



Wine and cultural heritage.

The experience of the Alto Douro Wine Region

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Abstract

The Demarcated Douro Region is one of the oldest demarcated wine regions, and is the largest and the most heterogeneous mountainous wine region in the world. Viticulture covers 44,000 ha, and since 2001 an area covering 24,600 ha has been designated as the most representative territory of the Demarcated Douro Region, the Alto Douro Wine Region. This region is included in the list of World Heritage Sites as an evolving and living cultural landscape. The Demarcated Douro Region fits the *terroir* model, as its economy is based on wine (Porto wine and Douro still wines), supplemented by tourism. During recent decades, both activities have witnessed deep and structural changes, with consequences for the maintenance of the traditional characteristics of the cultural landscape that drove the UNESCO classification. With this issue in mind, the goal of this paper is to describe the recent evolution of the main economic activities of the Demarcated Douro Region and, in particular, to increase what is known about the preferences of Portuguese visitors to the Alto Douro Wine Region, and to consider the attributes that deserve preservation and, consequently, public attention. The results of a mixed logit model show that the visitors assign utility to the preservation of the traditional attributes in the following order: vineyards supported by schist walls, the agglomerations and the characteristic mosaic nature of the landscape. Additionally, respondents who are richer, employed, better educated, better informed regarding the culture of the site and more influenced by the listing are more willing to participate in preserving the cultural heritage of the region.

1 Introduction

The emergence of the Demarcated Douro Region (DDR), located in the northeast of Portugal, dates from 1756, when it was recognized as one of the first demarcated wine regions of the world. The viticulture covers 44,000 ha, almost 18% of the total area of the region and, since 2001, 24,600 ha (almost 10% of the total DDR area<sup>1</sup>), the Alto Douro Wine Region (ADWR) is included in the list of World Heritage Sites as an evolving and living cultural landscape, based on the following: *Criterion (iii) – The Alto Douro Region has been producing wine for nearly two thousand years and its landscape has been moulded by human activities; Criterion (iv) – The components of the Alto Douro landscape are representative of the full range of activities associated with winemaking – terraces, quintas (wine-producing farm complexes), villages, chapels, and roads; Criterion (v) – The cultural landscape of the Alto Douro is an outstanding example of a traditional European wine-producing region, reflecting the evolution of this human activity over time* (UNESCO, 2001).

These criteria point to the centrality of the wine economy on the configuration of the landscape and on the traces that defined the way its population occupied the territory, villages, accessibility and religion (agglomerations). Additionally a historical value accrues from the coexistence of different vineyard plantation techniques, ranging from the older forms (pre-*phylloxera* terraces, or *socalcos*, from before 1860 and post-*phylloxera* *socalcos* supported by schist walls from the late nineteenth century to the 1930s) to the more modern forms (*patamares* (from the 1980s), vertical planting (during the last decades of the twentieth century) and vineyards with no land organization).

In the oldest vineyards (where there are *socalcos* supported by schist walls), mechanization is difficult and complex, and the manpower requirement is high, leading to higher production costs and to a consequent increase in the market price of the wines produced. To overcome these weaknesses, the activity has undergone structural changes over recent decades. From 2001 to 2012, the total area occupied by vineyards with traditional techniques (*socalcos* with schist walls) decreased from 4,871 ha to 3,476 ha, with more modern agricultural techniques being used instead. Additionally, the structural change indicates a tendency for monoculture of vines: the area of monoculture vineyards grew by 1,282 ha at the expense of other uses of the land (namely

<sup>1</sup> The remaining 90% is considered a buffer zone.

Mediterranean cultures and traditional woods). These other uses create the characteristic mosaic of the ADWR, which is defined by the multiplicity of crops surrounding the vineyard plots and which is identified in preferences studies (e.g. Madureira et al., 2005) as one of the more appreciated attributes.

Beyond their value in themselves, the wine *filière* and the cultural landscape connected with it are also important inputs for tourism (cultural tourism and oenotourism). Consequently, it is necessary to balance the competitiveness of the DDR's wine industry in an increasing globalized market with the preservation of the cultural attributes of the landscape and with visitors' preferences, bearing in mind that the preservation of landscapes "depends on national policy decisions which in turn will be shaped by the preferences of the general public" (Howley et al., 2012: 66).

Non-market valuation methods, in general, and stated preference techniques, in particular, provide a consistent way to understand preferences and to measure the benefits provided by cultural heritage goods, some of which are external to the marketplace. Their ability to capture both use and non-use values means that stated preference methods are the most suitable for the valuation of the majority of cultural heritage goods, which provide utility for direct users and for non-users in the form of existence value, option value and bequest value. In this category the technique that has been most commonly applied for capturing the value of cultural goods has been the contingent valuation method (e.g. Kaminsky et al., 2007; Navrud and Ready, 2002; Noonan, 2003; Tuan and Navrud, 2007), which elicits the maximum willingness to pay (minimum acceptable payment) to ensure (to forgo) a hypothetical change in the availability of a non-market amenity. Nevertheless, when the valuation process is related to multi-attribute resources (Mazzanti, 2003), is based on the attributes or specific changes in their levels (Hanley et al., 1998), or considers goods that individuals have no experience in valuing, the discrete choice experiments technique (DCE), a variant of choice modelling, is more suitable than the contingent valuation method.

As a stated preference method, the DCE method builds hypothetical markets through repeated discrete choice questions that encompass trade-offs between the relevant attributes and, in addition to the total economic value of a good or resource, is able to determine the most important attributes of the proposed change (Bateman et al., 2002). Applications of DCE in the cultural arena have been much more limited than in the

environmental economics field (Choi et al., 2010) and have focused on monuments or groups of monuments (Morey et al., 2002), sites (Alberini et al., 2003; Lourenço-Gomes et al., 2013, 2014; Rolfe and Windle, 2003; Tuan and Navrud, 2007) and cultural institutions (Apostolakis and Jaffry, 2005; Choi et al., 2010; Choi, 2011; Jaffry and Apostolakis, 2011; Maddison and Foster, 2003; Mazzanti, 2003; Snowball and Willis, 2006; Willis and Snowball, 2009).

In this paper, the DCE method is applied to enhance knowledge about the determinants of participating in a preservation programme to safeguard the more traditional attributes of the ADWR and to understand the relative value that Portuguese visitors attach to each attribute. This issue needs to be seen alongside the recent evolution of the main economic activities of the DDR, namely the wine *filière* and tourism. To achieve these goals, the remainder of the paper is organized as follows. Section 2 provides an economic overview of the DDR's wine *filière* and tourism. Section 3 presents the DCE application (theoretical framework and survey, data and results). Section 4 concludes the study with a discussion of managerial policy implications.

## **2 DDR wine *filière* and tourism: an economic overview**

The main economic activities of the DDR are related to wine and tourism (Andresen and Rebelo, 2013), and both activities have witnessed deep and structural changes during the past three decades that have a determining effect on the safeguarding of the attributes of the ADWR and its continuity in the cultural landscape.

### **2.1 Vines and wines**

DDR is a typical *terroir* model,<sup>2</sup> and fits the *organized cluster* model, as is known to be the case for other European wine regions (Rebelo and Caldas, 2013). According to the Centre for the Research, Study and Advancement of Mountain Viticulture, the DDR is the largest and most heterogeneous mountainous wine region in the world, characterized by valleys that cut deeply through steep high slopes along the river Douro and its tributaries, with predominantly shale rock; it experiences cold winters, hot

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<sup>2</sup> A *terroir* is defined as a clearly identified and homogeneous territory endowed with a strong identity that characterizes the whole of the natural and cultural resources and is generally backed up by a certificate of guaranteed origin (Ditter, 2005).

summers and low rainfall. Here there are hillside vineyards, and more than 40% of the vines are planted in plots with a gradient greater than 40%, which hampers mechanization and requires manual labour; consequently, there are high production costs. The DDR has low-density population (Andresen and Rebelo, 2013), with 236,786 inhabitants in 2011, of whom 22.7% were over 65 years old. From 2001 to 2011, the region has lost 7.9% of its population.

During the last thirty years, with strong public support (Magalhães et al., 2013), a strategy for improving productivity,<sup>3</sup> reducing production costs and decreasing the huge amount of human labour was adopted. This strategy led to the conversion of 24,334 ha of vineyards (up to 2014), which is almost 55% of the area of the DDR that is under vine. This process started in the 1980s with a programme funded by the World Bank allowing the conversion of 2,800 ha and the introduction of two new land terracing systems – wide *patamares* (terraces supported by land banks) and vertical planting. Supported by European Union funds, the investment in the conversion of vineyards was continued in subsequent decades (4,400 ha between 1990 and 1999 and 17,134 ha between 2000 and 2014).

The conversion of vineyards led to a significant transformation of the landscape, a fact particularly relevant in an area classified as a world heritage site, which is required to maintain its authenticity and integrity despite being an evolving and living landscape. Table 1 presents the evolution of the land occupancy of the vineyard system<sup>4</sup> between 2001 and 2012 in the ADWR area classified by UNESCO. In 2012, 55% (5,785 ha) of the vineyards were on *patamares*, a rise of approximately 2,500 ha from 2001. This line of evolution can also be seen for vertical planting (363 ha more in 2012 than in 2001), although this was on a much smaller scale. By contrast, the vineyards on post-*phylloxera socalcos*<sup>5</sup> experienced the greatest reduction (1,898 ha). New forms of land organization, which aimed to reconcile the conservation of the heritage with mechanized crop operations using new technologies (Magalhães et al., 2013), were

<sup>3</sup> The productivity of the region is low, with an average of 4,500 kg of grapes per hectare.

<sup>4</sup> For the remaining DDR area this information was not available (Andresen and Rebelo, 2013). The Appendix includes figures with the scheme and pictures of the different land organization systems of the vineyards.

<sup>5</sup> In terms of landscape, the *socalcos* (or terraces supported by schist walls) were a key element for the classification by UNESCO.

introduced: *socalcos* with *patamares* (514 ha) and *socalcos* with vertical planting (26 ha).

However, according to Andresen and Rebelo (2013: 64):

*the Authenticity of Douro Wine Region prevails and sustainable solutions are being implemented according to the condition of scarce resources – water and fertile soil – and steep slopes. In ADWR the composition and functional organization of the place that is needed to maintain the Integrity of the property is still present. The preference shown today in the DDR is to build narrow patamares and micro-patamares, to preserve walls, encourage biodiversity, preserve the diversity of grape varieties and maintain the genetic heritage of the vine.*

**Table 1 Evolution of the land organization systems of vineyards between 2001 and 2012, ADWR**

Vineyard organization system		2001		2012		Variation		
		(ha)	%	(ha)	%	(ha)	%	% Total Area
<i>Socalcos</i>	pre- <i>phylloxera socalcos</i>	215	1%	200	1%	-15	-7	0%
	post- <i>phylloxera socalcos</i>	4,659	19%	2,762	11%	-1898	-41	8%
	<i>socalcos</i> with <i>patamares</i>	0	0%	514	2%	514		-2%
	<i>socalcos</i> with vertical planting	0	0%	26	0%	26		0%
	Total <i>socalcos</i>	4,875	20%	3,502	14%	-1373	-28	6%
<i>Patamares</i>	3,297	13%	5,785	24%	2488	75	10%	
Vertical planting	509	2%	871	4%	363	71	1%	
No land organization	608	2%	412	2%	-196	-32	1%	
<b>Total vineyards</b>	<b>9,288</b>	<b>38%</b>	<b>10,570</b>	<b>43%</b>	<b>1282</b>	<b>14</b>	<b>5%</b>	
Other uses	15,312	62%	14,030	57%	-1282	-8	5%	
<b>Total</b>	<b>24,600</b>	<b>100%</b>	<b>24,600</b>	<b>100%</b>				

Source: Magalhães et al. (2013: A1-23)

In a similar way to the oldest wine regions of Europe, the ownership structure in DDR is skewed (Table 2): 43,991 ha of vineyards are distributed amongst 25,668 grape-growers, corresponding to an average farm size of 1.71 ha. Roughly 37% of the vineyard land is owned by just 666 grape-growers, with an average area each of 24.61 ha. Most of these farms belong to bottlers and wine producers, and to traders in Porto wine. In contrast, 26.7% of the area is owned by 21,074 grape-growers (82.11% of the total), with an average area each of 0.56 ha. Most of these grape-growers are members of wine cooperatives (Rebelo et al., 2010).

**Table 2 Number of Grape-growers and Farm Size in the DDR, in 2013**

Area (Hectares)	Grape-growers (n <sup>o</sup> )	Grape-growers (%)	Hectares	Size %
Up to 0.5	12,285	47.86	2,720	6.18
0.5 – 2.0	8,792	34.25	9,030	20.53
2.0 – 5.0	2,968	11.56	9,267	21.07
5.0 – 8.0	714	2.78	4,427	10.06
8.0 – 10.0	243	0.95	2,155	4.50
More than 10	666	2.59	16,392	37.26
<b>Total</b>	<b>25,668</b>	<b>100.00</b>	<b>43,991</b>	<b>100.00</b>

Source: Instituto de Vinho do Douro e Porto- IVDP (www.ivdp.pt)

Table 3 presents the quantity of wine produced in recent years, from 2005 to 2013, for the DDR, divided into categories of Porto wine and still wines (Appellation d'Origine Contrôlé – AOC – and other wines). The average annual production is 1,474,231 hl (an average of 37.23 hl/ha), accounting for around 23% of the domestic wine production. Porto wine represents 53% of the DDR production and 12% of the domestic production, on average.

**Table 3 DDR production from 2005 to 2013**

Year	Porto wine (hl)	Still wines (hl)	DDR Production (hl)	Porto wine/ DDR production (%)
2005	845,169	873,604	1,718,773	49.17
2006	867,107	850,766	1,717,873	50.48
2007	877,405	562,786	1,440,191	60.92
2008	871,864	502,047	1,373,911	63.46
2009	773,718	552,657	1,326,375	58.33
2010	771,777	870,483	1,642,260	46.99
2011	590,436	729,736	1,320,172	44.72
2012	674,768	537,398	1,337,280	55.66
2013	691,028	825,417	1,516,445	45.57
<b>Total</b>	<b>6,963,182</b>	<b>6,322,894</b>	<b>13,268,076</b>	<b>52.48</b>

Source: Authors' computations from data collected by the IVDP (www.ivdp.pt)

Porto wine and still wines have different positions in the marketplace. Whereas Porto wine is used as a case study for globalization, having been exported for more than two centuries (albeit in cycles (Rebelo and Correia, 2008)), bottled still wine is a “new” product in the market. Recent data (Table 4) show that Porto wine is witnessing a negative phase, expressed by the decrease in sales, both in volume (-16%) and in monetary value (-10%), between 2005 and 2013. Domestic demand has remained relatively stable, representing around 13-14% of the total demand and 15-16% of the total value (€). Despite the negative evolution of the sales, it is unquestionably true that Porto wine is a globalized product that is sold around the world, with special emphasis on the EU market, followed by the USA and Canada ([www.ivdp.pt](http://www.ivdp.pt)).

**Table 4 Sales of port wine: 2005 – 2013**

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Domestic market									
– Volume (hl)	129,330	130,860	128,430	125,100	110,160	120,906	106,607	110,339	106,666
– Value (10 <sup>3</sup> euro)	63,029	64,224	61,704	59,578	51,874	55,327	50,321	52,104	53,998
– Euro/litre	4.87	4.91	4.80	4.76	4.71	4.58	4.72	4.72	5.06
Exports									
– Volume (hl)	807,750	785,250	814,050	767,070	725,940	741,604	718,624	715,273	679,281
– Value (10 <sup>3</sup> euro)	341,930	331,685	342,550	316,222	300,266	315,474	305,592	308,282	311,022
– Euro/litre	4.23	4.22	4.21	4.12	4.14	4.25	4.25	4.31	4.58
Total									
– Volume (hl)	937,080	916,110	942,480	892,170	836,100	862,511	825,230	825,612	785,947
– Value (10 <sup>3</sup> euro)	404,959	395,909	404,254	375,800	352,100	370,801	355,912	360,386	365,020
– Euro/litre	4.32	4.32	4.29	4.21	4.21	4.30	4.31	4.37	4.64

Source: IVDP (www.ivdp.pt)

The history of still wines is totally different from that of Porto wine. Until the 1980s still wines were essentially transformed into brandy to be used in the production of Porto wine, and currently only some of the total of still wines is sold as AOC wine (Table 5). The amount of still wine (AOC) sold, as a proportion of the total production reached a maximum of 71% in 2008. In 2013, the level of export intensity (export sales divided by total sales) of AOC wines was around 37% (by volume) and 38% (by value), with an average price per litre of 4.11 euro (0.3€ above the price in the domestic market). Compared with 2005, export sales had increased by 110% (by volume) and by 69% by price, whereas domestic sales decreased by 22% and the price only increased by 21%. This evolution reflects the strategy for DDR AOC wines and the search for international solutions in external markets, adopting the Porto wine route.

**Table 5 Sales of DDR's AOC wines**

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Domestic market									
– Volume (hl)	230,481	268,956	308,520	279,369	222,453	142,400	136,317	136,283	180,175
– Value (10 <sup>3</sup> euro)	51,866	62,374	70,070	70,645	66,156	56,113	52,076	52,953	68,731
– Euro/litre	2.25	2.32	2.27	2.53	2.97	3.94	3.82	3.89	3.81
Exportations									
– Volume (hl)	49,545	58,140	69,822	74,646	77,202	71,162	85,571	93,396	103,833
– Value (10 <sup>3</sup> euro)	16,853	20,717	25,243	26,977	27,680	29,087	34,000	36,878	42,654
– Euro/litre	3.40	3.56	3.61	3.61	3.59	4.09	3.97	3.95	4.11
Total									
– Volume (hl)	280,026	327,096	378,342	354,015	299,655	213,562	221,888	229,680	284,008
– Value (10 <sup>3</sup> euro)	68,719	83,091	95,313	97,622	93,836	85,200	86,076	89,831	111,385
– Euro/litre	2.45	2.54	2.52	2.76	3.13	3.99	3.88	3.91	3.91
Sales of still wines/ Annual production	0.32	0.38	0.67	0.71	0.54	0.25	0.30	0.43	0.34

Source: IVDP (www.ivdp.pt)

In relation to still wines, it is important to highlight that it was only in the 1990s that some grape-growers started to develop their own labels and bottle their wines rather

than selling the grapes to Porto wine shippers as they had done for nearly two centuries. These new start-ups produced predominantly still red wines based on a blend of grape varieties. While these new brands found heavy demand in Portugal, their entrance into the international markets became quite difficult, since the Douro wine region was not known at all, and therefore did not represent a category to be included in wine lists and shelves (Rebelo and Muhr, 2012).

To enter the export markets, the strategy followed by these new wine producers was based on the concept of the *terroir* as a point of differentiation for market niches, when marketing is done through events, press releases and interactions with wine experts (such as media, trade and gastronomy). One of the consequences of this entrepreneurial production and marketing strategy is the emergence of Douro still wines, which, from being unknown, have achieved high national and international recognition within a decade (Rebelo and Muhr, 2012). For instance (Rebelo and Caldas, 2013), in 2010 the expert Robert Parker gave 26 Portuguese wines (23 red and 3 white wines) more than 90 points out of 100, and, of these, 23 (21 red and 2 white wines) came from the Douro region; in the same year, the Wine Spectator awarded more than 90 points to 27 wines, all red and from Douro; Cellartracks rated 23 wines above 90 points, all red and 22 of them from Douro. Wine Spectator's Top 10 of 2014 includes three Douro red wines, Dow's Vintage Port 2011 (first), Chryseia 2011 (third), and Quinta do Vale Meão (fourth).

Despite these awards, the DDR continues to be a territory of large differences, as is well expressed by the opinion maker Jancis Robinson (FT.com/Magazine, 23/24 November 2013), in a simple statement that characterizes the DDR:

*What is more of a concern is that the going price for grapes in the Douro is hardly more than the cost of having them picked. Just one glance at any photograph of the extraordinary topography of the underpopulated Douro valley is enough to demonstrate that viticulture will never be cheap in this corner of the wine world and deserves our support. That it produces wines as delicious and distinctive (...) is even more reason why we should support the region by paying the going rate for them, at least.*

In summary, particularly in the last decade the DDR in general and the ADWR in particular have witnessed great changes that policy makers should take into account

when formulating rational policies that include the preservation of the attributes of traditional vineyards, which involve higher production costs and market competitive disadvantages.

## 2.2 Tourism<sup>6</sup>

To diversify the economic activities of the region, tourism has enjoyed strong political and institutional support by the Portuguese government, especially since the classification of the ADWR as a world heritage site in 2001.

Tourism in the Douro region tends to be structured around two dominant influences, the river (Douro) and the *terroir*. The river began to be navigable in 1994, and nowadays shows a remarkable economic vitality. In 2013, 35 companies were operating, with 86 regular boats and 11 hotel boats, carrying a total of 545,630 passengers. Of these, 7.2% travelled in hotel boats, 27.5 % on one-day cruises, 1.1% in recreational boats and 64.2% on small trip cruises on the same reservoir. On the demand side, there are sharp differences between the types of users, according to the category of boat/trip. Roughly 97% of the hotel boat (cruise ships) users are international customers, compared to the one-day cruises that depend almost entirely on the domestic market, around 94% of its total demand. The hotel boat market is mainly centred on big international cruise companies (e.g. CroisiEurope and Viking). Most of the tourists (77%) come from European countries (France 22%; United Kingdom 15%, Germany 14% and others 26%), and the United States of America, which generates around 22%.

The tourism activities within the *terroir* are well embedded in the cultural environment of this region, which is clearly based on the wine *filière*. During the 1990s, the evolution of the traditional *quinta* (wine-producing property) to satisfy the new agro-tourism demand is an important landmark that shows the linkage between wine and tourism. Altogether, there are presently 25 *quintas* that serve the tourism market. In 2012, the accommodation sector contained 36 hotels, with a capacity of 2,303 beds, and a considerably higher number of rural tourism units (101), although with a smaller number of beds (552). On average, between 2010 and 2012 the hotel establishments were responsible for a guest room annual income of almost 8 million euro.

<sup>6</sup> This section is based on Rebelo et al. (2014), which includes a better and more detailed description.

In contrast to hotel boats, the demand for traditional hotels is essentially concentrated in the domestic market, which represents on average 78% of the total demand, with the remaining visitors mainly from six European countries (the United Kingdom, Spain, France, Germany, the Netherlands and Italy).

To sum up, from the demand side we can conclude that the ADWR is not a massive tourism site, and will not become one in the near future; it is still questionable if this is even desirable. However, it is expected that a significant increase will occur, especially if the ADWR meets the demands of being a cultural heritage site that competes with similar sites spread around the world. In this sense, it is in the best interests of the public authorities and landscape managers to have better knowledge about visitors' preferences regarding the maintenance of the more traditional attributes. To address this issue, we defined a hypothetical preservation programme using the DCE technique, as described in the following section.

### 3 Visitors' preferences: DCE

The DCE technique is inspired by the Lancasterian consumer demand theory (Lancaster, 1966), in which the utility provided by a good or service is derived from the characteristics or attributes of that good or service. Analytically, this is rooted in the random utility theory (Manski, 1977), according to which individuals faced with a choice within a set of mutually exclusive alternatives will choose the one that maximizes its utility, which is composed of an observed and a stochastic component.

In its first stages a DCE model involves the selection of the relevant attributes, their levels and the specification of the choice sets to be presented to the respondent. Each choice set is formed from two or more alternatives (preservation programmes) that result from the combination of the attribute levels (experimental design). Through a survey, data on the sequential choices, among other things, are gathered (data collection), and finally the data are econometrically analysed (discrete choice models), allowing the estimation of part-worth utilities and monetary welfare measures if a price attribute is included.<sup>7</sup>

<sup>7</sup> See Louviere et al. (2000) and Hensher et al. (2005) for a full description of the DCE technique, the theoretical framework and practical issues.

### 3.1. The attributes, levels and choice sets

Based on UNESCO's listing criteria, interviews with experts, a previous pilot study and the trends of the landscape evolution, three binary landscape attributes were selected: (a) terraced vineyards supported by schist walls, (b) a mosaic landscape, and (c) traditional agglomerations. These are all at the level 1 when the attribute is protected and the level 0 when the attribute is not a target of protective measures, compromising its continuation in the landscape.<sup>8</sup> Additionally, a fourth attribute, related to the means of payment, in the form of an annual tax payment per household (d) was selected, and its levels were €20, €40 and €60 for the alternatives involving a programme of preservation and €0 for the no-programme option.

The attributes and levels were combined and paired into choice sets using a D-efficient design (SAS software) for main effects and a generic DCE, in which the alternatives were not labelled. The final design included six choice sets formed from two generic alternatives (A and B) representing hypothetical preservation programmes and a "none" option, to approximate the real choices in which the respondents always have the option of choosing nothing when none of the offers is of interest. In the "none" option all the attributes were set at level zero, corresponding to a scenario of the absence of preservation. Table 6 presents one of the choice sets from which the respondents were asked to choose their preferred alternative, taking into account the trade-offs among the attributes presented and their budgetary constraints. In the example (Table 6), the visitor is asked to choose between the preservation programme A that guarantees the presence of both the attributes "mosaic landscape" and "traditional agglomerations", at a cost of €20/household per year, programme B that preserves the attribute "traditional vineyards" at a cost of €60, or the "none" option.

**Table 6** Example of a choice set

Programme	A	B	None
	MOS + AGGLO €20	VIN €60	€0
Your choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<sup>8</sup> Both the scenarios (with and without the attribute) were shown to the respondents through photographs that were digitally modified from an actual photograph of a village in the ADWR.

### 3.2 Data

The collection of the choice data involved the construction of a survey instrument containing three main sections. The first section embraced a set of questions to ascertain the consumer's cultural habits and cultural participation regarding the ADWR. The second part is the valuation section, where the respondent was asked to choose his or her preferred option (preservation programme) for each of the six choice sets presented. This section concluded with questions related to the decision process. The last section included questions on socioeconomic variables, to provide a profile of the visitors with respect to income, employment situation, age, gender, family size, level of education and variables related to the trip or visit, such as the length, average spending, accommodation and transport mode.

The survey was administered through personal interviews in two emblematic sites of the ADWR between March and October 2013. Useful data was gathered from 249 Portuguese visitors, corresponding to 1,494 choice observations (each visitor selected his or her preferred alternative from six sequential choice sets). Table 7 presents the descriptive statistics of the sample.

**Table 7 Descriptive Statistics**

Variable	Acronym	Codification	Sample Average	Standard Deviation	Proportion of 1
<b>Socioeconomic characteristics:</b>					
Gender	GE	1-Male; 0-Female			0.526
Age	AGE	18-70	40.8	12.3	
Education degree	EDU	1-Basic; 2-Secondary; 3-Post-Secondary	2.38	-	
Monthly household income	INCOME	1- <1,000€ 2- 1,000-2,000€ 3- 2,001-3,000€ 4- >3,000€	2.18	-	
Member of a cultural association	MEMBER	1- Yes; 0-No		-	0.12
Visiting the ADWR for the first time	FIRST	1- Yes; 0-No	-	-	0.149
Purpose of visit	PURPOSE	1-To know the ADWR cultural heritage; 0- others	-	-	0.48
Influence of the world heritage classification on decision to visit	LIST	1-Yes; 0-No	-	-	0.18
Knows the reasons for ADWR inclusion in UNESCO list	KNOW	1-Yes; 0-No	-	-	0.49
Identifies the more traditional attributes	IDENT	1-Yes; 0-No	-	-	0.8
Consumption of cultural activities (no. last year)	CCULT	0-160	14.88	16.7	
Household size	SIZE		2.56	1.06	
Distance between home and the ADWR	KM	0-1,556	148.7	152.1	
Employment status	JOB	1-Employed 0-Other (unemployed, student, retired)			0.807
<b>ADWR TRIP:</b>					
Length of stay (no. of days)	DAYS	1-120	3.25	10.7	
Persons (no.)	PERSON	1-30	4.2	3.96	
Expenditure €/day (spending)	EXPEND	0-450	68.5	72.2	
Accommodation (housing)	ACCOM	1-hotel; 2-rural tourism; 3- home of friends or family; 4-other; 5-none	3.35	1.53	
Transportation	TRANSP	1-Own car; 2-Bus; 3-Boat; 4-Train;5-Other	1.25	0.87	
<b>Decision process</b>	<b>TRADE</b>	1-all the attributes; 0-other	-	-	0.67

Specifically related to the ADWR, around 15% of the respondents were visiting the ADWR for the first time (85% were repeat visitors), and, for nearly 49%, the main reason for the visit was to discover the landscape and cultural heritage (the remaining

reasons for being in the locality were sightseeing, visiting friends, or professional reasons, among others). For 18.6% of respondents the decision to visit was influenced by the world heritage status, but 99.6% stated that they would also have made the visit if the ADWR did not have that status. The majority of visitors (80%) declared that they knew the more traditional attributes of the ADWR, and 49% affirmed that they knew about the criteria for inclusion on the UNESCO list.

Visits had an average duration of three days and each visitor spent, on average, 69€ per day. During the visit, 39% of respondents did not use any type of accommodation, and for 27% the accommodation was provided by friends or relatives. An accommodation establishment (hotel or similar establishment) accounted for around 28%. The remaining corresponds to the “other” category. Driving a private car was the main means of transport (92.4%), with the others (e.g. bus, boat or train) being far less significant.

With respect to the decision process, 67% asserted that they had considered all the attributes presented (made a trade-off between the attributes) to make the choice.

### 3.3 Results

To analyse the choice between the three generic preservation programmes  $i$  for the ADWR by respondent  $n$  in the choice set  $t$ , we used the mixed logit model (e.g. Revett and Train, 1998; Hensher and Greene 2003), in the random coefficients form (RPL). This assumes the prior specification of the distribution of the taste attributes and requires simulated maximum likelihood methods.

The utility that respondent  $n$  derives from the choice of alternative  $i$  ( $i=1, 2, 3$ ) in choice set  $t$  is specified by the following additive and linear functions:

$$U_{nit} = \beta'_n X_{nit} + \alpha P_{nit} + \varepsilon_{nit}, \quad i = A, B$$

$$U_{nit} = ASC + \beta'_n X_{nit} + \alpha P_{nit} + \varepsilon_{nit} \quad i = \text{none}$$

where:

$X_{nit}$  = ADWR attributes (VIN, MOS, AGGLO)

$P_{nit}$  = TAX attribute

ASC=1 (for the none option)

$$\beta'_n = (b' + s' \eta_n)$$

$b'$  = population mean;

$s' \eta_n$  = independent random deviations, representing the deviation from the mean;

$\eta$  = randomness in the coefficients, which are assumed to be random and normally distributed,<sup>9</sup> implying that  $\beta \sim N(b, s^2)$ .

Additionally, to capture the sources of the observed heterogeneity, we introduced variables that were intrinsic to the respondent to the utility specifications of the alternatives involving a preservation programme (A and B), setting the option “none” as the reference.

Table 8 reports the estimation results of the RPL model (NLOGIT<sup>®</sup> Econometric Software, Inc., version 5.0), with a simulated maximum likelihood using Halton draws with 100 replications. All the models presented are statistically significant ( $p$ -value approximately equal to zero) and have considerable values for pseudo-R<sup>2</sup>.

The  $RPL_1$  includes only the option attributes and the constant specific to the “none” option (ASC). Regarding the design attributes, all but TAX are statistically significant, positively affecting the utility associated with a preservation programme. The ASC has a negative signal, indicating the relative disutility of choosing the “none” option.

Considering the normally-distributed coefficients related to the landscape attributes, none of the derived standard deviations (SD) are statistically significant, suggesting the absence of dispersion around the mean of the random parameter or unobserved heterogeneity over the sample. In this sense, a fixed parameter could be specified instead. The only standard deviation that is statistically significant is associated with the ASC, suggesting that a fixed parameter would not reflect the unobserved heterogeneity over the sample.

Based on these prior results, we estimated the  $RPL_2$  model specifying all the design attributes as fixed coefficients and the ASC as a normally distributed random parameter. To capture the sources of observed heterogeneity, the  $RPL_2$  model includes the intrinsic characteristics of the respondents<sup>10</sup> (socio-demographic, cultural consumption, experience relative to the ADWR and indicators related to the visit).

<sup>9</sup>As the direction of the preferences is not clear (the parameters may have positive or negative values), the landscape coefficients (VIN, MOS, AGGLO) are specified to be normally distributed. As is conventionally done, the tax attribute is specified as a fixed or non-random parameter.

<sup>10</sup>In terms of model fit, the  $RPL_2$  outperforms the  $RPL_1$ , considerably improving the convergence value of  $LL$ , the AIC criterion and the pseudo-R<sup>2</sup>.



The evidence on the influence of the design attributes remains unchanged. All the attributes of the ADWR are positive and statistically significant, and the magnitude of the coefficients suggests the following rank order: VIN, AGGLO and finally MOS. The TAX attribute remains statistically insignificant.

**Table 8 Estimation Results of the RPL**

		RPL <sub>1</sub>		RPL <sub>2</sub>		RPL <sub>3</sub>	
		Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
<b>Random parameters</b>							
VIN	Mean	0.45***	0.069				
	SD	0.0006	0.08				
MOS	Mean	0.13*	0.07				
	SD	0.01	0.17				
AGGLO	Mean	0.29***	0.069				
	SD	0.027	0.18				
ASC	Mean	-4.25***	1.01	4.3	4.6	4.16	4.49
	SD	9.5***	1.45	7.2***	1.12	6.8***	1.1
<b>Fixed parameters</b>							
TAX		0.00023	0.0022	0.0015	0.002	-0.005	0.006
VIN				0.49***	0.073	0.487***	0.073
MOS				0.16**	0.075	0.17***	0.075
AGGLO				0.33***	0.072	0.33***	0.073
<b>Respondent characteristics</b>							
GE			0.52	1.17	0.52	1.14	
AGE			-0.17**	0.07	-0.16***	0.07	
EDU			1.94*	1.16	1.87*	1.09	
INCOME			3.65***	0.93	3.48***	0.91	
MEMBER			4.26	3.16	4.2	2.7	
FIRST			-8.9***	2.03	-8.5***	1.9	
PURPOSE			1.76	1.24	1.65	1.2	
LIST			5.98**	2.05	5.7***	1.89	
KNOW			-1.67	1.52	-1.69	1.43	
IDENT			3.1**	1.35	2.93**	1.3	
CCULT			-0.047	0.05	-0.044	0.045	
SIZE			-1.66**	0.66	-1.59**	0.65	
KM			-0.004	0.005	-0.004	0.004	
JOB			2.98*	1.55	2.88*	1.5	
<b>ADWR Visit</b>							
DAYS			1.7***	0.5	1.59***	0.48	
PERSON (no.)			-0.15	0.19	-0.14	0.18	
EXPEND			-0.0027	0.0076	-0.002	0.007	
<b>Interaction</b>							
Trade*P					0.007	0.006	
LL <sub>0</sub>		-1641.3		-1509.49			
LL <sub>Model</sub>		-1102.33		-969.25		-964.54	
		(LL <sub>MNL</sub> = -1604.5)		(LL <sub>MNL</sub> = -1285.8)			
Pseudo R <sup>2</sup>		0.328		0.358		0.358	
AIC/N		1.488		1.44		1.44	
Chi squared		1077.99 [9 d.f.]		1080.48 [23 d.f.]		1076.4 [24 d.f.]	
		p=0.00000		p=0.00000		p=0.00000	
N (n)				1494 (249)			

\*\*\*, \*\*, \* Significance at 1%, 5%, 10% level; SD=standard deviation of coefficient;  $ASC = \beta_0$ ; LL<sub>0</sub>=Restricted log likelihood; LL<sub>Model</sub>= LogLikelihood (model)

Concerning the statistically significant individual characteristics, the utility provided by the choice of a preservation programme (versus the “none” option) decreases for

older respondents (AGE), which is similar to the negative influence on preservation found by Tuan and Navrud (2007) in the segment of foreign visitors. Nevertheless, the literature is not unanimous regarding the influence of age. For example, Morey et al. (2002), Morey and Rossmann (2003) and Mazzanti (2003) concluded that the utility derived from preserving the past increases with age, confirming that the loss of heritage affects the identity of older people (Peacock, 1995).

The positive influence of EDU and INCOME corroborates: i) the findings that the cultural heritage is interpreted and enjoyed by those with a certain degree of knowledge and education (e.g. Amestoy, 2013), because of the interconnection between education and culture whereby “educational processes play a major role in forming cultural values, opening up cultural experience” (Throsby, 2010: 181); and ii) evidence from other cultural research (e.g. Morey and Rossmann, 2003; Morey et al., 2002; Mazzanti, 2003; Pearce et al., 2002; Pollicino and Maddinson, 2002; Snowball, 2008; Tuan and Navrud, 2007) that the preservation or value of cultural heritage increases with higher income levels. Linked to the economic context, as expected, the utility of preserving is greater for employed respondents (JOB) than for their counterparts (unemployed, student and retired) and is lower as the size of the household increases (FAM), probably because large families face higher financial burdens and so would find it more difficult to contribute to a preservation programme.

Bearing in mind the importance to appreciation of experiencing and being exposed to cultural goods and services (e.g. Pearce et al., 2002), repeated visitors attribute more utility to a preservation programme than do first time visitors (FIRST). Additionally, the positive influence of LIST on visiting decisions can be understood as an effect of UNESCO listing, signalling value and attention to the need for preservation.<sup>11</sup> At the same time, as expected, individuals who distinguish the historical and cultural elements in the ADWR are more willing to support preservation than those who do not have this knowledge (IDENT); in addition, visitors whose visit is longer (DAYS) are also more keen to preserve, presumably because this behaviour indicates interest in the cultural good and consequently a preference for it to be safeguarded.

<sup>11</sup> What consumers consider as heritage is strongly influenced by what is designated as “heritage”, for example by a listing on the UNESCO international world heritage list (Towse, 2010). Listing attracts the attention of various actors: the general public, decision makers, potential sponsors and profit firms (Frey and Steiner, 2013). Additionally, the list adds value: Klammer (2003:11) points out that “get a cultural good on the UNESCO world heritage list, and people will value that good more”.

To understand the statistical insignificance of the price attribute (TAX) better, we estimated the RPL<sub>3</sub> model that includes (in addition to the RPL<sub>2</sub>) an interaction term between the TAX attribute and a variable related to the decision process (TRADE), which is set to be equal to one when the respondent asserts that he or she has considered all the attributes presented and to zero otherwise. Although TAX presents a negative coefficient, as expected, it is still statistically non-significant, and the same is the case when an interaction term is included. In this sense the decision process does not constitute a source of observed heterogeneity associated with the insignificance of TAX. A possible explanation of this result could be related to the economic and financial crisis that was being experienced in Portugal when the survey was conducted.<sup>12</sup> In this context, it seems that the Portuguese are not willing to pay an additional contribution (translated as income tax) to a preservation programme, although they still value the preservation of the traditional attributes of the ADWR.

#### 4 Conclusion

Particularly since the inclusion of the Alto Douro Wine Region on the UNESCO list, the wine *filière*, the cultural heritage and tourism present a clear symbiosis in the region, in the sense that any change in one field necessarily has an effect on the others. Whereas the integrity of the cultural heritage depends on the vine and wine activities, the development of tourism activities is based on both.

Despite the structural changes in viticulture activity, as Andresen and Rebelo (2013) state, the integrity and authenticity of the cultural landscape of the ADWR have not been called into question since the region was included on the list. Nevertheless, there is a tendency for the presence of key elements in the classification of the area as a cultural heritage site, especially the traditional vineyards supported by schist walls and the mosaic landscape, to decrease, as well as for the agglomerations to be mischaracterized. To the extent that visitors are relevant stakeholders for policy making, these trends should be monitored and controlled by landscape managers.

<sup>12</sup> According to the National Statistics Institute (INE), the unemployment rate increased from 7.6% (2008) to 16.3% (2013), payments to employees (including wages and employers' social contributions) decreased by 6.7%, and the growth rate of GDP at constant prices (base 2006) decreased from -0.01% (2008) to -1.37% (2013). As consequence the fiscal policy relied on a systematic increase of income tax. For example, the tax rate on the remuneration from labour for an unmarried individual without dependents with a monthly salary of 1,000€ increased from 8% (2008) to 13.5% (2013). Additionally, from 2013 onwards a special surcharge of 3.5% on all net monthly wages exceeding the minimum wage has been added, and a solidarity surcharge of 2.5% is still applied up to a higher income limit.

The results of the discrete choice experiments indicate that there is a consensus among visitors to the ADWR that the three traditional attributes, in the following order, should be safeguarded: vineyards supported by schist walls, agglomerations and the mosaic landscape. Nevertheless, it seems that the Portuguese are not willing to pay an additional contribution (translated into income tax) to a preservation programme, probably because of the increased fiscal burden imposed on the Portuguese population by the economic and financial crises. In this sense, at this moment, preservation policies should rely on other sources of funding.

From the results obtained, some management policy implications emerge. The richer, those who are employed, the better educated, the better informed (regarding the cultural aspects of the site) and those who are more influenced by the listing are the subjects who have greater willingness to participate in preserving the cultural heritage of the region. In this sense, preservation efforts should always be accompanied by educational campaigns to overcome the lack of knowledge and understanding of preservation values. As stressed by Cofresi and Radtke (2003: 144) "the key to the future of preservation is education".

In addition, since the length of stay also has a positive impact on the utility derived by preservation policies, managers and policy authorities should start to make efforts to connect tourist activities to extend the lengths of stays in the region (e.g. thematic routes, networking visits, integrated shows), at same time increasing local consumption and the sales of wines.

A third guideline is the implementation of incentives for repeat visitors (e.g. new programmes every year), because newcomers assigns less utility to a preservation programme. This evidence indicates that the appreciation and consequently the value interpretation of the ADWR requires exposure and increases with experience.

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Appendix – Schemes and pictures of the different land organization systems of vineyards in the DDR

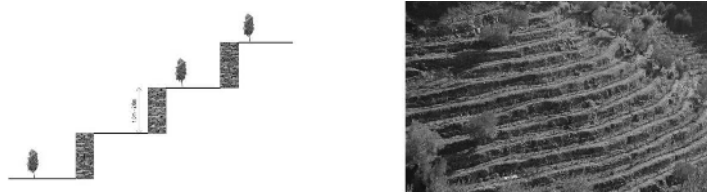


Figure 1.1 Pre-phyloxera *socalcos*

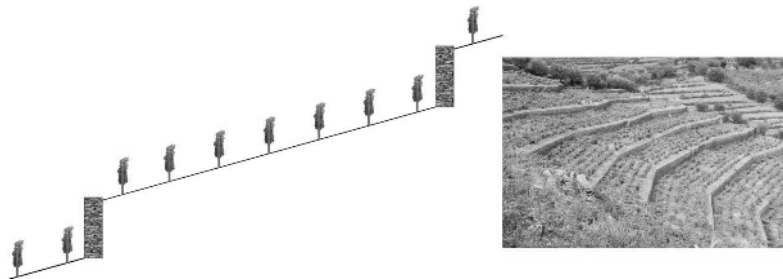


Figure 1.2 Post-phyloxera *socalcos*

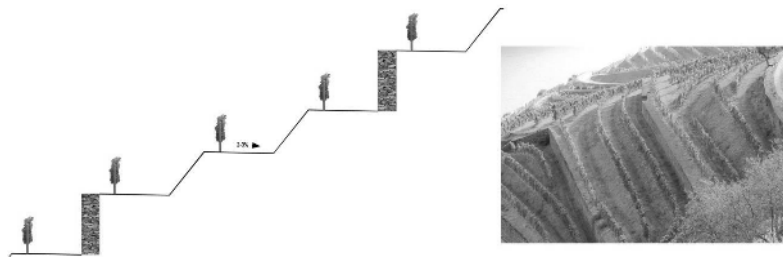


Figure 1.3 *Socalcos* with *patamares*

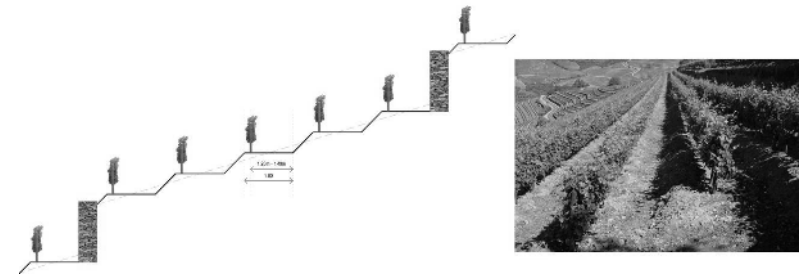


Figure 1.4 *Socalcos* with narrow *patamares*

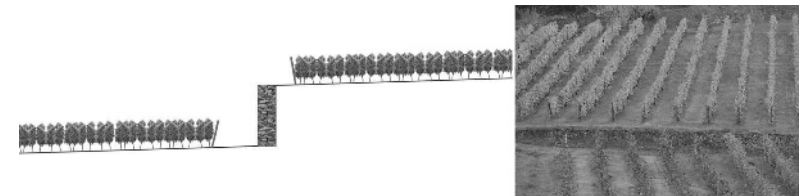


Figure 1.5 *Socalcos* with vertical planting

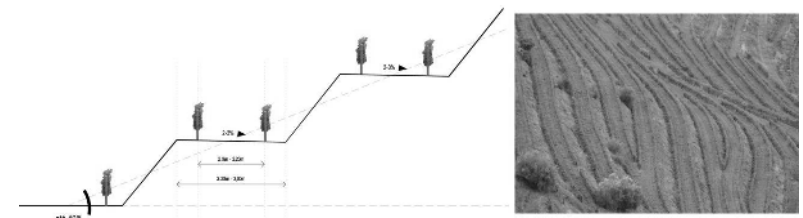


Figure 1.6 Wide *patamares*

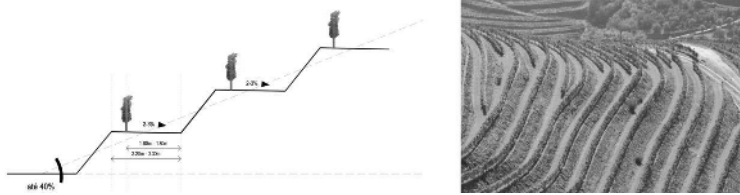


Figure 1.7 Narrow *patamares*

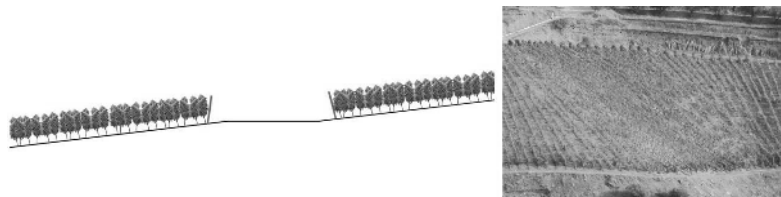


Figure 1.8 Vertical planting

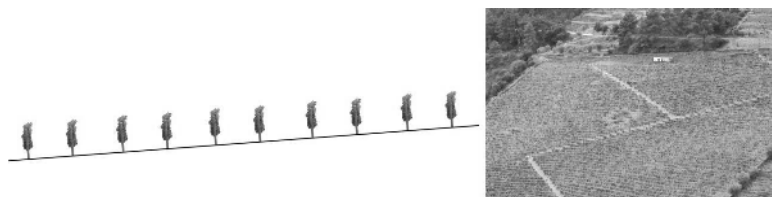


Figure 1.9 No land organization