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Crowdfunding vs. Taxes: Does the payment vehicle influence WTP for Ecosystem Services

MARIA A. CUNHA-E-SÁ, TIL DIETRICH, ANA FARIA, LUIS C. NUNES, MARGARIDA ORTIGÃO, RENATO ROSA, CARINA VIEIRA-DA-SILVA

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Crowdfunding vs. Taxes: Does the payment vehicle influence WTP for Ecosystem Services protection?

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Cunha-e-Sá, Maria A. [a]; Dietrich, Til. [a]; Faria, Ana [a]; Nunes, Luis C. [a]; Ortigão, Margarida [a]; Rosa, Renato [c,a]; Vieira-da-Silva, Carina [a,b,d]

[a] Nova School of Business and Economics, Campus de Carcavelos, Rua da Holanda, 1, 2775-405 Carcavelos, Portugal

[b] MARE - Marine and Environmental Sciences Centre, Faculdade de Ciências, Universidade de Lisboa, Av. Nossa Srª do Cabo 939, 2750-374 Cascais, Portugal

[c] CeBER - Center for Business and Economics Research, Faculdade de Economia Universidade de Coimbra, Av. Dias da Silva, 165, 3004-512 Coimbra, Portugal

[d] CIDP – Centro de Investigação de Direito Público, Instituto de Ciências Jurídico-Políticas, Faculdade de Direito da Universidade de Lisboa, Alameda da Universidade 1649-014, Lisboa, Portugal

Abstract

The effect of the payment vehicle (PV) on economic valuation estimates has been addressed since the early literature on stated preferences studies. Particularly, some studies have focused on willingness to pay (WTP) sensitivity to mandatory/collective vs. voluntary/individual PVs, by comparing tax increases or redistribution based on specific taxes with donation-like contributions. These two payment schemes may induce different types of strategic behavior and eventually free riding by the economic agents involved. We conducted a choice experiment through a face-to-face survey held in 2020 for a representative sample of the Portuguese population. We investigate the national population's WTP to invest in oil spills' prevention along the coastline of mainland Portugal to ensure the provision of four marine and coastal ecosystem services (MCES): (1) biodiversity conservation, (2) beach use, (3) coastal protection and (4) surf. We used a split-sample design to test for differences between the two PVs considered, a mandatory income tax and a voluntary contribution collected through a crowdfunding campaign. We estimate a mixed logit model (MXL) in WTP-space. Furthermore, we control for several sociodemographic characteristics to capture the influence of respondents' heterogeneity on the elicited WTP, and to check the robustness of our results. We find that mean WTP estimates are positive and significant for all ES except for surf. Biodiversity conservation has the highest WTP estimate. The results obtained suggest that the lack of trust in institutions, fairness concerns and disbelief in policy consequentiality seem to be intrinsic to the Portuguese population, influencing WTP regardless of the PV. However, when comparing an extra income tax with a crowdfunding campaign, respondents have a lower preference for the status quo in this latter case. Therefore, our results highlight the importance of better understanding the role that the payment vehicle may play in funding ecosystem services' conservation. This is important since how populations respond to incentives for sustainability purposes is crucial to ensure that the targets are met in a more efficient (or cost-effective) and equitable way.

Keywords

Discrete choice experiment, Oil spills, marine and costal ecosystem services (MCES), Payment vehicle

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1. Introduction

The importance of the links between a healthy ecosystem and human well-being has become more evident in recent decades (TEEB, 2010). Today, approximately 40% of the world's population live within 100 kilometers of the coast, and 10% live in coastal areas less than 10 meters above sea level. Coastal populations and many of their economic activities significantly depend on Marine and Coastal Ecosystem Services (MCES) and the goods and services delivered (TEEB, 2012), thus contributing to increased pressure on those ecosystems. Typically, the most important direct threats to MCES are overfishing, pollution, habitat loss and degradation, and impacts on coastal dynamics (sea-level rise and erosion). However, environmental hazards are also likely to result from emerging activities such as offshore aquaculture, deep-sea mining or offshore energy production. Moreover, coastal ecosystems have been identified to be particularly exposed to climate change's negative impacts. It is, therefore, in this context that the UN Decade of Ocean Science for Sustainable Development 2021 – 2030 set a call for urgent action to conserve and sustainably use the oceans, seas and marine resources for sustainable development. In particular, the advancement of Sustainable Development Goal (SDG) 14 is focused on reducing marine pollution, protecting MCE, increasing investment in scientific knowledge, and respecting international law, among others.

In the case of MCES, vulnerability is aggravated in the presence of market and government failures. The absence of markets for many of the goods and services provided incorrectly suggests that the opportunity cost of degrading MCES is zero, implying that current decision-making processes often ignore or underestimate the value of natural ecosystem benefits. However, for preservation purposes, assessing their economic value, for example, by estimating the population’s willingness-to-pay (WTP) to prevent damages to or improve MCES, is key to inform policymakers about the social benefit of sustainable initiatives. As these also involve costs, this information is essential to assess the net benefits that MCES provide for populations’ well-being, and, therefore, to what extent local populations are willing to support environmental goods’ conservation.

Stated preference survey techniques, such as the Contingent Valuation approach, and Discrete Choice Experiments (DCEs), among others, are widely used to elicit the economic value of public goods. Since the resulting damages from eventual hazards involve the loss of both use

and non-use values, stated preferences methodologies are most appropriate as they can capture both types of values. Choice modeling using DCEs has been widely used in several fields, such as transportation, marketing, retailing, health, and environmental economics, to explain and predict preference and choice behavior (Hensher, Rose, & Greene, 2015; Louviere, Hensher, & Swait, 2000). In this context, a particularly relevant issue concerns the effect of the Payment Vehicle (PV) on the economic valuation of environmental goods (e.g., Bergstrom et al., 2004; Campos et al., 2007; Morrison et al., 2000; Rowe et al., 1980), namely on the role of mandatory vs voluntary payment settings. While each of these two payment mechanisms has different implications on potential strategic behavior and the presence of free riding, most of the literature shows evidence of lower WTP estimates in voluntary payment contexts (e.g., Bateman et al., 1995; Ivehammar, 2009; Stithou and Scarpa, 2012; Wiser, 2007; Ivehammar, 2009; Green et al., 1994; Jakobsson & Dragun, 2001). Research on WTP sensitivity concerning mandatory versus voluntary payment mechanisms is, however, relatively scarce and restricted to a comparison between taxes or fees and a simple donation.[1]

In this paper, we develop a study that elicits the individual WTP for a representative sample of the Portuguese population regarding the implementation of preventive measures for eventual hazardous spills along the southwestern coast of Portugal (south of Lisbon) and what determines their WTP to invest in prevention. We add to the existing literature by comparing individual WTP estimates using a tax increase with those elicited in the context of a crowdfunding campaign, a voluntary collective funding mechanism in which individuals choose whether to contribute and are free to choose any amount. An individual's WTP is measured as a one-time payment for a 5-year program, which would be administered by the Portuguese Authority responsible for combating those accidents: Directorate-General of Maritime Authority (DGAM). To ensure that respondents perceive their choices as consequential, participants are presented with a commitment letter written by DGAM. We conducted a DCE and applied the Total Economic Value framework to identify use (surf or beach) and non-use values (biodiversity, coastal protection). As mentioned above, two payment vehicles (PV) were considered: an increase in the mandatory income tax,[2] and a crowdfunding

[1] The literature on public goods provision experiments also discusses the warm-glow effect associated to voluntary donations (Andreoni, J.; 1990). It is shown that it can positively influence the willingness to contribute through a crowdfunding mechanism, when comparing to a mandatory income tax. Blanco et al. (2012), based on a sample of tourists in Majorca, observed that participants who voted for a low mandatory tax would on average also contribute with an additional voluntary donation. Therefore, the authors concluded that the crowding-out effect of a mandatory tax on voluntary donations to an environmental protection program exists but is partial, and that the amount of voluntary donations collected may add to the contributions collected through an imposed tax.

[2] Since in Portugal around 50% of the population does not pay income tax because it is below the threshold, we considered (and informed the respondents) that in this case this would be universal.

with a provision point mechanism and a money-back guarantee. We use a split sample to measure the effect of the PV on individual WTP for a representative sample of the Portuguese population.

As a voluntary instrument, crowdfunding may present the same limitations as other voluntary PVs, namely, the incentive to free-riding in actual contributions and to overstate the true WTP in hypothetical surveys (Carson and Groves, 2007; Stithou and Scarpa, 2012; Veisten & Navrud, 2006; Mitchell and Carson, 1989). Crowdfunding characteristics', however, make it a particularly interesting voluntary payment case study even for public institutions, as we show in this paper. Typically, the contributions in crowdfunding campaigns are targeted, delivered within a specific time frame, and have a provision point mechanism, meaning that if the target amount is reached at some point before the deadline, the project is implemented. If not, there is a money-back guarantee, and all contributors are refunded, hence removing the risk of losing their contributions. (Rondeau et al., 1999; Spencer et al., 2009). Besides, and in what concerns social welfare, a crowdfunding campaign conducted by the public sector is clearly an improvement relative to the use of taxes both from an efficiency and equity perspective. These are key differences with respect to previously studied voluntary payment settings, which can fundamentally change respondents' incentives when scenario credibility is high, as in this case. In fact, our results suggest a significant influence of the PV on the elicited WTP. Interestingly, and in contrast to earlier findings, respondents presented with the crowdfunding version were less likely to choose the status quo (SQ) than those in the mandatory tax version.

Crowdfunding campaigns constitute an interesting alternative to fund ecosystem services conservation, as they are generally held online using specialized platforms, which are cheaper, while promoting transparency and efficiency in the allocation of funds. In crowdfunding campaigns, fundraisers can seek funding for a wide variety of projects or initiatives by specifying a deadline for funding and a target amount that needs to be raised for the project to be implemented. Crowdfunding campaigns are still a recent financing tool offering a novel PV that can be used in stated preference surveys. However, its potential and properties as a PV have yet to be fully explored. In fact, only a few valuation studies use crowdfunding as a PV (Johnson, 2017; Kragt et al., 2021; Leiva, 2017; Roesch-McNally and Rabotyagov, 2016; Stoknes et al., 2021). Thus, our contribution to the existing literature is twofold. First, our split-sample design allows us to directly compare the elicited values obtained in the crowdfunding-type treatment to those obtained under the well-grounded, theoretically incentive-compatible tax mechanism. This is a novel aspect of this study and adds to the literature on PV bias by

contributing to the discussion about the role that crowdfunding elicitation mechanisms may play in environmental valuation studies. Second, this is the sole study of this kind in Portugal, and the estimated WTPs obtained will be useful to better inform decision-makers for public policy purposes. We find that mean WTP estimates are positive and significant for all ES except surf. Biodiversity conservation has the highest WTP estimate. The results obtained also suggest that the negative perceptions towards institutions (*lack of trust in institutions, fairness concerns* and *disbelief in policy consequentiality*) seem to be intrinsic to the Portuguese population, affecting WTP regardless of the PV. Yet, those respondents that were faced with a tax were less likely to pay for prevention than those that were confronted with a crowdfunding campaign. Therefore, our results also suggest that crowdfunding can be an interesting alternative vehicle to be used by regulators to raise funds to preserve natural ecosystems. Accordingly, it may to some extent overcome public institutions' reputational risks as it seems to be the case in Portugal. This result is relevant for public policy purposes, namely in what concerns fund raising for preservation of environmental goods and services

The remainder of the paper is organized as follows. Section 2 presents the case study, the survey design, and the descriptive statistics on the variables included in the final analysis. Section 3 describes the econometric model. Section 4 discusses the results obtained, and finally, section 5 offers conclusions. Ancillary tables are included in the Appendix.

2. Case study and data collection

In this section, the case study is presented, and the study site is briefly introduced, after which the data collection process is described.

2.1 Sea transport and oil spills case study

The Portuguese coast is characterized by a diversity of natural environments. Due to its geographical location, characterized by a long (North) Atlantic shoreline at the intersection of some of the world's main maritime routes (North/South and East/West), those natural environments are subject to rising pressure due to the growth in tourism demand and the heavy maritime traffic in commercial ports and maritime corridors along the coast. This traffic has increased over the last decade, and its trend is on the rise. In the context of the transition to carbon neutrality by 2050, ports are gaining relevance by serving as platforms for multiple

uses, mainly to support the energy transition.[3] To date, there are several records of hydrocarbon and/or hazardous and/or noxious substances (HC/HNS) accidental spills off the Portuguese coast, though information regarding their impact on the MCE is scarce. [4,5] Given the rising trend in maritime traffic along the Portuguese coast, the frequency of accidents involving vessels and/or industrial facilities, events such as ships cleaning out their bulk tanks, and HC/HNS spills may increase, implying increasing pressure on MCE. An eventual spill would entail significant ecological losses, given the natural heritage along the Portuguese coast including several protected areas. Beyond the 71 marine protected areas[6] the Portuguese shoreline also comprises several natural parks and reserves[7], 31 sites of community interest and 16 special protected areas both under the Natura 2000 network.[8] Thus, an HC/HNS spill in the vicinity of these areas will considerably affect flora and fauna both resulting from physical smothering and toxic effects. The ecological impacts of HC/HNS spills have been studied in the literature over several decades, revealing that despite the resilience of populations, the damage can be profound at the individual level.

The high risk of an oil spill occurring in the study area is used as a driver of change in the natural environment, considering the damage that this would cause and the impact it would have on MCES supply. The study site was identified as a location with a high risk of oil spills and high natural value (more details in section 2.2). We developed a stated preferences survey at the national level to assess the Portuguese population's WTP for investing in oil spill prevention (more details in section 2.3). Based on the data collected, we estimate the elicited economic value of the MCES identified in the selected site for the Portuguese population. In summary, we address two main research questions in this study:

- What is the Portuguese population's willingness to pay to invest in prevention against oil spill damages on MCES in the selected site?
- Does the payment vehicle influence individual WTP to invest in preventing oil spill damages to the MCES?

[3] This role is currently reinforced by the war in Europe.
[4] Accident with the oil tanker Prestige in Galicia and northern Portugal in 2002, oil spill in coastal Alentejo with the ship Marão in 1989, among others.
[5] http://wwz.cedre.fr/en/Resources/Spills
[6] This number is expected to increase in the near future due to the commitment to increase to 30% MPAs.
[7] Note that some of the marine protected areas are integrated in natural parks or reserves.
[8] Source: ICNF - http://www2.icnf.pt/portal/pn/biodiversidade/rn2000/rn-pt/rn-PT

2.2 Study area

The study area includes the coastal area of the *Southwest Alentejo and Costa Vicentina Natural Park*, located in the southwest coast of Portugal, including the marine protected area that is located 2 km from the coastline. This territory was classified as a protected area in 1988 and classified as a Natural Park in 1995 in order to protect its highly valued biodiversity.[9] The site contains a large diversity of coastal habitats, including cliffs, beaches, dunes, saltmarshes, among others, as well as rich and diverse fauna and flora species. Besides, it holds a high social, economic, cultural, and leisure interest. Several surfing hot spots can be found in this coastal area, as well as several beaches, that take advantage of a pristine natural environment.

On the other hand, the study area is also close to the port of Sines, which is Portugal's main entry point for oil and gas (currently, mostly liquefied), meaning that the area is at considerable risk of suffering from the adverse effects of hazardous spills.

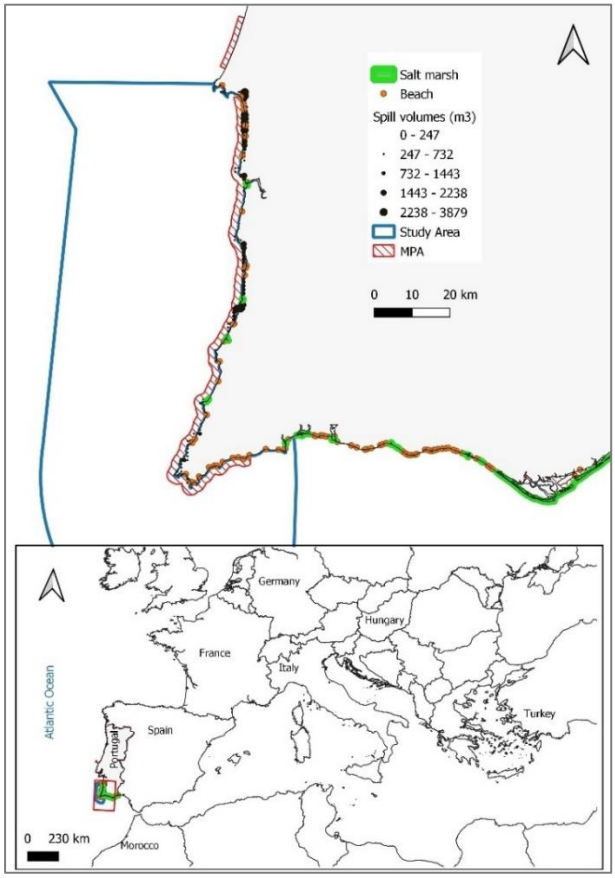


Figure 1 - Study site

[9] https://natural.pt/protected-areas/parque-natural-sudoeste-alentejano-costa-vicentina?locale=en

2.3 Survey design

In a first study of its kind in the country, we conducted a DCE survey with a representative sample of the Portuguese population to elicit their individual WTP to invest in prevention against oil spills along the southwestern coast of mainland Portugal and ensure the provision of four MCES. We followed a split-sample design to test for differences between the tax and crowdfunding PVs. In total, we interviewed 934 Portuguese residents, of which roughly half answered the tax version. ES were introduced and explained as the benefits that humans obtain from the natural environment. Participants were shown a short video explaining what is meant by each of the MCES considered and their role based on examples within the study area, and the existing threat of potential oil spills. The following four MCES were considered:

- **Biodiversity conservation** – The study area has a high diversity of species and habitats, which would be endangered by an eventual oil spill event.

- **Beach use** – The study area includes a coastline more than 100 km long, with beaches all over the coast, which are used by the local and touristic population for nature activities and bathing. Oil spill events can cause interdiction of beaches for different time periods.

- **Coastal protection** – The study area includes four saltmarsh areas, which work as natural barriers against flood and sea storms. Oil spills affect the vegetation of these areas, which decreases their protection.

- **Surf** – The study area includes several internationally renowned surf spots, which attract visitors all year round. Oil spills restrict the access by surfers to the affected areas.

A face-to-face survey was conducted at the national level, in all 18 districts of mainland Portugal. The survey was administered between September and December 2020 by a market research company to a representative sample of the Portuguese population regarding socio-economic characteristics and residence location[10].

With four MCES attributes having two levels each (some level of protection or no additional protection) and one cost attribute (with five levels from 0 € to 125 €), we followed a D-efficient design to reduce possible attribute combinations. The resulting design contained 24 choice sets, which were blocked into six distinct sets of four choice cards each. Thus, each respondent was presented with one of these six sets and asked to make four choices with three alternatives each.

[10] Based on the data from Censos 2011 (INE 2011).

One of the alternatives was always the SQ option, which is a non-cost option with no additional ES protection against oil spills.[11] The final survey was based on the inputs from an interdisciplinary team of researchers, three focus groups[12], and a pre-test with 105 respondents.

The survey was structured as follows: after explaining the purpose and conditions of the survey, the first section contained a short personality test (Ten Item Personality Inventory)[13]. The second section consisted of several questions related to the respondent's connection to the study site. Thirdly, the respondent was shown a video explaining the valuation scenario, including the payment vehicle, and a second short video explaining the choice cards and how to choose the preferred option (choice card example in Figure 2). After this, the respondent was asked to make a series of four choices and to answer a set of follow-up questions on the choices made, including certainty regarding the choices made, and the motives to contribute or not to a prevention program. In particular, we include a question regarding budget constraints issues (affordability of the program), and also on how the respondents perceive the quality of institutions (trust), the policy and payment consequentiality, scenario credibility and fairness related to whom should pay for the site preservation, either the local population, the polluting companies or the population in general. Finally, the respondents were asked a series of sociodemographic questions, and about their behavior with respect to the environment.

[11] The status quo was explained as being the current state of protection against oil spills. Despite there exist some protection measures, which are the responsibility of DGAM, they are limited in what concerns not only the quantity and quality of the available equipment but also in the area that can be assessed for intervention in case a hazard occurs.
[12] Two focus groups were held at Nova SBE in Lisbon, and one was held at the city of Sines.
[13] This will be explored in further work.

	Level of protection		
Ecosystem service	Program 1	Program 2	Status Quo
 Biodiversity conservation	Protects	Protects	No protection
 Beach use	Protects	No protection	No protection
 Coastal protection	Protects	Protects	No protection
 Surf	No protection	Protects	No protection
Cost	25 €	75 €	0 €
Choice	☐	☐	☐

Figure 2 - Choice card example

2.4 Data

In this section we describe and characterize the data collected. After removing incomplete answers, we ended up with 918 individual responses. Protesters were defined as respondents who are always unwilling to pay for ES protection, except for the "true zeros". That is, we have excluded those respondents that systematically choose the SQ in all choice tasks, except for whom the SQ choice can be related to rational economic behavior consistent with constrained utility maximization ("true zeros")[14] (Louviere, 2001, and McFadden, 2001). Thus, given that protest responses may not reveal respondents' true preferences and, therefore, would bias the

[14] The argument is that the estimated WTP in DCEs is a function of the various trade-offs among attributes (Louviere, 2001; McFadden, 2001). If we understand a protest answer as "refusal to trade one attribute for another", we may assume that individuals who always choose the SQ option are avoiding disclosure of their true WTP (Louviere, 2001).

WTP results, they should be considered and treated appropriately (Mariel et al., 2021). Since this is not at the core of this study, we have excluded them from our sample to obtain more accurate WTP estimates. After removing protesters, we ended up with 845 valid responses (410 for the tax version survey and 435 for the crowdfunding version).

Table 1 - Descriptive Statistics

		Full sample N=845	**Tax version sub-sample n=410**	**Crowdfunding sub-sample n=435**	**Difference between sub-samples** (p-values for t-test and Chi-Square test)
Gender (1=Male)		0.4521	0.4415	0.4621	$p = 0.2740$
Age	Min	18	18	18	
	Max	91	88	91	$p = 0.4764$
	Mean	47.8	47.74	47.81	
Education	None or Basic	60.24%	59.27%	61.15%	
	Secondary or professional	21.89%	23.17%	20.69%	$p = 0.684$
	Higher education	17.87%	17.56%	18.16%	
Employment	Employed	54.44%	50.49%	58.16%	
	Retired or on reserve	22.01%	22.44%	21.61%	$p = 0.073$
	Unemployed	17.40%	20.49%	14.48%	
	Student	6.15%	6.59%	5.75%	
Coastal municipality (1=Yes)		0.5680	0.0854	0.5517	*p = 0.162*
Lack of trust in institutions (1=Yes)		0.1231	0.0878	0.1563	*p = 0.001*
Fairness concerns (1=Yes)		0.2237	0.2390	0.2092	*p = 0.150*
Disbelief in policy consequentiality (1=Yes)		0.1586	0.1317	0.1839	*p = 0.019*
Environmental attitude (standardized)		0.0143	0.04206	-0.0119	$p = 0.4311$

Our sample matches the Portuguese adult population quite closely, only with the mean education level slightly above the national average. For the analysis, the variables *education* and *employment* were reduced from six to three, and from six to four categories, respectively, to avoid categories with low representation. The variable *coastal municipality* is a dummy variable for whether respondents lived in a municipality with a coastline at the time the survey was conducted. It was obtained from the four-digit postal codes which were elicited in the survey. The variable *environmental attitude* is a latent variable estimated through a structural

equation model (SEM), using five questions on environmental behavior, each measured on a 3-point Likert scale, as observed variables. *Lack of trust in institutions*, *fairness concerns* and *disbelief in policy consequentiality* are dummy variables that cover a variety of possible attitudes. They are derived from responses to one or two 3-point Likert scale questions each[15]. Respondents are considered to have a respective negative perception if they select the most extreme option in both corresponding questions.

The last column of Table 1 presents the p-values for the statistical tests performed to test whether there is a statistically significant difference between the two sub-samples (t-test for a difference in means for the continuous variables and chi-square test of independence for the categorical variables.) As observed, there is a statistically significant difference between the two sub-samples on the variable *employment* only at the 10% significance level. There are slightly more employed respondents in the crowdfunding version than in the tax version. Furthermore, there are more individuals having a *lack of trust in institutions* and having *disbelief in policy consequentiality* in the crowdfunding subsample. These differences are significant at 1% and 5%, respectively. For all other variables included in the final model there is no statistically significant difference across subsamples.

3. Econometric model

The theoretical background for analyzing discrete choice experiments is the random utility maximization model (McFadden et al., 1973). Underlying this method is the idea that respondents choose the alternative with the highest utility. Utility depends on observed attributes, entering the model as explanatory variables, and attributes that the analyst does not observe which are considered as random variables. In this context, an individual's indirect utility function consists of a deterministic and a stochastic component (McFadden et al., 1973). For N individuals, denoted by $n = 1, \dots, N$, facing a choice between J alternatives, indexed $j = 1, \dots, J$ at T choice occasions, indicated by $t = 1, \dots, T$, the indirect utility function takes the following form:

[15] *Lack of trust in institutions*: "The contributions/taxes collected for the program will be exclusively used for its implementation" and "This type of programs should be covered by already existing taxes"; *Fairness concerns*: "The cost of these programs should be beared by residents and visitors of the area" and "The costs of these programs should be beared by the oil companies and/or shipping agents"; *Belief in policy consequentiality*: "My answers will influence the implementation of the program"

$$U_{njt} = V_{njt} + \epsilon_{njt}, \quad (1)$$

where V_{njt} represents the deterministic (or representative) part of utility, and ϵ_{njt} stands for the stochastic (or idiosyncratic) part, not included in the representative component. An individual chooses alternative j if $U_{njt} > U_{nit}, \forall\, j \neq i$, maximizing utility conditional on observed and unobserved tastes. The deterministic component V_{njt} is assumed to be linear in its parameters. In this paper, the general specification of the utility function is similar to that in Train and Weeks (2005) as stated below:

$$U_{njt} = -p_{njt}\alpha_n + \boldsymbol{X}'_{njt}\boldsymbol{\beta}_n + \boldsymbol{Z}'_{njt}\boldsymbol{\gamma} + \epsilon_{njt}. \quad (2)$$

where p_{njt} represents the cost attribute, and $\boldsymbol{X_{njt}}$ represents a vector of variables describing the observed attributes of goods or services of alternative *j* for individual *n* at choice occasion *t*.

The cost coefficient α_n, and the coefficients of the ES attributes $\boldsymbol{\beta}_n$ are individual-specific as we introduce heterogeneity through a mixed logit (MXL) specification, which accounts for the heterogeneity of preferences among respondents. The other coefficients $\boldsymbol{\gamma}$ are treated as homogenous, as it is the case in standard multinomial logit (MNL) models. All interaction terms are included in the corresponding vector $\boldsymbol{Z}$ as we treat them as shifting the mean of the environmental attribute, thus keeping the distribution constant.

We assume that ϵ_{njt} is extreme value distributed and that the variance is allowed to differ between individuals, such that $Var(\epsilon_{njt}) = k_n^2\left(\pi^2/6\right)$, where k_n is an individual-specific scale parameter. The scale parameter captures variances in the utility of different choice situations, which are not related to differences in preferences and, therefore, not captured by the random choice coefficients $\boldsymbol{\beta}$ or $\boldsymbol{\gamma}$[16]. By dividing the utility equation (2) by the scale parameter k_n, we obtain a new utility function containing a new error term with equal variance for all individuals:

$$U_{njt} = -p_{njt}\left(\alpha_n/k_n\right) + \boldsymbol{X}'_{njt}\left(\boldsymbol{\beta}_n/k_n\right) + \boldsymbol{Z}'_{njt}\left(\boldsymbol{\gamma}/k_n\right) + \varepsilon_{njt}, \quad (3)$$

[16] The scale parameter can be understood as the variance of the error-term, implying that part of a decision-makers process is random from his own perspective. This variation is captured by the scale parameter. This randomness is expected to differ between decision-makers and more importantly between choice situations in a panel data setting with a sequence of choices. By allowing for the scale parameter to be individual-specific, the model allows for these factors, giving a variance to the variance of different choice situations (Train and Weeks, 2005).

where ε_{njt} is distributed i.i.d. extreme value type I, with variance $\pi^2/6$. Note that due to the division by a scale parameter, utility (3) has a different scale than (2). However, because utility is ordinal, the coefficients have no direct interpretation but can only be interpreted in relation to each other. This implies that the scale parameter cancels out and preferences are equivalent in both utility specifications (2) and (3).

Equation (3) represents the model in preference-space. Willingness to pay for an attribute is obtained as the ratio of the attribute's coefficient to the price coefficient. As the goal of this study is to estimate the WTP for the ES, it makes sense to incorporate this fact into the model directly. Specification (3) can be rearranged by dividing the non-monetary coefficients by the cost coefficient, as follows:

$$U_{njt} = \lambda_n\left[-p_{njt} + \boldsymbol{X}'_{njt}\boldsymbol{\omega}_n + \boldsymbol{Z}'_{njt}\boldsymbol{\upsilon}\right] + \varepsilon_{njt}, \quad (4)$$

where $\lambda_n = \alpha_n/k_n$, $\boldsymbol{\omega}_n = \boldsymbol{\beta}_n/\alpha_n$ and $\boldsymbol{\upsilon} = \boldsymbol{\gamma}/\alpha_n$. Therefore, the vectors of parameters $\boldsymbol{\omega}_n$ and $\boldsymbol{\upsilon}$ in specification (4) are scale-free and directly interpretable as marginal WTP. Moreover, it is possible to define a distribution for these WTP directly instead of working with ratios of the underlying preference-space distributions, which often imposes unrealistic assumptions on the WTP distributions[17]. Therefore, the variation in WTP can be modelled independently of scale and distinguished from the variation in the cost coefficient, which incorporates scale. When the goal is to obtain WTP estimates for policy purposes, parametrization into WTP-space is considered to be the best option (Mariel et al., 2021).

The model parameters can be estimated by Maximum Simulated Likelihood[18] (Revelt and Train, 1998; Train, 2009).

4. Results

Our results show that respondents in the DCE chose some sort of protection program in 52% of the choice occasions. As this is, to the best of our knowledge, the first study on MCES

[17] An alternative approach would be to use the parameters obtained in preference-space in a Monte-Carlo simulation to obtain WTPs. However, research has shown that this method usually yields fatter distribution tails and less efficient estimates (Train and Weeks, 2005; Scarpa, Thiene, and Train, 2008).

[18] All estimations were conducted using Carson & Czajkowski (2019)'s MATLAB code package for discrete choice experiments. The resources can be obtained at: https://github.com/czaj/DCE.git

valuation using stated preferences methods for a representative sample of the Portuguese population, we first provide baseline WTP estimates for the combined sample. Table 2 shows the estimated coefficients from the MXL and the MNL specifications. For the MXL, we assume that all ES attribute parameters are normally distributed, the cost parameter is log-normally distributed to ensure that it enters the random utility function negatively and the status quo coefficient is assumed to be fixed[19]. Moreover, we assume uncorrelated WTPs. We note that in this model coefficients in preference-space may be correlated due to the randomness of the price coefficient, capturing the randomness in the scale parameter, which is a realistic assumption given the panel and split sample structure of the data.

Table 2 – Baseline model results

	MNL	**MXL**	
	Mean (SE)	Mean (SE)	Std. Dev. (SE)
Status quo	75.5823***	63.6911***	0
	(8.5581)	(6.278)	(n/a)
Biodiversity	68.6703***	55.0477***	116.0076***
	(5.4125)	(6.7014)	(7.8598)
Beach	47.7602***	41.4956***	82.6891***
	(4.6658)	(5.9329)	(5.7727)
Coast	19.7838***	36.0787***	61.5772***
	(4.6435)	(5.5687)	(5.5875)
Surf	-7.9963*	-5.217	53.0125***
	(4.6667)	(5.2596)	(5.3198)
–Cost	0.0138***	-2.3362***	1.7658***
	(0.0007)	(0.4203)	(0.4243)
N	845	845	845

MNL: LogLikelihood = -3234.0884, AIC/n = 1.9172, McFadden's Pseudo-R^2 = 0.0879
MXL: LogLikelihood = -2584.0702, AIC/n = 1.5355, McFadden's Pseudo-R^2 = 0.2712
WTP in Euros with significances: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

[19] This implies that the reported means and standard deviations refer to the log of the underlying cost variable.

The goodness-of-fit measures show that the MXL specification fits the data better than the MNL specification. This and the fact that all standard deviations are highly significant suggest strong heterogeneity of preferences. As the model is estimated in WTP-space all coefficients can be interpreted as €-values, denoting the marginal WTP. In the context of this study, all attributes enter as dummy variables for either protecting the ES or not. Therefore, WTP estimates show how much the Portuguese population is willing to pay to provide some level of protection in comparison to no protection in the status quo. Except for surfing, all ES attributes have a significant positive WTP. Biodiversity protection has the highest mean WTP with ca. 55€. In combination with the estimated standard deviation, the underlying population distribution implies that over 68% of the Portuguese population have a positive WTP for this ES. Beach protection has the second highest mean WTP at roughly 41€, implying a positive WTP for over 69% of the sample. Among the significant attributes' coefficients, the lowest mean WTP is associated to the coastal protection ES, with ca. 36€. However, it is the attribute with the highest positive WTP rate, over 72%. The mean WTP for surfing protection is not statistically significant. A possible interpretation of these results is that the non-use values related to maritime ES are valued higher than their use-values as the combined WTP for biodiversity conservation and coastal protection is 91€, that is, more than twice the use value counterpart (41€). In what concerns surfing, it can be argued that it is a niche sport which can come with externalities (positive and negative) to the local population and is therefore not an ideal measure for the general use-value of a coastal area. In fact, surfing activity generates costs and social, economic and environmental benefits, often not only at local, but also, regional, national and international levels, affecting a large and diverse group of stakeholders besides surfers. However, these might not be perceived by the national population, and in this context, its economic value is difficult to elicit without considering all those potential spillovers.

Table 3 – Results for payment vehicle mode

	MNL	**MXL**	
	Mean (SE)	Mean (SE)	Std. Dev. (SE)
Status quo	58.8924***	45.9555***	0
	(8.5164)	(6.3045)	(n/a)
*Status quo * tax version*	34.6778***	44.0535***	0
	(5.388)	(6.0727)	(n/a)
Biodiversity	68.8581***	55.7444***	111.2021***
	(5.4032)	(6.1173)	(7.3852)
Beach	47.9266***	41.5291***	82.855***
	(4.6619)	(5.7507)	(5.5839)
Coast	19.9362***	36.1529***	62.602***
	(4.6349)	(5.3136)	(5.3068)
Surf	-7.6266	-5.9166	59.3928***
	(4.6526)	(5.3233)	(5.1537)
–Cost	0.0138***	-1.94***	2.1003***
	(0.0007)	(0.5475)	(0.5232)
N	845	845	845

MNL: LogLikelihood = -3211.3722, AIC/n = 1.9044, McFadden's pseudo-R^2 = 0.0943
MXL: LogLikelihood = -2564.2619, AIC/n = 1.5244, McFadden's pseudo-R^2 = 0.2768
WTP in Euros with significances: **p < 0.1; **p < 0.05; ***p < 0.01*

One of the main goals of this study is to investigate whether the choice of the payment vehicle in the valuation scenario makes a difference when assessing the economic value of MCES. Therefore, this model specification includes an interaction term between the status quo and a dummy variable that takes the value 1 in the case of the *tax version*. Table 3 shows the results for this model. The *tax version* interaction term is positive and statistically significant, meaning that respondents in the subsample contributing through an additional mandatory income tax on income have a higher preference for the status quo, i.e., not protecting any ES. Moreover, the means and standard deviations of the WTPs for the MCES remain relatively stable when this interaction term is included. These results are in line with Sanches et al. (2019), according to whom the use of a tax PV is related to respondents eliciting lower WTPs or more often choosing the status quo. This will be examined more in detail below.

To check for the robustness of our results and to measure the effects of socio-economic characteristics on elicited WTP, we estimate a model containing interactions as in Appendix Table A1. The results show that, most importantly, the *tax version* coefficient seems to be robust to the inclusion of further respondents' characteristics as it is similar in magnitude and remains statistically significant. The results also show that, all else equal, individuals that score higher on the *environmental attitude* variable have a lower preference for the SQ than those that score lower.

Interaction terms concerning occupation suggest that, on average, unemployed respondents have a considerably higher preference for the SQ compared to employed ones, who constitute the baseline in this estimation. Retired respondents also seem to have a slightly higher preference for the SQ. However, this coefficient is only significant at 10%. These results are as expected, since these groups are typically associated with lower disposable income. On the other hand, students' preference for the SQ does not differ from that of employed respondents, all else equal.

Moreover, there is evidence that preference for the SQ decreases with education. Both secondary education and higher education show negative coefficients that are highly significant. In comparison to respondents that have none or only basic education, those with secondary or higher education show a higher preference for investing in preventive measures rather than maintaining the SQ with no additional cost.

We find no significant difference in the preference for choosing the SQ over any preventive measure for *coastal municipality* or *age*. However, respondents living in a coastal municipality seem to have a ca. 29€ higher WTP for biodiversity conservation. Furthermore, the results suggest that age influences WTP for certain MCES. All else equal, we find that the WTP for biodiversity conservation and protection of surfing sites declines with age.

Table 4 - Results when controlling for PV and follow-up questions (distrust in institutions, fairness concern and disbelief in policy consequentiality)

	MNL	**MXL**	
	Mean (SE)	Mean (SE)	Std. Dev. (SE)
Status quo	43.3073***	33.5259***	0
	(8.8344)	(6.146)	(n/a)
*Status quo * tax version*	46.7627***	50.7043***	0
	(6.8108)	(6.9126)	(n/a)
*Status quo * protesting institutions*	40.5533***	33.4192***	0
	(11.4601)	(11.7188)	(n/a)
*Status quo * fairness concerns*	17.7532**	15.3448*	0
	(9.0318)	(8.9429)	(n/a)
*Status quo * disbelief in policy consequentiality*	30.8494***	20.986**	0
	(10.6869)	(10.2872)	(n/a)
*Status quo * tax version * protesting institutions*	-45.415***	-31.6297	0
	(17.2855)	(20.3304)	(n/a)
*Status quo * tax version * fairness concerns*	-2.1539	1.2938	0
	(12.432)	(12.8273)	(n/a)
*Status quo * tax version * disbelief in policy consequentiality*	-25.6185*	-5.908	0
	(15.1787)	(18.626)	(n/a)
Biodiversity	68.8527***	55.6907***	103.5114***
	(5.4233)	(5.5403)	(6.5261)
Beach	48.1763***	39.9776***	82.6815***
	(4.6892)	(5.4377)	(5.4449)
Coast	20.343***	35.6705***	59.362***
	(4.67)	(5.2246)	(4.8469)
Surf	-7.5655	-5.1073	55.1839***
	(4.6762)	(4.4605)	(4.2387)
–Cost	0.0138***	-1.6642***	2.4122***
	(0.0007)	(0.6353)	(0.6138)
N	845	845	845

MNL: LogLikelihood = -3189.3550, AIC/n = 1.8949, McFadden's pseudo-R^2 = 0.1410

MXL: LogLikelihood = -2557.3015, AIC/n = 1.5238, McFadden's pseudo-R^2 = 0.3113

WTP in Euros with significances: **p < 0.1; **p < 0.05; ***p < 0.01*

To further explore what may be driving the results regarding the influence of the PV, we constructed three variables aiming to elicit respondents' perceptions regarding the quality of institutions and use of tax money, policy consequentiality, and fairness concerns regarding the

programs presented. These variables were derived based on the answers given to some follow-up questions.[20] In turn, we include additional interaction terms of these variables with both the status quo and the PV dummy. The results are presented in Table 4. Again, it should be noted that the PV interaction term as well as the MCES attribute WTPs are relatively robust to the inclusion of these additional interaction terms.

We find that regardless of the PV, a marginal increase in the lack of trust in institutions produces the strongest marginal increase in the preference for the status quo (33.4192, significant at 1% in the MXL), immediately followed by the effect of a marginal increase in disbelief in policy consequentiality (significant at 5%), and finally in fairness issues (significant at 10%). Note that the less significant results that are obtained for fairness can be because this issue might not be necessarily perceived as relevant to the choice of the SQ. So, we conclude that the WTPs are different. When faced with the tax version, we observe that the respondents' preference for the SQ still increases (50.7043, significant at 1%) when compared to the crowdfunding alternative. In summary, we conclude that, when compared to the crowdfunding payment mechanism, a mandatory tax on income is associated with a higher preference for the SQ, thus adding to the marginal contribution of the variables *lack of trust in institutions, fairness concerns* and *disbelief in policy consequentiality*. Hence, these results suggest that these attitudes are somewhat intrinsic to the Portuguese population, regardless of the PV. This is consistent with recent evidence from Worldwide Governance Indicators (World Bank, 2021, in Government Effectiveness, Regulatory Quality and Control of Corruption, Figure 1 in the Appendix) showing that distrust in government and public institutions has increased in Portugal in the last five years. Moreover, as taxes represent a significant burden in Portugal, extra taxes cannot be welcome. Therefore, this may explain why in the *tax version* the preference for the SQ is higher than in the crowdfunding one. This is left for future research.

In addition to assessing the marginal effects, for a respondent that either *lacks trust in institutions*, has *fairness concerns*, or *does not believe in policy consequentiality* we tested the combined effect of those three dimensions in the case of facing the tax as opposed to crowdfunding. For those three dimensions, the combined effects are 19.07€ (50.70€-31.63€), 51.99€ (50.70€+1.29€), and 44.80€ (50.70€-5.90€), respectively. They are all significant at

[20] A detailed description of these variables is provided in section 2.

1%[21]. These results clearly show that using a crowdfunding mechanism instead of a tax can alleviate abovementioned concerns significantly.

We also check whether any of the three attitudes have an effect on any of the four ES WTPs besides the general aversion to pay for any sort of program. No statistical significance was found in any of the twelve interaction terms, except for *(coastal protection * disbelief in policy consequentiality)* which is only marginally significant at 10%. Therefore, we conclude that this effect concerns the payment for conservation programs in general and not specific ES. The results are presented in Appendix Table A2.

6. Conclusion

This study contributes to the literature on economic valuation of ecosystem services in Portugal, being the first to estimate the WTP for a representative sample of the Portuguese population to invest in protecting marine and coastal ecosystem services from hazards along the south-west and south Portuguese coasts. We use a split sample to measure the effect of the PV on individual WTP. In particular, we compare the results obtained in the case of a mandatory extra income tax with those that result from implementing a crowdfunding mechanism with a provision point. In this last case, if the target is achieved, the public authority in charge (DGAM) will be responsible for carrying out the investment program. In the context of oil spills prevention, these estimates can help decision-makers to assess trade-offs concerning different management options (e.g., prevention or restoration), to identify priority areas of intervention (e.g., for cleaning-up), to decide on the appropriate amount of compensation to injured parties when liability is at stake, also allowing for implementing cost-benefit analyses, among others.

We find that respondents that were faced with a tax were less likely to pay for prevention than those that were confronted with a crowdfunding campaign. Therefore, our results also suggest that crowdfunding can be an interesting alternative vehicle to be considered by the public sector to raise funds to preserve natural ecosystems, even in less credible institutional contexts, as it seems to be the case in Portugal. This result is relevant for public policy purposes, namely in what concerns fund raising for preservation of environmental goods and services.

[21] All tests were conducted using a Wald test for the significance of a linear combination of parameters.

We conclude from our results that the respondents who distrust institutions, do not perceive policy consequentiality, or have fairness issues related to the scenario presented are more likely to choose the status quo, suggesting that those attitudes regarding institutions and policy consequentiality are embedded into the Portuguese population. As mentioned before, there is recent evidence in Portugal showing the poor performance of the country based on several governance indicators, such as those produced by The World Bank (see Figure 1 in the appendix). This may explain why we find that respondents are less willing to participate in the prevention program in the tax version relative to those that face the crowdfunding payment mechanism.

This evidence highlights the role that the payment vehicle can play as a source of funding to preserve local ecosystem goods and services, namely in the context of climate change. More generally, recent studies focus on the political economy of climate policies by analyzing the effects of transitioning to carbon neutrality by 2050, namely, on how populations perceive the use of environmental taxes such as carbon taxes for climate change mitigation. This is a critical issue in this context entailing both efficiency or cost-effectiveness resource allocation issues, but also equity. Douenne and Fabre (2022) investigate how beliefs regarding a policy form (carbon tax with dividend policy) determine attitudes towards it by distinguishing between beliefs from the pure effects of preferences for the French population during the Yellow Vests crisis. Pessimism is often related to government distrust (Alesina et al., 2018). Since this can only be overturned in the long run, it is relevant to understand what its causes are and how it can be overcome.

As crowdfunding becomes more popular due to the increasing use of technological platforms in daily life, and the success obtained in several different campaigns in Portugal (health, cultural, among others), this type of payment mechanism may become an important tool for future environmental valuation studies. Yet, more research on this topic is still needed to understand its potential to contribute to funding conservation of public goods, such as local ecosystem services. To investigate how to better "match" the payment vehicle with preservation goals in the short/medium run can be an interesting research line to further pursue.

References

Alesina, A., Stantcheva, S., & Teso, E. (2018). Intergenerational mobility and preferences for redistribution. *American Economic Review*, *108*(2), 521-54.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal*, *100*(401), 464–477.

Barbier, E. B. (2011). Pricing nature. *Annu. Rev. Resour. Econ.*, *3*(1), 337-353.

Bateman, I. J., Langford, I. H., Turner, R. K., Willis, K. G., & Garrod, G. D. (1995). Elicitation and truncation effects in contingent valuation studies. *Ecological economics*, *12*(2), 161-179.

Bergstrom, J. C., Kevin J. B., & Mitsuyasu, Y. (2004). Trading taxes vs. paying taxes to value and finance public environmental goods. *Environmental and Resource Economics* 28.4,: 533-549.

Blanco, E, Lopez, M & Coleman, E. (2012) Voting for environmental donations: Experimental evidence from Majorca, Spain, *Ecological Economics*, 75, 52-60,

Campos, P., Alejandro, C., & Oviedo, J. L. (2007). Comparing payment-vehicle effects in contingent valuation studies for recreational use in two protected Spanish forests. *Journal of Leisure Research* 39.1, 60-85

Carson, R. T., & Czajkowski, M. (2019). A new baseline model for estimating willingness to pay from discrete choice models. *Journal of Environmental Economics and Management*, *95*, 57–61. https://doi.org/10.1016/j.jeem.2019.03.003

Carson, R. T., & Groves, T. (2007). Incentive and informational properties of preference questions. *Environmental and Resource Economics*, *37*(1), 181-210.

Douenne, T., & Fabre, A. (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. *American Economic Journal: Economic Policy*, *14*(1), 81-110.

Green, D.P., D. Kahneman, & H. Kunreuther. (1994). How the Scope and Method of Public Funding Affect Willingness-to-Pay for Public-Goods. Public Opinion Quarterly. **58**(1): p. 49-67.

Hensher, D. A., Rose, J. M., & Greene, W. H. (2015). Experimental design and choice experiments. *Applied choice analysis*, 189-319. Hudik, M., & Chovanculiak, R. (2018). Private provision of public goods via crowdfunding §. *Journal of Institutional Economics*, *14*(1), 23-44.

Ivehammar, P. (2009). The payment vehicle used in CV studies of environmental goods does matter. *Journal of Agricultural and Resource Economics*, 450-463.

Jakobsson, K.M. & A.K. Dragun. (2001). The worth of a possum: Valuing species with the contingent valuation method. Environmental & Resource Economics, 2001. **19**(3): p. 211-227.

Johnson, W. J. (2017). Understand Willingness to Pay for Pollination and User Sense of Place Connections on the Eastern Shore. Diss. Virginia Tech

Kragt, M. E., Burton, R., Zahl.Thanem, A., Otte, P. P., (2021). Farmers' interest in crowdfunding to finance climate change mitigation practices. *Journal of Cleaner Production*, 321, 128967.

Leiva Molano, J. S. (2017). Crowdfunding information: a voluntary contributions experiment, through a discrete-choice based mechanism.

Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). Stated choice methods: analysis and applications. Cambridge university press.

Louviere J,. (2001). Choices experiments: an overview of concept and issues. In: The choice modelling approach to environmental valuation (Bennet J, Blame R, eds). *Cheltenham, UK, Edward Elgar Publishing Ltd.* pp: 13-36.

McFadden, D. (2001). Economic choices. *American Economic Review*, *91*(3), 351-378.

Mariel, P., Hoyos, D., Meyerhoff, J., Czajkowski, M., Dekker, T., Glenk, K., ... & Thiene, M. (2021). *Environmental valuation with discrete choice experiments: Guidance on design, implementation and data analysis* (p. 129). Springer Nature.

McFadden, Daniel, et al. (1973). *Conditional logit analysis of qualitative choice behavior*

Mitchell, R. C., & Carson, R. T. (1989). Using surveys to value public goods. Resources for the Future. *Washington, DC*.

Morrison, M.D., Blamey, R.K. & Bennett, J.W. (2000). Minimising payment vehicle bias in contingent valuation studies. Environmental and Resource Economics, 16, 407-422.)

Revelt, D., & Train, K. (1998). Mixed logit with repeated choices: households' choices of appliance efficiency level.

Roesch-McNally, G. E., & Rabotyagov, S. S. (2016). Paying for forest ecosystem services: voluntary versus mandatory payments. *Environmental management*, *57*(3), 585-600.

Rowe, R. D., d'Arge, R. C., & Brookshire, D. S. (1980). An experiment on the economic value of visibility. *Journal of Environmental Economics and Management*, *7*(1), 1-19.

Rondeau, D., Schulze, W. D., & Poe, G. L. (1999). Voluntary revelation of the demand for public goods using a provision point mechanism. *Journal of public Economics*, *72*(3), 455-470.

Poe, G. L., Clark, J. E., Rondeau, D., & Schulze, W. D. (2002). Provision point mechanisms and field validity tests of contingent valuation. *Environmental and resource economics*, *23*(1), 105-131.

Sanches, E., Cancela, J. C. G., & Pereira, J. S. (2019). *Instituições e qualidade da democracia: cultura política na Europa do Sul*. Fundação Francisco Manuel dos Santos. https://www.ffms.pt/publicacoes/grupo-estudos/3907/instituicoes-e-qualidade-da-democracia-cultura-politica-na-europa-do-sul

Spencer, M. A., Swallow, S. K., Shogren, J. F., & List, J. A. (2009). Rebate rules in threshold public good provision. *Journal of Public Economics*, *93*(5-6), 798-806.Stithou, M., & Scarpa, R. (2012).

Collective versus voluntary payment in contingent valuation for the conservation of marine biodiversity: an exploratory study from Zakynthos, Greece. *Ocean & coastal management*, *56*, 1-9.

Stoknes, P. E., Soldal, O. B., Hansen, S., Kvande, I., & Skjelderup, S. W. (2021). Willingness to pay for crowdfunding local agricultural climate solutions. *Sustainability*, *13*(16), 9227.

Train, K. E. (2009). *Discrete choice methods with simulation*. Cambridge university press.

Train, K., & Weeks, M. (2005). Discrete choice models in preference space and willingness-to-pay space. In *Applications of simulation methods in environmental and resource economics* (pp. 1-16). Springer, Dordrecht.

Veisten, K., & Navrud, S. (2006). Contingent valuation and actual payment for voluntarily provided passive-use values: Assessing the effect of an induced truth-telling mechanism and elicitation formats. *Applied Economics*, *38*(7), 735-756.

Wiser, R. H. (2007). Using contingent valuation to explore willingness to pay for renewable energy: a comparison of collective and voluntary payment vehicles. *Ecological economics*, *62*(3-4), 419-432.

Worldwide Governance Indicators, World Bank, 2022.
https://databank.worldbank.org/source/worldwide-governance-indicators

Appendix

Appendix Table A1

	MNL	**MXL**	
	Mean (SE)	Mean (SE)	Std. Dev. (SE)
Status quo	87.3004***	84.3604***	0
	(26.9508)	(22.1703)	(n/a)
*Status quo * tax version*	37.1197***	46.5152***	0
	(5.494)	(6.4016)	(n/a)
*Status quo * environmental attitude*	-20.0367***	-19.6***	0
	(3.0299)	(3.3235)	(n/a)
*Status quo * retired*	17.5697**	12.134	0
	(8.7847)	(10.0663)	(n/a)
*Status quo * unemployed*	42.8187***	40.8653***	0
	(7.2961)	(8.6749)	(n/a)
*Status quo * student*	9.1154	10.7325	0
	(11.8915)	(13.0848)	(n/a)
*Status quo * secondary education*	-34.4498***	-39.5199***	0
	(7.2582)	(7.8785)	(n/a)
*Status quo * higher education*	-47.0808***	-37.5812***	0
	(8.2264)	(8.9898)	(n/a)
*Status quo * coastal municipality*	-4.0511	-10.79	0
	(15.4604)	(11.3301)	(n/a)
*Status quo * age*	-0.5056	-0.6828*	0
	(0.4893)	(0.4069)	(n/a)
Biodiversity	88.2718***	98.112***	98.653***
	(15.5404)	(19.4837)	(6.8756)
Beach	53.3351***	55.1392***	78.0315***
	(14.4589)	(15.9228)	(5.4954)
Coast	26.4763*	47.7426***	59.6968***
	(14.6406)	(15.429)	(5.4757)
Surf	26.0277*	28.8695**	48.7637***
	(14.5313)	(14.4522)	(5.2463)
*Biodiversity * coastal municipality*	28.8553***	35.4042***	0
	(9.813)	(12.2111)	(n/a)
*Beach * coastal municipality*	15.0629	16.8648	0
	(9.3287)	(10.8288)	(n/a)
*Coast * coastal municipality*	9.7783	13.0402	0
	(9.2746)	(10.0462)	(n/a)
*Surf * coastal municipality*	-3.7355	-8.916	0
	(9.3294)	(9.0531)	(n/a)
*Biodiversity * age*	-0.798***	-1.2505 ***	0
	(0.2837)	(0.3592)	(n/a)
*Beach * age*	-0.2732	-0.4848	0
	(0.2692)	(0.3085)	(n/a)
*Coast * age*	-0.2116	-0.4706	0
	(0.2671)	(0.2982)	(n/a)
*Surf * age*	-0.5947**	-0.6031**	0
	(0.2659)	(0.2756)	(n/a)
-Cost	0.0145***	-2.4655***	1.606***
	(0.0007)	(0.3406)	(0.333)
N	845	845	845

MNL: LogLikelihood = -3023.2022, AIC/n = 1.8025, McFadden's pseudo-R^2 = 0.1858
MXL: LogLikelihood = -2472.0743, AIC/n = 1.4793, McFadden's pseudo-R^2 = 0.3342
WTP in Euros with significances: **p < 0.1; **p < 0.05; ***P < 0.01*

Appendix Table A2

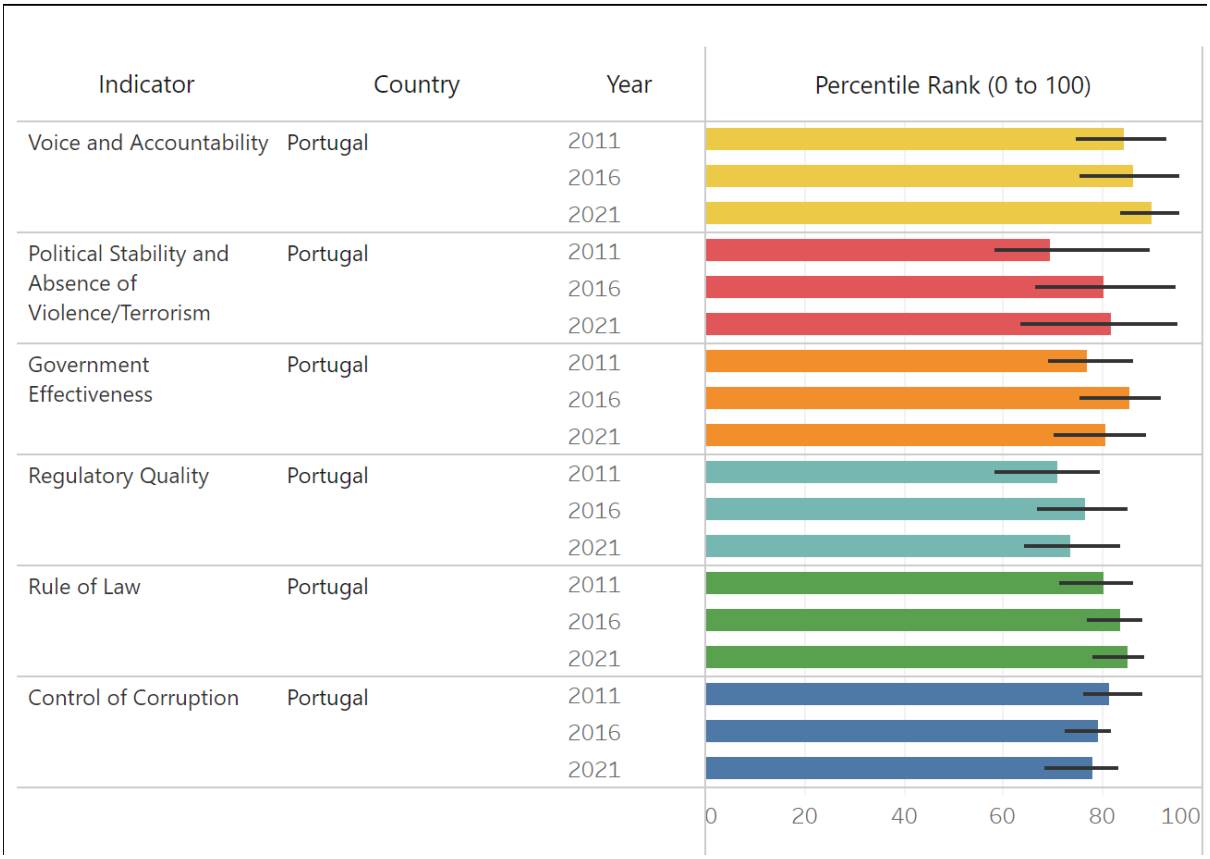
	MNL	**MXL**	
	Mean (SE)	Mean (SE)	Std. Dev. (SE)
Status quo	56.9452***	42.105***	0
	(8.5687)	(6.2078)	(n/a)
*Status quo * tax version*	37.3085***	49.5479***	0
	(5.4823)	(6.2188)	(n/a)
Biodiversity	74.07***	64.827***	109.0513***
	(6.1537)	(7.3472)	(6.9143)
*Biodiversity * protesting institutions*	-9.6162	-17.1458	0
	(12.0497)	(20.0036)	(n/a)
*Biodiversity * fairness concerns*	-9.4834	-15.3576	0
	(8.5933)	(12.8703)	(n/a)
*Biodiversity * disbelief in policy consequentiality*	-14.3048	-16.336	0
	(10.3447)	(15.9299)	(n/a)
Beach	50.8973***	44.2558***	82.2621***
	(5.3009)	(6.3683)	(5.5835)
*Beach * protesting institutions*	-8.6681	-13.6911	0
	(11.0882)	(16.2656)	(n/a)
*Beach * fairness concerns*	-5.4587	-5.1736	0
	(8.2826)	(10.6067)	(n/a)
*Beach * disbelief in policy consequentiality*	-4.9557	-7.5372	0
	(9.7919)	(14.0605)	(n/a)
Coast	25.8411***	39.3421 ***	62.117***
	(5.3854)	(6.3239)	(5.6251)
*Coast * protesting institutions*	-22.0341*	-15.0754	0
	(12.2399)	(14.8039)	(n/a)
*Coast * fairness concerns*	-5.6407	-0.769	0
	(8.8549)	(10.5013)	(n/a)
*Coast * disbelief in policy consequentiality*	-13.7534	-23.5259*	0
	(10.4528)	(12.3753)	(n/a)
Surf	-8.4745	6.2954	56.2788***
	(5.461)	(5.8186)	(5.2594)
*Surf * protesting institutions*	-6.2374	-11.4139	0
	(13.1463)	(15.9672)	(n/a)
*Surf * fairness concerns*	5.2319	1.4971	0
	(9.7833)	(10.2427)	(n/a)
*Surf * disbelief in policy consequentiality*	0.8615	4.564	0
	(11.4459)	(13.6163)	(n/a)
-Cost	0.0139***	-1.8114***	2.3018***
	(0.0007)	(0.5808)	(0.5606)
N	845	845	845

MNL: LogLikelihood = -3194.0672, AIC/n = 1.9012, McFadden's pseudo-R^2 = 0.1398

MXL: LogLikelihood = -2552.8227, AIC/n = 1.5247, McFadden's pseudo-R^2 = 0.3125

WTP in Euros with significances: **p < 0.1; **p < 0.05; ***P < 0.01*

Appendix Figure 1



Source: Worldwide Governance Indicators, World Bank, 2021.

Nova School of Business & Economics
Campus de Carcavelos
Rua da Holanda 1
2775-405 Carcavelos | Portugal
novasbe.pt

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