TIME STABILITY OF VISITORS' PREFERENCES FOR PRESERVING THE WORLDWIDE CULTURAL LANDSCAPE ALTO DOURO WINE REGION

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Abstract

The Alto Douro Wine Region (ADWR) was classified a world heritage site, specifically as a cultural landscape, by UNESCO, in 2001. The well known "Porto Wine" and other high quality wines are produced in the Douro region. As an attraction and touristic site, the cultural site has to meet the needs of more demanding visitors and to compete with a growing number of cultural sites, also classified by UNESCO. To achieve this goal, landscape managers and public authorities have much to profit from knowing and understanding visitors' preferences regarding the attributes associated to its outstanding universal value.

The goal of this paper is to enhance the knowledge about the preferences of the ADWR Portuguese' visitors, considering the attributes that deserve preservation and consequently public attention. Using the choice experiments technique, six alternative choice sets were presented in a questionnaire in the year 2013. Data was collected from 249 useful surveys corresponding to 1,494 responses. Responses are analyzed by a random parameters or mixed logit model, taking into account the random preferences heterogeneity and the panel nature of the data.

An additional and innovative issue of the article is to compare the results of the survey conducted in 2013 with previous evidence from own work conducted in 2008. The comparison of the results in two distinct periods of time is a novelty; moreover the question of preferences' stability has rarely been addressed in discrete choices models. Nevertheless, in the context of changing living conditions and expectations of Portuguese consumers plunged into an economic crisis, this subject is clearly relevant.

Keywords: Preferences' stability; applied microeconomics; discrete choice models; cultural economics; consumer preferences

1 INTRODUCTION

The Alto Douro Wine Region (ADWR), located in the north interior of Portugal, was classified as a world cultural heritage by UNESCO (2001). The main inclusion criteria were related with the outstanding value of ADWR as a traditional wine making region, where the earliest viticulture techniques (e.g. terraced vineyards supported by schist walls) coexist alongside the more modern techniques. This activity also shaped the living of local population (the villages, traditional agglomerations), its routines and traditions. The small size of the plots and the coexistence of other Mediterranean cultures, such as olive, orange and almond, transform the landscape into a mosaic of unique beauty.

The increasing number of cultural sites recognized by UNESCO and the ever more demanding visitors requires from landscape managers and public authorities a new approach, more active and especially more personalized to the different types of visitors. To this end it is of utmost importance that they know and understand visitors' preferences regarding the most valuable attributes associated to ADW outstanding universal value.

Considering the multi-attribute nature of the ADWR, in 2008, we conducted a discrete choice experiments technique[1] (DCE) to assess the relative importance of the main characteristics. The results (Lourenço-Gomes *et al.,* 2013; 2014) suggested that the maintenance of the more traditional attributes is consensual for visitors. Additionally, the implied ranking of the attributes suggested the Mosaic as the most valuable attribute.

Given the economic and financial crisis in which Portugal entered, there is a reason to suspect that preferences regarding the main attributes to safeguard the cultural landscape of the ADWR and simultaneously to participate in a preservation program requiring private funding have not remained unchanged. Thus, we hypothesize that consumer preferences regarding cultural goods, and ADWR in particular, are not stable across time.

In this sense, the present research aims to understand how stable over time are the determinants of the visitors' choices with respect the ADWR, considering two distinct periods of time: 2008 and 2013, pre and post the Portugal social and economic crisis effects, respectively. According to the national statistics institute (INE), the unemployment rate increased from 7.6% (2008) to 16.3% (2013), the payments to employees (including wages and Employers 'social contributions) decreased by 6.7%, the Household consumption in Portugal as percentage of GDP fell from 67.5% to 66.2%, and the growth rate of GDP at constant prices (base 2006) decreased from -0.01% (2008) to -1.37% (2013).

The preferences stability' is not a new subject, having been in the research agenda under discussion for a long time. It constitutes a fundamental premise of microeconomics consumer models and is essential to generalize results, predict market shares, being useful to support managerial decisions. Nevertheless, the comparison of preferences and choices over time in DCE applications, as is the case of the present paper, remains a scarce topic of research[2]. In cultural economics field, we are not aware of any application on this subject.

To achieve the previous goal, we analyze the discrete choices from each sample separately and subsequently tested the homogeneity of preferences based on a pooled model. Taking into consideration the panel structure of the data and testing for potential sources of non observed heterogeneity, the discrete choices were analyzed through the mixed or random parameters logit model (e.g. McFadden and Train, 2000; Train, 2003), considered by Hensher and Greene (2003) as the most promising available discrete choice model. Despite this model being widely applied in distinct research fields such as transportation and agricultural economics (e.g. Botelho *et al.*, 2013), in the cultural economics area, the applications of this model are confined to Morey and Rossman (2003). Snowball and Willis (2006), Tuan and Navrud (2007) and Alberini *et al.* (2003) also estimated this model, but the main results were based on the multinomial logit model.

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[1] DCE, a stated preference approach of non market valuation, is part of choice modeling technique grounded in random utility model (Manski, 1977) and on Lancasterian microeconomic approach (Lancaster, 1963). Louviere *et al.* (2000) and Hensher *et al.* (2005) present a full description of this methodology.

[2] In the context of retail choice, Severin *et al.* (2001) analyze model stability over space and time taking into account the random component variance differences in the multinomial logit model framework, concluding for the consistency of preferences (both in space and time).

The reminder of the paper is organized as follows. The next section describes the applied methodology and the descriptive statistics of the data collected. Section 3 reports the results of econometric analysis and presents some discussion. The last section concludes.

2 MATERIALS AND METHODS

The DCE was applied to assess the relative importance of the main attributes that characterize the ADWR, deserving greater public and political attention. The relevant attributes[3], namely the terraced vineyards supported by schist walls (VIN), landscape mosaic (MOS) and traditional agglomerations (AGGLO) were defined for 2 levels: protection, ensuring their presence in the landscape (level 1) or potential abandonment (level 0). To configure a preservation program, we include a fourth attribute, the annual income tax payment per household (TAX) that was set to levels of €20, €40 and €60 for the alternatives involving a program of preservation and €0 for the None-Option (in which all the attributes are set at zero level, implying the absence of a preservation project).

Through a D-efficient design (SAS software) for a generic DCE (see Lourenço-Gomes *et al.*, 2013a for a detailed description about the experimental design phase), the attributes and levels were combined and paired producing six choice sets from which the visitors were asked to select the preferred alternative. Table 1 presents an example of a choice set[4].

Table 1: An example of a choice set

	A	B	None
Program	MOS + AGGLO €20	VIN €60	€0
Your choice	☐	☐	☐

The data was collected in two distinct periods of time using a similar questionnaire to allow comparisons. The introductory section includes a set of questions to ascertain about the general pattern of consumption of cultural goods and concerning the knowledge and use of the ADWR in particular. The valuation section presents the alternative hypothetical preservations programs paired in choice sets from which the respondents are asked to choose. Additionally, some questions were posed to control for the respondents' decision process and the degree of easiness to decide among distinct alternatives. The last section includes socioeconomic questions[5].

The survey was administered through personnel interviews, intercepting 189 ADW visitors in site between May and August 2008 (*sample 2008*), and 249 between March and October 2013 (*sample 2013*). Each respondent answered to six choice sets, corresponding to 1134 useful choice responses (*sample 2008*) and 1494 (*sample 2013*).

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[3] The selection of the relevant attributes was based on 4 sources, namely the criteria for inclusion in UNESCO's list of World Cultural Heritage sites, previous evidences, a pilot-study carried out and on close consultation with experts and local authorities.

[4] In the example, the respondent is asked to choose his preferred alternative: (A) a preservation program to guarantee the presence of both the attributes Mosaic and traditional agglomerations with a cost of €20/household by year; (B) a program that preserves the attribute traditional vineyards at a cost of €60 and (C) none of the presented alternatives.

[5] Further descriptions of the questionnaire structure are available in Lourenço-Gomes *et al.* (2013b) and Lourenço-Gomes *et al.* (2014).

Table 2 reports the descriptive statistics of the data collected by sample year.

Table2: Descriptive Statistics (*Sample 2008, 2013*)

Variable	Acronym	Codification	Sample Average (2008)	Standard Deviation* (2008)	Sample Average (2013)	Standard Deviation (2013)
ADW'attributes						
Terraced vineyards	VIN	0; 1	0.333	-	0.333	-
Landscape mosaic	MOS	0; 1	0.389	-	0.389	-
Agglomerations	AGGLO	0; 1	0.333	-	0.333	-
Price	TAX	0 (*none*); 20; 40; 60 (€)	26.67	23.1	26.67	23.1
-Gender	GE	1-Male; 0-Female	0.58	-	0.526	
-Age	AGE	18-75 (sample 2008) 18-70 (sample 2013)	39.5	12.6	40.8	12.3
-Education degree	EDU	1-Primary; 2-Secondary; 3-Pos-Secondary	2.4	-	2.38	-
-Monthly household income	INCOME	1- <1000€ 2- 1000-2000 3- 2001-3000 4- >3000€	2.3	-	2.18	-
-Household size	SIZE		2.67	1.18	2.56	1.06
-Member of a cultural association	MEMBER	1- Yes; 0-No	0.185	-	0.12	-
-Consumption of cultural activities (Number times last year)	CULT	0-389 (*Sample 2008*) 0-160 (*Sample 2013*)	24.28	39.95	14.88	16.7
-Visit the ADW for the 1st time	FIRST	1- Yes; 0-No	0.143	-	0.149	-
-Distance between the residence and the ADW	KM	15-622 (*Sample 2008*) 0-1556 (*Sample 2013*)	136.58	118.6	148.7	152.1
-Visit purpose	PURPOSE	1- To know the ADW cultural heritage; 0-Others	0.249	-	0.48	-
-Influence of the world heritage classification in decision to visit	LIST	1- Yes; 0- No	0.280	-	0.18	-
-Identifies the more traditional attributes	IDENT	1- Yes; 0- No	0.84	-	0.8	-
-Know the reasons of ADW inclusion in UNESCO list	KNOW	1- Yes; 0- No	0.439	-	0.49	-
-Choice Decision Process	*TRADE*	1- Considered all the attributes presented; 0-Other	0.561	-	0.67	-
-Choice Task	*EASY*	1-Very Easy + Easy; 0-Other	0.61	-	0.46	-

Considering the *sample 2013*, 47.2% of the respondents are women (42%, *sample 2008*) and the average respondent is 41 years old (40, *sample 2008*). More than a half of the respondents (51%) have completed the post-secondary education (54.5%, *sample 2008*). Around 13% of visitors only completed the primary education (14.3%, *sample 2008*) and 36% the secondary education (31.2%, *sample 2008*).For nearly 70% (61.5%, *sample 2008*) of the respondents the net average income/household is less than 2000€/month and the household size ranges from 1-5 persons (1-6, *sample 2008*) and on average is 2.56 (2.67, *sample 2008*).

Considering cultural consumption' indicators or contextual information, 12% is member of a cultural association (18%, *sample 2008*) and on average attended cultural activities 15 times (24 times, *sample 2008*).

Nearly 14.9% (14%, *sample 2008*) of the respondents are visiting the ADWR for the first-time. The distance between respondents' residence and the site is on average 148.7 kilometers (136.6 km, *sample 2008*). About 48% (25%, *sample 2008*) of respondents visited the site for meeting its landscape and cultural heritage. The remaining are visiting for no specific reason except spending some leisure time, to look up friends or family, for professional reasons, or because of other reasons. The status of the world heritage influenced the decision of visiting for nearly 18% of the respondents (28%, *sample 2008*). With respect to knowledge about the ADWR, 79.5% (84%, *sample 2008*) state their ability to identify the more traditional attributes, while 49% (44%, *sample 2008*) state to know the inclusion criteria on the UNESCO list.

Concerning the variables about the choice decision process, 67% (56.1%, *sample 2008*) of respondents state that have pondered all the attributes defining the preservation programs. About 46% (61%, *sample 2008*) considered that it was easy or very easy to make each choice. Taking all variables into consideration, the two samples appear quite similar not only with respect to socio-demographic characteristics, but also with respect to the other characteristics, thus any differences in the coefficients can be attributed to a structural change in the preferences and not to the sample composition.

3 RESULTS AND DISCUSSION

The choice between three unlabeled preservation programs *i* for the ADW by respondent *n* in the choice set *t* is analyzed through the specification of a mixed logit model (e.g. Revelt and Train, 1998; Hensher and Greene, 2003), in a random coefficients the form (RPL). This promising extension of the traditional multinomial logit model assumes prior specification of the distribution of the taste attributes and requires simulated maximum likelihood methods.

Assuming a linear additive utility function, the utility that respondent *n* derives from the choice of preservation program *i* in choice set *t* is written as:

$$U_{nit} = \beta_0 + \beta_n' X_{nit} + \alpha P_{nit} + \varepsilon_{nit}, \qquad i = 1,2,3$$

where:

X_{nit} = attributes of preservation program (*Vin, Mos, Agglo*)

P_{nit} = Tax attribute

$\beta_n' = (b' + s'\eta_n)$

$\qquad\qquad b'$ = population mean;

$\qquad\qquad s'\eta_n$ = independent random deviates representing the deviation from the mean;

η = randomness in the coefficients, assumed to be random and normally distributed[6], implying that $\beta \sim N(b, s^2)$.

Table 3 reports the estimation results of the RPL model for the *samples 2008 (RPL$_{2008}$) and 2013 (RPL$_{2013}$)* and a *pooled model* (*RPL$_{pooled}$*) that considers both the samples simultaneously (NLOGIT® Econometric Software, Inc., version 5.0) with simulated maximum likelihood using Halton draws with 100 replications[7].

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[6] As the direction of the preferences is not clear (the parameters may have positive or negative values), the landscape' coefficients are specified as to be normally distributed (VIN, MOS, AGGLO). As conventional procedure, the tax attribute will be specified as fixed or non random parameter.

[7] All the models presented are statistically significant (*p-value* equal to zero) and have considerable values for pseudo-R^2.

		2008		2013		Pooled		Pooled with heterogeneity	
		Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Random parameters									
VIN	Mean	1.69***	0.207	0.45***	0.0069	0.71***	0.058	0.99***	0.094
	Sd	1.34***	0.22	0.0006	0.08	0.032	0.146	0.04	0.256
MOS	Mean	1.82***	0.21	0.13*	0.07	0.54***	0.06	1.07***	0.097
	Sd	1.43***	0.23	0.01	0.17	0.456***	0.11	0.32*	0.18
AGGLO	Mean	1.68***	0.23	0.29***	0.069	0.6***	0.0065	1***	0.1
	Sd	2.13***	0.29	0.027	0.18	0.66***	0.09	0.69***	0.095
ASC	Mean	-19.07***	4.3	-4.25***	1.01	-7.08***	1.15	-10.3***	2.09
	Sd	22.6***	4.6	9.5***	1.45	11***	1.47	10.6***	1.59
Fixed parameters									
Tax	Mean	-0.0014***	0.004	0.00023	0.0022	-0.0028	0.00174	-0.0025	0.0017
Heterogeneity in mean									
Vin×S2013								-0.49***	0.116
Mos×S2013								-0.94***	0.124
Agglo×S2013								-0.7***	0.139
ASC×S2013								5.4*	3.23
LL0		-1245.8		-1641.33		-2887		-2887	
LL$_{Model}$		-631.4		-1102.33		-1838		-1788.6	
		(LL_{2008})		(LL_{2013})		(LL_{pooled})		($LL_{pooledhet}$)	
Pseudo R^2		0.49		0.328		0.363		0.38	
AIC/N		1.129		1.488		1.406		1.371	
Chi squared		1228.8 [9 d.f.] p=0.00000		1077.99 [9 d.f.] p=0.00000		2098.29 [9 d.f.] p=0.00000		2196.98 [13 d.f.] p=0.00000	
N (n)		1134(189)		1494(249)		2628(438)		2628(438)	
Log-likelihood test									

$2*(LL_{2008}+LL_{2013}-LL_{pooled})=208.55$; $\chi^2 (8)_{5\%} = 15.5$

***, **, * Significance at 1%, 5%, 10% level; SD=standard deviation of coefficient; $ASC = \beta_0$; LL$_0$=Restricted log likelihood; LL$_{Model}$= LogLikelihood (model)

Concerning the $RPL_{2008,}$ the non random parameter (*Tax*) is statistically significant and has the expected sign. Additionally, as expected, the disutility increases for higher prices. Considering the normally distributed coefficients, the means of the random parameters are all statistically significant, i.e., different from zero. The derived standard deviations (SD) are all statistically significant (and large) suggesting the presence of dispersion around the mean of the random parameter. The individual specific parameters estimates may diverge from the sample population mean parameter estimate, and therefore a fixed parameter will not reflect this unobserved heterogeneity over the sample. Specifically, 89 per cent of the distribution places a positive value on the attribute *VIN*. For *MOS*, 65 percent is above zero and 35 percent below. The *AGGLO* is a positive influence for 78 per cent. For about 20% the *ASC* is a positive determinant and for 80% a negative suggesting a greater disutility of selecting the no-program alternative.

Distinctly from the evidence reported on sample 2008, as noted by $RPL_{2013,}$ the attribute *Tax* is not statistically significant. Additionally, although the means of the random parameters are all statistically significant and positive, the respective parameter estimates for standard deviations are not different from zero. In this case, the

mean captures all the information in the distribution, being similar to consider the *VIN*, *MOS* and *AGGLO* parameters as fixed assuming the values of 0.45, 0.13, and 0.29, respectively. Nevertheless the dispersion of *ASC* parameter is statistically significant, suggesting the presence of dispersion around the mean parameter, a signal of unobserved heterogeneity among sample individuals. The effect on utility of choosing one alternative without a preservation program (versus a situation evolving a program) has a negative and a significant mean, but this unique parameter value is not representative of the total sample.

To enhance knowledge about the preferences' stability over the two analyzed periods, we applied a log likelihood test based on the estimated *pooled* model[8] (RPL_{pooled}) and on the separately estimated RPL_{2008} and RPL_{2013} models. As reported in Table 3 (last row), the null hypothesis of homogeneity of parameters is rejected, suggesting the presence of structural change.

In order to take into account this hypothesis on the analysis, we introduce preference heterogeneity around the mean of the random parameters ($RPL_{pooledhet}$), through the interaction of each random parameter with a dummy variable identifying the separate sample ($Sample_{2013}$=1 for 2013, and zero for 2008). As presented in Table 3, all the interaction terms included are statistically significant, suggesting the presence of heterogeneity around the mean due the sample' period. Specifically, the proportion of sample that consider the effect of each landscape attribute as positive decreases (or is closer to zero) when the sample is 2013.

4 CONCLUSION

This paper analyses the question of preferences stability' over time, an issue rarely addressed in the context of DCE and therefore constituting one of the first applications in the cultural area.

The paper compares the estimates from two independent samples collected in two distinct periods, namely in 2008 and 2013, with a pooled sample. Confirming our initial hypothesis, the statistical evidence suggests a the presence of structural change in visitors' preferences regarding the attributes of a hypothetical program to safeguard the ADWR, requiring an additional monetary contribution, due to significant changes in the general social and economic environment.

Despite of landscape' attributes remaining statistically relevant for preservation in all models estimated (in each sample and pooled model), the price/tax was no longer statistically significant in the 2013 sample. This result rules out the assessment of a measure of willingness to pay based on the tax attribute, constituting an important issue for ADWR managers. To pursue the goal of efficient' resource allocation decisions, the authorities must be aware that, despite the fact that visitors' ascribe value to the preservation of the main site' attributes, they are not willing to pay additional taxes for it. In this sense, alternative support financial measures should be found to attend to this purpose. Particularly, policy makers should be aware of the influence of the general economic environment on consumers´ preferences and on their willingness to pay for cultural goods such as the ADW.

Finally to accommodate in a single model the structural differences, we include heterogeneity in the mean of the random parameters. This model confirms that there exist statistical differences in the mean of the parameters due the sample, and specifically this model reveals a decrease in the proportion of respondents who considered the preservation of each landscape' attribute as positive in 2013 (compared to 2008).

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[8] Distinctly from the multinomial logit model, the *RPL* model handles the scaling directly in the model.

The present analysis does not confirm the stability of preferences assumption if taken at face value, limiting the spread of this type of results over time. However, consumer theory does not postulate that preferences are invariant with changes in the overall situation of the consumer. In fact, our results not only show that consumers´ preferences respond to changes in the context, but also that DCE is able to capture these changes. In the present application, consumers' preferences for ADWR landscape attributes remain basically unaltered, the significant change is in the tax attribute, which is the attribute most directly related to the changes in the economic environment between 2008 and 2013. An alternative explanation is the hypothesis that the payment vehicle, an income tax, might not be the most appropriate in situations of economic crisis. Nevertheless the DCE' results meet our expectations, suggesting that this methodology reflects conveniently the ADWR visitor' preferences.

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