish and Ukrainian Black Sea coasts and elicits public preferences towards different marine management alternatives to improve water quality as well as biodiversity and reduce the risk of contracting water-related diseases in the Western Black Sea Shelf. The survey was pretested through face-to-face interviews over a week in early August 2009 in Turkey and late September 2009 in Ukraine. Data collection took place from August to October 2009 through personal interviews by trained local personnel. The survey administration resulted in the collection of 472 usable questionnaires, 312 in Ukraine and 160 in Turkey. Sampling areas are depicted in Figure 1. While a sample of this size is not sufficient to claim representativeness with regards to neither the Ukrainian nor the Turkish population, or to generalize the results for the whole Western Black Sea Shelf, it is adequate for the methodological purpose of this study.

Feedback from focus groups with the general public and scientists at the National Academy of Sciences of Ukraine as well as scientific evidence from background reports (BSC 2009) and discussions with marine biologists studying the Black Sea

³ For initiatives at the regional and international levels, see the Black Sea Commission website (www.blacksea-commission.org) and the Black Sea NGO network website (www.bsnn.org). An extensive review is offered in the Black Sea Commission's report on the implementation of the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (BSC 2009).

marine environment guided the selection of attributes and their potential levels under different management options⁴.



Figure 1: Sampling areas (Ukraine: Sevastopol, Yalta, Odessa, Nikolaev, Eupatoria and Kherson. Turkey: Karaburun and Sile)

The employed attributes and their levels are presented in Table 1. Water quality was associated with water transparency as indicated by the color of the water and sight depth. Depending on the algae density, water quality can be high, medium or low. Biodiversity was defined as the number of different species and their abundance, again categorized as high, medium and low. Health risks were linked to the number of pollution hotspots associated with risk of contracting water-related diseases. Three levels were identified; high, corresponding to the current situation with 28 pollution

⁴ In particular, the survey was developed in collaboration with scientists working in the Sesame FP6 project, which is an integrated programme merging economic and natural sciences to assess and predict changes in the Mediterranean and Black Sea ecosystems due to climate change. Marine biologists also reviewed the final survey information to ensure accuracy.

hotspots identified in the Western Black Sea; medium, with a decrease in pollution hotspots to 14; and low, with no pollution hotspots being identified in the area.

Table 1: Attributes and their Levels

Attribute	Definition	Levels
Water quality	Water transparency as indicated by sight depth	Low Medium High
Biodiversity	Number of different species and their abundance	Low Medium High
Public Health Risk	Number of pollution hotspots associated with risk of contracting water-related diseases	Low Medium High
Tax Reallocation	Reduction of the 2010 budget for projects on Renewable Energy / Training for Civil Servants	0 (status quo): money will not be reallocated 20 Euro 50 Euro 80 Euro 100 Euro

All levels corresponded to the situation that would prevail in the Black Sea ecosystem in 2030. Visual aids were also used to ease comprehension. An example of a choice card is provided in Figure 2. Photos and accompanying wording were carefully tested in the pilot survey to ensure respondents understood them clearly.

An orthogonal fractional factorial design was used to generate 32 choice sets, which were blocked in four versions for each split sample. A cyclical design procedure (fold-over design) was followed to avoid strictly dominated alternatives (Carlsson and Martinsson 2003; Carlsson et al. 2010). Respondents thus looked at eight choice cards each, and were asked to state which profile they preferred among the two marine

resource management options and a status-quo alternative. A cheap talk script first introduced the notion of hypothetical bias, and asked respondents to truthfully state their preferences keeping in mind the disposable tax revenues for the alternative public good (Cummings and Taylor 1998). A number of debriefing questions to identify protest behavior were also incorporated. In total three protestors were identified in the Renewable Energy sample and 12 in the Training for Civil Servants sample, and excluded from the final sample. Serial non-participation significantly differs (p-value: 0.0198) in the two split samples with a higher proportion always selecting the status quo in the Training for Civil Servants sample (5%) compared to the Renewable Energy sample (1.28%).

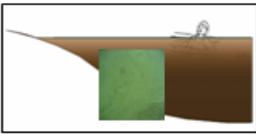
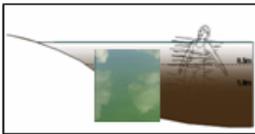
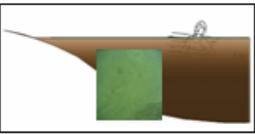
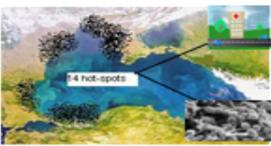
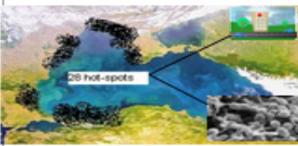
Assuming that the following three marine management strategies were the only choices you had, which one would you prefer?			
Management strategy Characteristics	Management strategy A	Management strategy B	No management strategy
Water quality	Low 	Medium 	Low 
Biodiversity	Medium 	High 	Low 
Health Risk	Medium 14 hot spots 	Low No hot spots 	High 28 hot spots 
Public Good Reallocation	20 euros to the Maxine Program through reduction of the 2010 budget on Renewable Energy Projects	50 euros to the Maxine Program through reduction of the 2010 budget on Renewable Energy Projects	No reallocation of existing taxation

Figure 2: Example of a Choice Card

A follow-up question asking respondents to rate their perceived level of difficulty to accomplish the choice task was included, given that people in the sampled regions were unfamiliar with surveys. Respondents who reported high levels of complexity were treated as outliers and were removed from the final sample. Complexity would likely encourage respondents to apply simplifying heuristics when making choices and consequently affect choice consistency or result in status quo bias (DeShazo and Fermo 2002; Dhar and Simpson 2003; Meyerhoff and Liebe 2009). In total, 15 respondents who found the task highly complex were excluded from subsequent analyses in the Renewable Energy and four in the Training for Civil Servants treatment. Excluding protestors and respondents who reported high-complexity for the choice task, 215 individuals remained in the Renewable Energy sample and 223 in the Training for Civil Servants sample.

The last part of the stated choice questionnaire ascertained respondents' socio-demographic information, such as gender, age, level of education and household income. Formal testing revealed the two splits were statistically equivalent in all socioeconomic characteristics. Thus, difference in preference across the two treatments, if established, can be ascribed to funding source. Table 2 reports the socioeconomic background of the respondents in the two samples.

3. Theoretical Framework, Treatments and Hypotheses

The present valuation exercise employs a reallocation of the existing public budget as the payment vehicle. Bergstrom et al (2004) were the first to introduce a reallocation scheme as an alternative to standard taxes in a contingent valuation study to value water quality. The authors developed the conceptual model and defined the notion of

compensating tax reallocation (CTR) as the change in the provision of the other public good in the reallocation scheme that holds the utility constant, given a change in the provision of the public good in question.

Table 2: Descriptive Statistics

Socioeconomics	Renewable Energy Survey	Training for Civil Servants Survey	P-value
Age	39.21 (14.67)	37.73 (15)	0.297
Gender ^(a)	0.41 (0.49)	0.60 (0.49)	0.5219
Household size	2.98 (1.36)	3.01 (1.47)	0.8244
Number of children	0.79 (0.96)	0.72 (0.62)	0.3672
Education ^(b)	0.65 (0.47)	0.57 (0.49)	0.0819
Employment ^(c)	0.57 (0.50)	0.55 (0.50)	0.6756
Household income (€/month)	502.16 (452.17)	471.83 (600.47)	0.5506
High realism of the scenario	0.62 (0.48)	0.68 (0.46)	0.1823
Confidence in government to undertake the marine restoration programme	0.26 (0.44)	0.26 (0.34)	1

Notes:

^(a) 0=male, 1=female;

^(b) 1=tertiary education and higher, 0=otherwise;

^(c) 1=in full time employment, 0=otherwise.

This is analogous to the compensating surplus under standard taxes. Formally, by using expenditure functions:

$$CTR = e(P, Q^0, Z^0, u^0) - e(P, Q^1, Z^1, u^0), \quad (1)$$

where e is the household expenditure required to attain the utility level u^0 , P is the price vector for the market goods, Q^0 and Z^0 are the initial levels of provision of the alternative public good and of the public good under valuation, respectively, Q^1 and Z^1 are the subsequent levels of provision after the reallocation, and u^0 is the utility associated with the initial level of provision of all public goods. Given that a tax reallocation scheme does not affect household's disposable income (e^*), and therefore $e^*(P, Q^0, Z^0, u^0) = e^*(P, Q^1, Z^1, u^0)$, and taking into account the non-discretionary nature of expenditure on public goods, that is $e(P, Q, Z, u) = e^*(P, Q, Z, u) + Z$ Bergstrom et al (2004) showed that:

$$CTR = e^*(P, Q^0, Z^0, u^0) + Z^0 - (e^*(P, Q^1, Z^1, u^0) + Z^1), \quad (2)$$

which reduces (2) to:

$$CTR = Z^0 - Z^1. \quad (3)$$

Equation 3 therefore implies that willingness to reallocate (WTR) is the expenditure respondents are willing to forgo of the other public good in order to finance the good in question.

Within this framework, the point of interest in this paper is to examine whether preferences are sensitive to the selection of the alternative public good in a tax reallocation scheme. To this end, two versions of the questionnaire were designed that differed only with respect to the public good whose budget would be reduced to finance the marine restoration programme; these were renewable energy projects and training projects for civil servants. Several alternative public goods were considered

and evaluated in focus groups with the general public.⁵ The final selection was based on the notion of proposing public goods that are of timely policy interest for the countries under investigation, and thus the implied public trade-offs between them can provide significant guidance for policy formulation. Since ample evidence of corruption is documented for both countries and there is a growing call for the enforcement of anti-corruption initiatives⁶, knowledge of the relative ranking of the good ‘training of public servants’ who are broadly perceived as corrupted may assist the design of efficient reallocation schemes in policy making. In the meanwhile, the countries bordering the Black Sea are of high renewable energy potential and there is evident need to strengthen the penetration of renewable energy projects in the area to achieve, *inter alia*, the European goals (a 20% share of renewable energy in the EU's total energy consumption by 2020) and the Kyoto Protocol targets. Finally, the Black Sea countries are called to undertake marine restoration activities through regional and European Union initiatives (Bucharest Convention for the Protection of the Black Sea, Water Framework Directive, Marine Strategy Framework Directive). Therefore, information on the relative value of these public goods and on the complementarities and substitutabilities between them can inform the public policy choice problem of allocating the restricted tax revenues among marine restoration and other social endeavours—a problem much aggravated in the case of developing and transitional economies.

⁵ Alternative candidates included expenses for public health, education and transportation. However, the implied trade-offs were not perceived as plausible and meaningful from respondents since these goods were deemed as of high priority and people were reluctant to negotiate them.

⁶ The European Commission's *2009 Report on Turkey*, for example, makes a negative statement on Turkey's anti-corruption policy (pp. 12-13): ‘Limited progress has been made in fighting corruption... [which] remains prevalent in many areas.’ Respectively, the International Commission of Independent Experts (2010), consisting of prominent international and Ukrainian academics, policymakers, and lawyers, states that (p.10) ‘Ukraine badly needs to launch a new wave of substantial and comprehensive reforms, which are widely perceived as necessary’.

Furthermore, from the valuation point of view, the stability of preferences when a substitute environmental good and a non-environmental good are offered as the alternative public good (Z) can be explored since our design explicitly specifies the opportunity cost of financing the marine restoration program. Therefore, this study also contributes to the ongoing debate on the sensitivity of preferences to the framing of the valuation task and in particular to the inclusion of substitute goods.⁷

In both treatments, the scenario clarified that the European Union would coordinate the programme and guarantee compliance by the governments of all border nations. Coordination by an international organization was deemed necessary, since the high levels of corruption in both countries involved in the study, could have otherwise rendered the scenario unrealistic. Indeed, only 26% of the respondents in each treatment reported high confidence in the national government to implement the marine restoration programme (Table 2). However, the scenario employed was perceived as highly realistic by the majority (62% in the Renewable Energy treatment and the 68% in the Training for Public Servants).

The script depicting budget reductions in the renewable energy projects read as follows:

*To cover the cost of the marine restoration program described above, funds will be raised from the government purse in each country. In this case **no new taxes** will be introduced. Money will be reallocated to the marine program through a reduction in the 2010 public budget on*

⁷ Evidence from the existing literature is inconclusive as to whether the value of the environmental good under consideration is sensitive to the existence of substitutes, which are either included as alternatives in the choice sets (Rolfe et al. 2002; Jacobsen and Thorsen 2010) or are reminded to respondents in the valuation scenario (Jacobsen et al. 2011).

renewable energy without any further taxation. Therefore, this money will no longer be available for financing renewable energy projects that would contribute to the increase of the share of renewable energy in the total energy mix in the countries of the Western Black Sea.

Respectively, the script explaining that part of the tax revenues currently being spent on training projects for public servants would be used to finance the marine program read as follows:

*To cover the cost of the marine restoration program described above, funds will be raised from the government purse in each country. In this case **no new taxes** will be introduced. Money will be reallocated to the marine program through a reduction in the 2010 public budget on civil servant's training expenses in each country without any further taxation. Therefore, this money will no longer be available for financing training projects aiming at improving civil servants' skills and productivity and at making them work more efficiently and able to support citizens better.*

To ensure that respondents did not overlook the budget source when stating a choice, the payment vehicle in each choice card clearly stated the reallocation involved along with the monetary figure (see Figure 2).

Two hypotheses are examined to investigate whether funding source affects the value of the good in question. The first hypothesis claimed that the utility parameters vectors do not differ between the two treatments. Formally:

$$H_{01} : \beta_{RE} = \beta_{PST}$$

$$H_{11} : \beta_{RE} \neq \beta_{PST},$$

where the subscripts *RE* and *PST* on the coefficient vectors refer to the Renewable Energy and Training for Public Servants treatments, respectively. This is a joint hypothesis that all preferences for all attributes are equal in the two samples.

Next, the hypothesis that implicit prices for each attribute i^8 , or WTR estimates are equal, was examined.

$$H_{02} : WTR_{REi} = WTR_{PSTi}$$

Even if the equality of the whole vector of utility parameters between the two samples cannot (can) be rejected, it might be that for some attributes, preferences do (not) vary between treatments, while for others they do (not). Besides, information on implicit prices may be more useful to policy-makers.

4. Econometric Results and Welfare Estimations

4.1. Model specification

A Random Parameters Logit (RPL) model is used to analyze the stated choice data to allow for preference heterogeneity in the population. RPL models do not exhibit the strong assumption of independent and identically distributed error terms and its underlying behavioral assumption of independence of irrelevant alternatives of the

⁸ Since all the three initial attributes are qualitative and take three discrete levels each, they were dummy-coded for the analysis generating six attributes.

standard multinomial logit model. Moreover, this specification allows the derivation of individual-specific parameter estimates given the observed individual choices.

Under a random parameters logit specification, the utility a respondent i derives from an alternative j in each choice situation t is given by:

$$U_{ijt} = \beta_i X_{jt} + e_{ijt},$$

where X is a vector of observed attributes associated with each alternative. and e_{ijt} is the random component of the utility that is assumed to be independently and identically distributed (iid) and follow a Type 1 extreme value distribution. The probability that an individual i will choose alternative j in choice situation t is:

$$\Pr_{ijt} = \int \left(\frac{\exp \beta_i X_{jt}}{\sum_k \exp \beta_i X_{kt}} \right) f(\beta) d\beta,$$

which is the integral of standard logit function over the distribution of random parameters, $f(\beta)$. Since this integral has no closed form, parameters are estimated through simulation and maximizing the simulated log-likelihood function. Parameter estimates in all models are generated using 100 Halton draws, and all attribute parameters, except tax reallocation, are assumed to be normally distributed in the population. The assumption of normally-distributed random parameters allows different respondents to have positive or negative, in the presence of negative externalities, preferences towards the attributes of the good in question and is commonly adopted in the literature (Kataria 2009; Olsen et al 2011, Lew and Wallmo

2011). Since the reallocation coefficient enters the denominator of the WTR, constant marginal utility is commonly assumed for this attribute to assure finite moments for the WTR distribution (Olsen et al 2011, Lew and Wallmo 2011)⁹.

4.2. Econometric estimation results

In the analysis that follows, data for each treatment are pooled from the two countries. Although countries are different in terms of the macroeconomic, cultural and political variables, formal testing revealed that the pooled samples did not have statistically different socioeconomic characteristics. Differences in valuation may thus be attributed only to funding source effect. However, to uncover the effects of the heterogeneity between the two considered countries on valuation in each treatment, a dummy variable indicating respondent's country of origin (with 1 corresponding to Ukraine) is also included in the models and is interacted with the tax reallocation coefficient.

4.2.1. Utility coefficients estimation

Table 3 accommodates the results of the random parameters estimation. In the renewable energy sample, all attributes have a significant effect on the choice of a marine restoration alternative, and the expected signs with positive coefficients for water quality, biodiversity and reduced health risk. The magnitude of the coefficients suggests that reducing health risk from high to low was considered the most important attribute of the marine management alternative.

⁹ Results are similar when a triangular distribution is assigned to the tax reallocation coefficient. Another procedure to ensure WTP with finite moments would be to re-parameterise the utility model in the WTP space, as suggested by Scarpa et al (2008). However this is beyond the scope of the current paper.

Table 3: RPL Estimation Results

Attribute	Renewable Energy	Training for Civil Servants	Pooled Sample
	Parameter (St Error)		
Water Quality Medium	1.448*** (0.125)	0.866*** (0.099)	1.063*** (0.074)
Water Quality High	1.484*** (0.13)	1.207*** (0.113)	1.315*** (0.098)
Biodiversity Medium	1.269*** (0.12)	0.752*** (0.095)	0.919*** (0.076)
Biodiversity High	1.273*** (0.133)	0.176 (0.114)	0.643*** (0.087)
Health Risk Medium	1.104*** (0.131)	1.072*** (0.108)	1.090*** (0.086)
Health Risk Low	1.857*** (0.175)	1.208*** (0.13)	1.43*** (0.106)
Tax Reallocation	-0.008*** (0.0023)	0.007*** (0.002)	-0.001 (0.002)
Tax Reallocation*	-0.006** (0.0026)	-0.005** (0.002)	-0.004** (0.002)
Country dummy			
Alternative Specific Constant	-0.11 (0.19)	-0.285 (0.18)	-0.212* (0.127)
Parameters standard deviation			
Water Quality Medium	0.783*** (0.139)	0.655*** (0.148)	0.591*** (0.102)
Water Quality High	0.566** (0.232)	0.57241*** (0.220)	0.601** (0.266)
Biodiversity Medium	0.505*** (0.178)	0.555*** (0.149)	0.639*** (0.099)
Biodiversity High	0.285 (0.262)	0.897*** (0.165)	0.735*** (0.152)
Health Risk Medium	1.07*** (0.155)	0.029 (0.237)	0.572*** (0.144)
Health Risk Low	1.596*** (0.174)	0.864*** (0.164)	1.161*** (0.123)
Log likelihood	-1131.572	-1264.573	-2466.256

*** Indicates significance at 1%, ** Indicates significance at 5%, * Indicates significance at 10%.

The tax reallocation coefficient is negative and statistically significant, indicating that respondents are not willing to reallocate money from the renewable energy budget to finance the marine programme *ceteris paribus*. The result is even more pronounced in the Ukraine sample, as implied by the negative coefficient of the interaction term. In

the training for public servants sample, all attributes are significant determinants of individual choice, with the exception of high biodiversity level. The coefficients are also positively signed, with high water quality influencing individual choice the most. The tax reallocation coefficient is positive and statistically significant, indicating that respondents are indeed willing, *ceteris paribus*, to reallocate money from the budget previously spent on training public servants to finance the marine programme. This implies that training for public servants exhibits features of a public bad and thus a reallocation of the tax revenues contributes positively to respondents' utility. The negative coefficient of the interaction term implies that this public bad nature is even more evident among the Turkish respondents.

4.2.2. WTR estimation and marginal rates of substitution

The marginal WTR for changes in each attribute is calculated in the renewable energy sample as the ratio of the coefficient on each attribute to the coefficient on the monetary attribute (assuming linearity in utility parameters):

$$WTR = -\frac{\beta_{attribute}}{\beta_{cost}}$$

Standard errors and the corresponding 95% confidence intervals are estimated using the bootstrap method proposed by Krinsky and Robb (1986). WTR estimates are presented in Table 4. Results suggest that WTR estimates are statistically significant for all the improvements over the status quo. In the training for public servants treatment, WTR cannot be estimated since, by definition, WTR presupposes a trade-off between the good in question and income (in this case, the provision of the alternative public good). However, marginal rates of substitution are estimated for the non-price attributes in both samples to enable an examination of whether the relative

ranking of individual attributes is affected by the choice of the alternative public good in the reallocation task.

Table 4: States Choice Estimates (for the Renewable energy survey)

Attribute	WTP estimate (Euro)
High water quality	189.35 [106.16 370.39]
Medium water quality	185.75 [109.01 376.71]
High biodiversity	163.05 [92.53 324.97]
Medium biodiversity	162.07 [90.3 335.82]
Medium health risk	141.07 [79.41 285.04]
Low health risk	237.55 [136.87 473.08]

95% Confidence intervals calculated using the Krinsky-Robb method in brackets

The medium water quality attribute is used as the *numéraire*: $MRS = \frac{\beta_{attribute}}{\beta_{medium\ water\ quality}}$

To assure finite moments for the implied distribution of the MRS, its calculation is based on models assuming constant marginal utility of the medium water quality attribute that enters the denominator¹⁰. Standard errors are estimated using the Krinsky-Robb method with 8,000 replications – see Table 5. In the renewable energy treatment, respondents consider low health risks as the most important attribute followed by high water quality. There is a reversal in the ranking of these two

¹⁰ Results are robust to any specification of the underlying distribution assigned to the attributes including the numeraire.

attributes in the public reform treatment with respondents considering high water quality as the most important.

Table 5: Marginal Rate of Substitution

Attribute	Renewable Energy		Training for Civil Servants		P-value Poe et al. test
	MRS	Rank	MRS	Rank	
Medium water quality	1.0000***	3	1.0000***	4	
High water quality	1.0245***	2	1.4012***	2	0.02
Medium biodiversity	0.8817***	5	0.8788***	5	0.479
High biodiversity	0.8822***	4	0.2052	6	0.000078
Medium health risk	0.7640***	6	1.2493***	3	0.00556
Low health risk	1.2891***	1	1.4097***	1	0.32

5. Effect of Funding Source on Valuation

5.1. Utility coefficients

Since utility coefficients are confounded with the scale parameter in Random Parameter Logit models, testing for equivalence of preferences across the two samples requires that scale parameter differences be isolated. Following the two-step procedure proposed by Swait and Louviere (1993), a likelihood ratio test is performed first to test for equality of the utility parameters between the two samples while allowing for the scale to differ; and if the equivalence of parameters cannot be rejected, a second likelihood ratio test assesses the equality of scale factors. Our results show that the hypothesis of equal marginal utilities between the two samples can be rejected at 5% level of confidence with a test value of 140, implying that preferences differ significantly under different tax reallocation regimes (Table 6).

Table 6: Swait-Louviere Likelihood Test

Hypothesis	Test-Value	Critical Value for χ^2 statistic at 5%
$\beta_{renewableenergy} = \beta_{public\ servants\ training}$		
LR statistic		
$LR = -2\{LL_{pooled} - (LL_{renewableenergy} + LL_{public\ reform})\}$	140	16.93
$\beta_{renewableenergy} = \beta_{public\ servants\ training}$		
LR statistic		
$LR = -2\{LL_{pooled} - (LL_{renewableenergy} + LL_{public\ reform})\}$	97.72	14.06

Note: a two tailed test was performed

To examine whether this result is driven by the difference in the tax reallocation coefficients, we repeat the procedure allowing the tax reallocation parameter to differ among the two survey versions. The equality of the vectors of non-monetary coefficients is thus examined. Table 6 reports the relative LR statistics. The results suggest that the equality of the non-price attributes can be also rejected.

5.2. Relative ranking of the attributes

Since WTR estimations cannot be derived in the training for public servants sample, the marginal rate of substitution for each of the attributes is estimated using the medium water quality attribute as the *numéraire*. To formally examine whether or not the marginal rates of substitution are statistically different in the two treatments, the complete combinatorial test proposed by Poe et al. (2005) is applied. This test calculates every possible difference between the two empirical distributions generated

by the Krinsky-Robb procedure and calculates the proportion of negative values in the distribution of differences to approximate a one-sided p-value for the null of equality in the MRS across the two treatments. Results suggest that the null of equal MRS can be rejected for the high biodiversity attribute. Table 5 reports the relevant p-values. Our findings therefore illustrate that the MRS estimates between the attributes of a given public good, that is, the rate they are willing to substitute on for the other, may be affected by the funding mechanism applied for their provision.

6. Discussion

When using a tax reallocation scheme to infer the value of a public good, researchers make the implicit key assumption that both goods are of value to respondents who can substitute one for the other to choose utility-maximizing alternatives. Empirically, this is mirrored in a negative coefficient for the reallocation attribute, revealing that financing the good under evaluation entails indeed an opportunity cost. Contrary to the theoretical predictions, in this case study reallocating money currently spent on renewable energy projects to finance the proposed marine programme involves a real trade-off to respondents who, *ceteris paribus*, prefer lower levels of reallocation. This is consistent with the answers in a relevant attitudinal question asking respondents to state their degree of agreement (in a 5 point Likert scale) with the statement “[r]enewable energy projects should be further enhanced in the Western Black Sea region”. The 95% of the Ukrainian and the 65% of the Turkish subsample supported the argument which shows a realization on behalf of respondents of the need to further exploit the considerable capacity for renewable energy production that both countries possess.

On the other hand, monies reallocated from training for civil servants contribute positively to respondents' utility (*ceteris paribus*), implying that there is a welfare improvement when money from this budget is redirected to finance the marine restoration programme. Closer examination of the public sector in the two countries offers insights as to what drives the positive coefficient in the reallocation attribute when civil servants' training is employed as the alternative public good. Both countries are characterized by inefficiently large public sectors, while widespread corruption among civil servants constitutes a significant barrier to any effort towards administrative reform and hinders the state's ability to respond adequately to citizens' needs. According to the *2010 Corruption Perceptions Index* prepared by Transparency International (2010a), an acknowledged authority on this issue, Turkey ranks 56st with a score of 4.4 (on an index from 0 to 10, 10 corresponding to no corruption at all and 0 to full corruption) and Ukraine 134th with a score of 2.4. With respect to the public sector, Transparency International's (2010b) *2009 Global Corruption Barometer* study reports a perceived corruption rate for public officers/civil servants of 3.6 in Turkey and 4.5 in Ukraine on a scale of 1 to 5 (where 1 corresponds to not at all corrupt and 5 to extremely corrupt). Meanwhile, in both countries respondents of the 2009 Transparency International's *Global Corruption Barometer* named public officials and civil servants as those most affected by corruption compared to other sectors/organizations. This is reminiscent of the *2004 European Social Survey* findings where "trust in public officials to honestly deal with respondents" is very low especially in Ukraine, where only 20.6% of the respondents declared being confident or highly confident in their government (ESS 2004). The relative figure in Turkey is 52%. This is a clear illustration of the low quality level that people attach to the public good denoted "civil services".

Corruption, along with a long tradition of malfunctioning in the public sector, is likely to nurture the belief that “...any effort for further training will end up as a waste of resources,” as stated by a resident in Ukraine during the focus groups. Although one might expect that existing low quality public services would encourage people to opt for substantial reforms through the training of civil servants, it appears that low confidence in the government’s capacity to tackle corruption and efficiently implement reforms challenges the rationale of distributing money from the restricted public budget on training for civil servants. Consequently, reallocating the public budget previously spent on training for public servants—considered to be inherently corrupt—is a Pareto improvement, as indicated by the positive coefficient on the tax reallocation attribute in the training for civil servants treatment.

Although similar in direction, results appear to differ in magnitude for the two countries considered. Turkish people seem to perceive the reallocation of public money from the training budget for civil servants to the marine program as a Pareto improvement relatively more than their Ukrainian counterparts. This experiment is not conducive to making accurate recommendations as to what drives the differences in the magnitude of the sign between the two countries; nor is this intended. It is, however, contemplated that the obtained results are driven by cultural and political variables that shape people’s perceptions, but most importantly, by democratic longevity. However fragile, democracy in Turkey dates back to 1950 and compared to Ukraine, which has been under the strict political bureau regime till recently, Turkey is able to question the balance between public and private, as well as the magnitude of resources allocated to the public sphere, more freely.

On the other hand, Ukrainian people seem to find it more difficult to trade-off money currently spent on renewable energy projects to finance the proposed marine

programme. We speculate that the difference in the magnitude of the coefficient is due to the fact that the share of renewable energy is higher in Turkey where renewables account for the 17.4% of the total electricity generation compared to Ukraine where only the 6% of the total energy mix is produced from renewable energy sources (International Energy Agency 2008). Turkey has explored its renewable energy potential relatively more, especially in the hydropower field, which alone accounts for the 16.8% of the total electricity produced (Renewable Development Initiative 2006a). On the other hand, Ukraine is yet to explore its considerable capacity for renewable energy production, primarily hydropower and wind generation, due to impediments relating to prevailing high-risk economic conditions and financial constraints (Renewable Development Initiative 2006b). Consequently the country still relies on traditional energy sources and nuclear energy (46.7%) for electricity (International Energy Agency 2008). This may explain why Ukrainian people support renewable energy production more than their Turkish counterparts and in turn trade-off renewable energy projects for marine restoration with greater difficulty.

We now turn to the implications of our findings for the valuation literature and the potential future research applying tax reallocation schemes. Our survey results show that preferences are sensitive to the opportunity cost implied by the funding mechanism. In particular when a public good exhibiting characteristics of a bad is involved in the reallocation scheme, reallocation is utility enhancing and no trade-off is implied by the valuation task. Subsequently, respondents WTP, upon which policy is commonly based, cannot be defined. Findings therefore suggest that researchers should be cautious when selecting the alternative public goods to be included in a

reallocation scheme since this may have implications for the valuation exercise. Furthermore, the MRS for the high biodiversity attribute also statistically differs between the two survey versions suggesting that the relative ranking of the non-price attributes may also be affected by the funding source.

Several interpretations of the results can be adopted. In a broader perspective, our findings corroborate earlier evidence suggesting that the contextual and framing characteristics of the value articulating process influence preferences (for a recent review, see Luisetti et al. 2011). The interpretation of this deviation from the conventional viewpoint of already established and stable preferences has triggered ongoing debates. Many scholars argue that this is due to the endogenous construction of preferences during the elicitation process (Shapansky et al. 2008; Lichtenstein and Slovic 2006; Payne et al. 1999). According to the constructive viewpoint, values for the good under consideration are formed at the time of the valuation and are thus sensitive to task and context contingencies. Others attribute preference anomalies, such as context dependence and sensitivity to framing, to the difficulty of the cognitive task respondents are called to undertake and the application of simplistic heuristics to provide the required response (Tversky and Kahneman 1981; Horowitz and McConnel 2002).

Furthermore, in our design one sub-sample was exposed to a project funded by a substitute environmental good (renewable energy projects), whereas the other sub-sample to a project funded by a dissimilar good (civil servants training budget). Therefore, a second possible explanation would be that our results may well mirror the existing evidence of preferences sensitivity to framing, in general, and to the

presence of substitute goods in the valuation task, in particular (Rolfe et al. 2002; Jacobsen and Thorsen 2010; Jacobsen et al. 2011).

A final explanation is the one provided by Carlsson et al. (2009). Authors attribute their finding of significant differences in preferences with and without a price attribute to the fact that people pay greater attention at the attributes of the good being valued in the absence of a price constraint. We argue that this may be the case in this study as well, since funding a public good out of a public bad does not imply an opportunity cost to respondents.

Our results then pose the question as of how to select the alternative public good in order to ensure reliable valuation results when a tax reallocation scheme is employed. Clearly, more research is warranted to form complete guidelines. Research should firstly assess the robustness of our results when other public goods and different cultural settings are considered. As a general principle, public goods that are policy relevant and meaningful to respondents should be chosen.

7. Conclusions

A novel payment vehicle in stated choice experiments is used in this paper. We refer to a tax reallocation scheme and contend that funding public goods out of existing revenues can be a promising valuation tool, particularly in low-income countries. The main advantage of this novel financing instrument relates to its capacity to overcome the problem of high protest responses, resulting from respondents' inability to pay and perceptions of inequality, often reported in non-market valuation exercises that use 'new taxes'. Further, from a policy viewpoint, reallocation schemes inform policy-

makers on the relative value of different public goods and subsequently facilitate priority-setting when deciding which different public projects should be funded.

However, reallocation schemes have only been recently introduced in the non-market valuation literature and the respective validity of the value estimates is to be tested. A particular concern relates to whether consumers' preferences for the good under evaluation depend (and if yes, how) upon the budget source. In this line of thinking, we present an economic valuation exercise that studies the sensitivity of the welfare estimates to alternative public funding sources. The study uses data from a stated choice experiment implemented in Turkey, a developing country, and Ukraine, an economy in transition, to value marine restoration. Two treatments are considered; in the first the restoration programme is to be financed by reducing current public expenditures for renewable energy projects, whereas in the second, by reducing current public expenditures for training of civil servants.

Results suggest that the opportunity cost involved had significant implications for the valuation task. In the treatment suggesting a reallocation from a substitute environmental good, a trade-off between goods was present as indicated by the negative coefficient on the reallocation attribute. This is equivalent to the negative coefficient on additional taxes in conventional practice. However, when the budget to be reallocated pertains to that for the training of civil servants, people choose, *ceteris paribus*, alternatives involving higher reallocation of the tax revenues. The reallocation is thus welfare-enhancing, implying that training for civil servants exhibits public bad features. Under such a design, the elicitation of welfare estimates in the treatment involving the public bad is not feasible since for WTP to be estimated

it is implicitly assumed that people may apply compensatory decision-making mechanisms. The MRS for non-price attributes can, nevertheless, be estimated. Formal testing reveals that the MRS for one of the considered attributes differs in the two survey treatments implying that the ranking of the attributes of the good under evaluation may be sensitive to the financing context that frames their provision.

The above conclusions are in contrast with the earlier findings of Nunes and Trivisi (2009), who could not reject the null of equal preferences between the two reallocation schemes considered, highlighting that generalization of the results drawn from experiments conducted in western developed economies cannot be proclaimed. The different social, cultural, economic and political characteristics of developing countries and countries with economies in transition are likely to have implications for the valuation outcome even when methodological issues are examined. However, since this is the first study applying a tax reallocation scheme in lower income countries more research is in order. Developing countries and economies in transition are a very heterogeneous group and thus our results may well differ in different settings.

Finally, from a policy perspective results revealed that preferences in the case study areas are such that a welfare gain is associated with a decrease in the current budget for civil servants' training. Governments in Ukraine and Turkey can therefore attain a Pareto improvement by simply redistributing existing revenues without bringing any added tax pressure to citizens. Moreover, estimation results show that respondents are willing to pay, in terms of forgone available public budget for renewable energy projects, for the introduction of a marine protection programme to reduce the level of

public health risk and improve the overall level of marine biodiversity, here measured in terms of the abundance of different marine species. It can thus be argued that there is high potential for sustainable marine resources management in the Western Black Sea under cooperation of the governments of the bordering states with international organizations such as the European Union.

8. References

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