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UNCOVERING THE MACROSTRUCTURE OF TOURISTS' PREFERENCES. A CHOICE EXPERIMENT
ANALYSIS OF TOURISM DEMAND TO SARDINIA

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Uncovering the macrostructure of tourists' preferences. A choice experiment analysis of tourism demand to Sardinia.*

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Abstract

This paper studies the preferences of tourists visiting the island of Sardinia (Italy), by means of a choice modelling approach. The focus is on some specific demand-enhancing effects which should confirm the feasibility of implementing sustainable tourism policies. Multinomial logit estimations reveal the strong negative effects resulting from the congestion of tourist attractions and the major transformation of coastal environments. On the other hand, recreational services and the proximity of accommodation to the beaches also seem to be important. The computation of willingness to pay measures and choice probabilities for hypothetical destinations illustrate how this kind of approach can provide useful information in determining decision processes by policy makers and development agencies.

Keywords: Tourism demand, green preferences, choice experiments, stated preferences
JEL classifications: Q56, L83, C25

1. Introduction

This paper examines the application of stated preference techniques (in particular discrete choice modelling) into the debate on designing policy commonly thought to be best suited to achieving "sustainable tourism development".

From a long-run economic perspective, the role of tourism is dubious. The literature has outlined some possible negative effects, such as dependence to foreign capital and to a volatile demand (Sinclair, 1998), disturbances in the labour market (Nowak, Sahli, Sgro, 2005), Dutch disease effects (Nowak and Sahli, 1999, 2005), land competition and speculation (e.g.; Giannoni and Maupertius, 2005). However, several theoretical studies (e.g. Lanza and Pigliaru, 1994; Rey-Maquieira, Lozano and Gómez, 2005; Cerina, 2005) have pointed out that these negative effects

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can be outweighed through a cautionary management of natural resources, not only in ensuring the long-run exploitation of resources, but also in increasing tourist willingness to pay, and ultimately tourism receipts.

In fact, the focus on the dynamics of tourists' expenditure is central for the debate on the growth potentials of the tourism sector which, on the one hand, is characterised (on the supply side) by a lower-than-average rate of productivity growth; but, on the other hand, can experience high rates of revenue growth thanks to the role (on the demand side) of "terms of trade" (Lanza and Pigliaru, 1994) and "high demand elasticity to income" effects.[1] In the theoretical literature on the dynamics of tourism economics, a "cautionary management" may take place whether by policies for the preservation of environmental quality, or for the limitation of tourists' arrivals.

However, these views appear in sharp contrast with how the tourism industry is being often developing in "practice" in many areas, where the main focus of attention has been the setting up of infrastructure, residential buildings and services, whose construction often negatively affects the original features of the very natural resources that made a given area attractive as a tourist destination.

A key issue is how to assess whether such transformation of tourist sites and destinations is the result of a rational attempt to respond to tourist preferences, or an undesirable consequence of market failures that have led to a non optimal exploitation of natural resources. If the second supposition is true, many tourism economies are currently on a sub-optimal path of economic development due to their failure to adequately satisfy consumer preferences as regards the quality of environment. Unfortunately, this "demand-led" path to economic and physical sustainability lacks substantial empirical evidence, given that it is difficult to verify it by means of the data sets on international tourist demand currently available. It is perhaps for this reason that empirical analyses of tourist demand have usually been carried out only at aggregate level on less specific issues.

It is customary to say that tourism economies relying on natural resources "supply their territory" to the international market. However, this is a rather generic expression that encompasses a set of characteristics ranging from the environmental state of a given natural attraction, to man-made

[1] See, for example, Hazari and Sgrò (1995).

facilities such as recreational services and, at least to some extent, the ease of access to a particular natural resource. In other words, tourism is a typical composite good, whose appeal clearly depends on how well balanced the mix of component characteristics is.

An empirical research method suited to the analysis of the relationship between product characteristics and consumer behaviour is the discrete choice modelling technique. In the last 15 years, literature on tourism economics has shown growing interest in stated preference approaches applied to the analysis of tourism demand (e.g. see the survey by Crouch and Louvière, 2000). Some studies have focused on very specific subjects, such as identifying the effects on WTP by selected characteristics that an accommodation facility or a single site should possess (e.g. Morimoto, 2005, studies tourist behaviour in the locality of Luang-Prabang, Laos); or estimating price responsiveness of "single origin-single destination" flows of international tourist demand (e.g. Morley, 1994). A slightly different approach, in line with a long tradition in transportation studies, has been that of applying discrete choice modelling to destination choice, both for international tourist demand (Huybers, 2003a; Huybers and Bennett, 2000), and for modelling factors that determine inbound tourism flows for short trips (Huybers, 2003b).

In fact, as Huibers (2004) remarks, the use of discrete choice modelling in tourism has appealing properties from a scholarly perspective, as a useful research method applicable to empirically testing some theoretical hypotheses on tourist-consumer behaviour (e.g., think of price sensitivity and "green preference" effects), and from a more policy-oriented viewpoint, as a tool which policy makers and promotion agencies can use in order to analyse the attractiveness of their existing products or tailor "tourism products" to existing and new target markets.

We consider both perspectives very important, and therefore endorse choice modelling as an analytical basis for an empirical analysis of the recent debate on tourism and sustainability. What information can we really infer from current demand, in particular in order to design an accurate "destination profile" for elaborating local and/or regional policies? Moreover, are current development projects consistent with the actual needs of demand? Also, are "sustainable tourism policies" an optimal, or at least a satisfying strategy for areas with important (and potentially marketable) natural resources?

With regard to the specifics of this study, which is based on the analysis of a sample of tourists interviewed in Sardinia's airports, tourist preferences are elicited by means of the choice

experiment technique, where respondents are asked to indicate their first choice among a series of available alternatives (technically, the "choice set"). In particular, by means of our choice experiment survey, carried out on a sample of tourists on completion of their holiday in Sardinia, we examine how tourist preferences are differentially affected by high or low degrees of accessibility to the tourist attraction, by the existence of protected areas in the vicinity of the accommodation, by the quality of the natural resources as well as by the overcrowding of tourist destinations. The use of standard econometric techniques for the analysis of discrete choice data enables us to generate estimates of the relative importance of these attributes. We also use the estimation results to simulate the effects on the likelihood that some hypothetical destinations (as defined by the various combination of the aforementioned attributes) are chosen over others. Finally, monetary evaluation of these characteristics are estimated and presented.

The structure of the paper is as follows. In the next section, we briefly describe the econometric procedures used for analysing the data. In section 3, we describe the structure of the study carried out in order to analyse tourism flows in Sardinia and the resulting dataset. Section 4 contains the main results of the analysis, and section 5 concludes by focusing on the main policy implications of the results.

2. Econometric tools for modelling tourists' choices

In this section we briefly summarize the analytical tools used for our empirical application based on the technique of choice experiments. We only recall the basic expressions used for carrying out the estimates, given that discrete choice techniques are nowadays well established.[2] In fact, after being initially developed in transportation and marketing literature, in more recent years the technique has also found several applications in environmental economics and health economics studies.[3]

As we said in the introduction, one interesting application of choice modelling to inbound tourism has been that of studying how the probability of one destination being chosen to another depends on the different combinations of certain basic characteristics (e.g. Morley, 1995). As a step forward, here we aim to assess the importance (in relative terms) of some "characteristics

[2] Recent reference texts are Louvière *et al*, 2000; Train (2003); Bateman *et al* (2002).
[3] E.g., see the surveys by Hanley, Mourato, and Wright (2001), Mazzanti (2003), and by Ryan and Gerard (2003), referred respectively to environmental economics, evaluation of cultural goods, and health economics literature.

which support sustainability", such as lack of overcrowding and preservation of quality in a natural environment vs. locating lodgings near to beaches and/or leisure services.

We want to stress that stated preference approaches are often the only empirical methodology available, given the absence of detailed data and the need to evaluate new policies and interventions. Moreover, a stated preference analysis gets rid off simultaneity problems which would characterize a study based on real markets data (as a simple example, think of the bi-directional link between overcrowding and tourist demand).

The theoretical basis for the application of stated preferences (in particular of choice modelling methods) to the demand of composite products is the Lancasterian approach to consumer analysis, in which utility for each good is defined as a weighted sum of a set of basic characteristics. When applied to tourism, these characteristics can be simply defined as the set of attractions and facilities which concur to define a holiday as a pleasant experience. Hence, when a choice experiment is carried out, the choice by the respondent should reflect, *ceteris paribus*, the combination of attribute levels which offers the highest utility for a given set of choice possibilities (the "choice set").

Although many complex estimation procedures are now available,[4] in this paper we base our empirical analysis on the estimates arising from a standard discrete choice multinomial logit model (henceforth, MNL).[5] As is well known, the MNL model enables us to relate the choice made by an individual in a real or hypothetical context to some characteristics which vary across his or her choice set.

More specifically, the data arising from the $j = 1,2, \ldots J$ alternative choices which are observed, and taken by a sample of $h = 1,2, \ldots, H$ respondents, are described according to a random utility specification such as the following:

$$U_j^h = V_j^h + \varepsilon_j^h = \boldsymbol{\beta}' \mathbf{x}_j^h + \varepsilon_j^h, \tag{1}$$

[4] See for example Train (2003).
[5] This model is also referred as the "conditional logit" (e.g. Greene, 2003). Here we follow the terminology adopted by Mc Fadden (1984) and Louvière *et al.* (2000).

where the vector $\mathbf{x}_j^h$ may refer to characteristics of both the choice alternatives and of the respondent. Therefore, the index structure $\boldsymbol{\beta}'\mathbf{x}_j^h$ implies a linear additive specification of indirect utility functions V_j. If an element of $\mathbf{x}_j^h$ is common to all alternatives of the choice set, the variable is termed *generic;* otherwise it is *alternative specific*. Intuitively, only the latter may affect a choice probability, unless generic variables are artificially "made" alternative-specific by associating them only with certain alternatives of the choice set.

The individual random components ε_j^h are assumed to be independently and identically distributed[6] (IID) with an extreme value type 1 (Gumbel) distribution with mean $\eta+\gamma/\mu$ and variance $\sigma^2 = \pi^2/6\mu^2$.[7] The IID assumption across alternatives of the unobservables leads to the well known property of independence of irrelevant alternatives (IIA). The property states that the odds ratio of an alternative *k* being chosen over alternative *l* is independent of the availability of attributes or alternatives other than *k* and *l* (e.g., McFadden, 1984). Therefore, the exclusion of some alternatives in estimation does not affect the consistency of the estimator, and the odds computed with a dataset related to a limited number of choice alternatives is still a reliable statistics for the market behaviour, even in cases where more choice possibilities are feasible.

One advantage of the above assumptions regarding the functional form is that the MNL model provides a particularly simple close form to estimate. Namely, the likelihood that household *h* chooses alternative *k* is:

$$\mathrm{P}[y_h = i] = \frac{1}{\sum_{j=1}^{J} \exp\left[-\left(V_i - V_j\right)\right]}. \tag{2}$$

The previous expression also makes clear that individual specific variables are cancelled out by the difference V_i - V_j.

Rearranging and using the index $\boldsymbol{\beta}'\mathbf{x}_j^h$ instead of V_i we get:

[6] The IID hypothesis implies that $\mathrm{cov}\left(\varepsilon_j^h, \varepsilon_i^h\right) = 0$ and $Var\left(\varepsilon_j\right) = \sigma^2 = \pi^2/6\mu^2, \forall j$, so that on the whole the variance – covariance matrix of the MNL is constant and simply equal to $\Sigma = \sigma^2 I$.

[7] The parameter η is the mode of the distribution, μ is a positive scale parameter, π = 3.14159 and γ = 0.577 (the Euler's constant).

(3) $$\mathrm{P}[y_h = i] = \frac{\exp\left(\boldsymbol{\beta}' \mathbf{x}_i^h\right)}{\sum_{j=1}^{J} \exp\left(\boldsymbol{\beta}' \mathbf{x}_j^h\right)},$$

where y_h is an index of the choice made by household *h.*

Equation (3) can be directly employed to estimate choice probabilities. From these, the market shares for the problems involved are directly obtained. The IIA hypothesis is crucial, here. In fact, if analysts believe it is valid, a choice between two alternatives can be enough for enlarging analysis to a case scenario with many possible choices (e.g., see Train, 2003, pp. 53-54). Otherwise, what needs to be done would be to build choice experiments with a number of alternatives as far as possible similar to those an individual faces in real life. This of course would expose the choice experiment to dramatic increases in task complexity for the respondent.

By estimating the previous model, we obtain an estimate of the relative weight of an attribute for each individual utility function. Substitution rates between the attributes can then be easily computed. In the case of continuous attributes, these rates translate into marginal effects and, with straightforward modifications, into elasticities. When the attribute to be evaluated is discrete, what can be actually computed is a "value of level change".

A very useful kind of substitution rate to use is the "implicit price", which can be computed when there is an attribute expressed in monetary terms. In this case, given the linear specification of the indirect utility function, welfare effects of a level change are measured as follows:

(4) $$WTP = -\frac{1}{\beta_p}\left(V_0^h - V_1^h\right).$$

The subscripts (0,1) in equation (4) define the indirect utility functions before and after the policy change, whilst β_p is an approximation of the inverse of marginal utility of income, which is usually given by the estimated coefficient associated with the attribute expressed in monetary terms. Alternatively, an estimate of the marginal utility of income can be obtained from the coefficient of a regressor defined as the difference between a respondent's income and the cost of the alternative.

As is explained, for example, in Louvière *et al.* (2000, pag 337), with the expression (4) we get the compensating variation in a case where an individual chooses a particular alternative (destination) with certainty. Alternatively, it can be seen as an appropriate measure for cases where a quality variation applies to all the alternatives of the choice set (Haab and McConnell, 2002). Moreover, even though it is widely acknowledged that the marginal utility of income actually varies with income, the use of the expression is justified by hypothesising that the marginal utility of income is constant over the range of implicit income changes involved by a given policy intervention. This would be quite feasible in cases where the cost difference of a choice alternative is small relative to individual income.

In addition to pointwise estimates, confidence intervals should be computed. Generally, the Krinsky-Robb technique or bootstrap methodologies are used. However, when one aims to evaluate the value of a single level change of a categorical attribute *i*, so that equation (4) reduces to the negative of the ratio of the associated parameter $-\beta_i/\beta_p$, also a more immediate approximate estimate of the standard error can be computed, where an orthogonal experimental design is used.[8] In particular, following Bateman *et al* (2002), we have that

$$\text{(5)} \qquad \operatorname{var}(WTP) \equiv \operatorname{var}\left(\frac{\beta_i}{\beta_p}\right) = \left(\frac{\beta_i}{\beta_p}\right)^2 \left[\frac{\operatorname{var}(\beta_i)}{\beta_i^2} + \frac{\operatorname{var}(\beta_p)}{\beta_p^2} - \frac{2\operatorname{cov}(\beta_i, \beta_p)}{\beta_i \beta_p}\right].$$

In the case of an orthogonal design, the covariance term is zero, so that the previous expression reduces to:

$$\text{(6)} \qquad \operatorname{var}(WTP) \equiv \operatorname{var}\left(\frac{\beta_i}{\beta_p}\right) = \left(\frac{\beta_i}{\beta_p}\right)^2 \left[\frac{\operatorname{var}(\beta_i)}{\beta_i^2} + \frac{\operatorname{var}(\beta_p)}{\beta_p^2}\right].$$

3. An outline of the survey and resulting database.

The survey was carried-out between June and October 2005 by means of personal interviews in three major airports of Sardinia. It aimed to collect comprehensive information sets encompassing the personal characteristics of tourists, their chosen holiday location and average daily expenditure, and a series of opinions and observations concerning their experience of the

[8] Orthogonal designs are the most used solution for the design of choice experiments. See Louvière *et al* (2000) for details, and the next section for the description of the design used in this paper.

"Sardinian tourist product". The survey included a choice experiment questionnaire designed to obtain original data on the tourist's perception of certain features (particularly with regard to the environment) of a standardised (and hypothetical) range of Sardinian destinations based on hotel accommodation.

The interviews were carried out on people leaving Sardinia, after holidaying in the island. Therefore, they were familiar with the kind of destinations proposed in the questionnaire. We are aware that the elicitation of individual's preferences after making their choice of destination might involve the risk of self-selection bias, if these preferences concern the estimation of choice probabilities for different destinations. However, stated choices by "experienced tourists" rather than by prospective ones have the advantage of providing information by an "informed" sample of people who properly know the nature of the product in question. Moreover, no bias effects occur when the focus is on the characteristics of existing tourist demand flows to Sardinia, rather than on the estimation of the probability of attracting additional flows. Of course, a policy intervention aimed at better matching and responding to the preferences of existing tourists is likely to have also an impact on destination choices at a more general level.[9]

With a view to collecting the required information, the survey was organised as follows. The questionnaire consisted of two main parts, one focusing on socio-demographic characteristics such as age, sex, and provenience (Italian region or country). Also, respondents were asked to give information about their mode of booking, the kind of accommodation, the main motivation for the holiday, etc. Finally, the personal daily expenditure was collected, for purposes of comparison with other existing studies. Most of these variables can be employed to check for the representativeness of the sample and perform some comparisons between subsets of the final demand (see table 2 and 3 below). The second part of the questionnaire introduced the choice experiment by means of short descriptions of the purpose of the survey and of a basic scenario (the "fixed" characteristics). The last part of the questionnaire asked some check questions to verify the quality of data collected and asked respondents to indicate their net personal annual income.[10]

[9] More precisely, the effect on overall tourist expenditure would be zero only when the property of weak separability between regional destinations holds for international tourist demand. When the focus is on the forecast of the variation of choice probabilities, an analysis based on stated choices of potential tourists is to be recommended, in order to avoid the potential for incidental truncation with surveys of tourists at their destinations (e.g., see Morley 1994; Huybers and Bennett, 2000); Huybers, 2003).

[10] The complete questionnaire which was prepared for the survey is available on request.

As a basic scenario for carrying out the choice experiments, tourists had to choose between various alternatives for a week's holiday (six nights) in a good quality three star hotel. The holiday scenario considered was a mainly "beach and sea-side" vacation, with accommodation in the vicinity of a sea-side resort. This would not of course exclude the possibility of doing excursions to inland areas of the island. However, the primary tourist attraction was the sea.

The description of the hypothetical scenario was followed by presentation of the "attributes" to be considered. These dealt with characteristics that varied in the choice set of the experiment according to our experimental design. Each attribute could assume different levels in each profile presented for choice; and in order to make the following choice process easier (in addition to the textual and oral explanation of different attribute levels) the interview showed respondents the illustrative choice set shown in Figure 1 below.

Figure 1: *An illustrative show-card used in the choice experiment*

Questionnaire type 1; Card n° 1

Assuming that the only two possible choices are the following, which would you choose?

Features of holiday	Type A holiday	Type B holiday
Proximity of main tourist attraction	**High**	**Low**
Risk of overcrowding in main point of attraction	**High**	**Low**
An uncontaminated natural environment	**Maximum**	**Minimum**
Availability of additional services	**Good availability**	**Low availability**
A nature reserve in the vicinity of your holiday location	**Yes**	**No**
daily cost per person per night	**80**	**65**
18. Preference (Tick one box only)	❒	❒

We defined and categorised the six attributes on the basis of several rounds of 'expert opinion' meetings carried out in February and March 2005, of a previous survey carried out in 2003 by CRENoS (where tourists were asked to indicate what characteristics they considered Sardinia lacked in terms of tourist services), and a first pre-test consisting of about 50 interviews carried out during the period of the Easter holidays, when the first sizeable tourism flows usually come to Sardinia. The pre-test was particularly useful for assessing if the attributes were presented in a

clear and understandable manner, i.e. whether the attribute labels and the wording of each attribute level were valid.[11]

The description of attributes and their levels are shown in Table 1. We think that some additional explanation is needed at least for the first two attributes. Namely, since the main attraction of Sardinia is its sea and coast, we needed a measure of the disutility of the distance of accommodation from the main "attraction site", i.e. the beaches and/or the seaside scenery. Ten minutes by car or public transport on a tourist route cover a distance of about 2 km. Given that building accommodation inland rather than on coastal areas reduces environmental impact, detecting tourist aversion to distance is important for municipal and regional territorial planning policy.

Table 1: *Description of the attributes and attribute levels of the choice experiment.*

1.Proximity of main tourist attraction (principal motivation for holiday choice)	- High: The main attraction (the beach) is easily reachable on foot from your accommodation - Low: From your accommodation, it requires about ten minutes by public transport or by car to reach the main attraction.
2.Risk of overcrowding in main point of attraction	- Low: Your hotel guarantees easy access to main tourist attraction (e.g. parking and sunshades reserved for hotel guests) - High: Your hotel does not guarantee easy access to main attraction (tourists rely on their own means)
3.An uncontaminated and untouched natural environment as a primary attraction	- Maximum: a site only reachable on foot, and leaving your car in a place not visible from the beach, and where there are no information and bar/restaurant services, and no buildings in the vicinity - Good: a site only reachable on foot, and leaving your car in a place not visible from the beach, but with some tourist information signs and basic services, around which there are some buildings which are, however, scarcely visible. - Discrete: a site with a nearby parking facility as well as information points and bars/restaurants available; buildings clearly visible. - Minimum: a site with ample parking and adjacent buildings; no lack of shops and kiosks or bar/restaurant services.
4.Availability of recreational services (e.g. guides, entertainment/ organised activities, shopping areas, pubs and night spots).	- Ample availability: A wide variety of all kinds of additional/complementary services in the location chosen. - Good availability: A reasonably good choice and variety of additional/complementary services in the location chosen. - Low availability: A reasonably good choice and variety of additional/complementary services in the location chosen. - Minimal availability: A scarce or total lack of additional/complementary services in the location chosen.
5.A natural reserve in the vicinity of your holiday location	- Yes: A nature reserve is within 30 minutes reach of your accommodation (for example, a marine park, a local nature reserve). - No: There are no nearby nature reserves, or at least 30 minutes is needed to reach one.
6.Daily cost per person per night (half board accommodation in a 3 star hotel)	- 50 euros - 65 euros - 80 euros - 95 euros

[11] In fact, the pre-test of the questionnaire in the Easter 2005 period consisted of about 100 interviews, with a share of these devoted to test a version of the choice experiment where an attribute regarding the kind of holiday (sea versus natural-cultural holiday) was included. Tourists mainly opted (lexicographically) for sea-side vacation, so that we gave up examining different kinds of tourism attractions in the same choice experiment. At present, a survey with the natural/cultural-based holiday scenario is also being carried out.

The second attribute aimed to capture aversion to overcrowding, which clearly constitutes a difficult task. Rather than trying to find an exact definition of a "perceived" carrying capacity, we considered that what tourists particularly dislike is the "risk of overcrowding", which occurs when the availability of the main tourist attraction (access to the beach and the sea) is not guaranteed since it must be contended with other visitors. The most immediate way to elicit a valuation of this effect was to envisage the possibility of "preferential access" associated to the accommodation. Where this preferential access is not guaranteed, tourists were faced with the risk of overcrowding (involving the need to find a place to park the car, to go ahead of time to the beach, etc).

The explanation of the scenario, of the attributes and corresponding levels may be quite time-consuming. This is one of the critical points of the choice modelling method because an inaccurate definition of attributes would make the detection of preferences less precise. But since a proper description requires time, interviewers were at risk of having to abandon the interview. Overall, the average length of the interviews was slightly less than 15 minutes.[12]

In theory, the full factorial arising from all the possible combinations would yield 512 profiles, but in order to keep the number of the required stated choices at a manageable size, we varied the level of the attributes according to an orthogonal fractional factorial design which yielded 32 profiles. The choice sets were then built by means of a "shifted pairs" technique (see Louvière *et al*., 2000). Accordingly, these 32 choice sets were divided into 4 groups made up of 8 choice cards similar to the one presented in Figure 1. Each tourist was asked to provide answers to one group of choice cards (i.e. to make 8 choices). Finally, with the purpose of limiting order bias, the 8 choice sets administered to each respondent were rotated sequentially.

We did not include any "none of these two alternatives" options in the choice cards. This is a debated issue. In our case, the main argument against inserting this third option was that respondents might have simply indicated this third option in those cases where it was difficult to make a choice between the two alternatives, or they did not like the alternatives proposed. On the contrary, giving respondents' the option not to choose any profile would make sense when the possibility of preferring not to go on holiday is made explicit (e.g., as in Huybers, 2003,b). In this study, however, we were not interested in estimating the probability or not of coming to

[12] The place where the interviews were carried out (directly by the gate area in the airport) made much more simple the administration of the questionnaire.

Sardinia, but rather how tourists might distribute according to the characteristics of the locations. Moreover, introducing the "no choice" option often leads to very high values of the alternative specific constants, which then become the main components of the willingness to pay estimates (e.g. Adamowicz *et al*., 1998).[13]

Sample representativity

The survey was planned so as to respect a simple stratification of the sample according to two characters of tourists universe: nationality (mainland Italy or foreign tourist) and type of accommodation (hotel and other categories). We based our survey plan on 2003 tourist flows (overnights), aiming also to respect the seasonality for the distribution of questionnaires. A total of 715 questionnaires were successfully completed.[14] The main characteristics of the samples are shown in the tables below.

Table 2: *Main socio-demographic characteristics*

Gender	
Male	57%
Female	43%
Total	**100%**

Age	
Average (years)	40,1
Median	39
15-30 years	26%
31-45 years	43%
46-60 years	23%
Over 60 years	8%
Total	**100%**

Personal Income	
Mean	€ 42.572
Median	€ 30.000
< € 10.000	11%
€ 10.000 - € 20.000	17%
€ 20.000 - € 30.000	19%
€ 30.000 - € 40.000	15%
€ 40.000 - € 50.000	9%
€ 50.000 - € 60.000	7%
€ 60.000 - € 75.000	7%
€ 75.000 - € 100.000	5%
> € 100.000	10%
Total	**100%**

Over half the respondents were male, aged on average 40, with a good cover of all demographic classes. What is most striking in these descriptive statistics is the very high average income, especially for foreign tourists (50,788) but also for the Italians (39,053),[15] relative to the national average income. In fact, the average per capita disposable income in Central and Northern Italy (the areas from which the vast majority of Italian tourists originate) is about € 16.000. This might be due to the high number of interviews with tourists staying in high quality hotels, due to

[13] In order to check if this format of the choice experiment constitutes a strong limitation, we carried out a test on a subsample of respondents by introducing a follow-up question which allowed them to confirm the choice made or to say "neither of these two alternatives". We find that the inclusion or exclusion of these answers does not change the quality of the results.

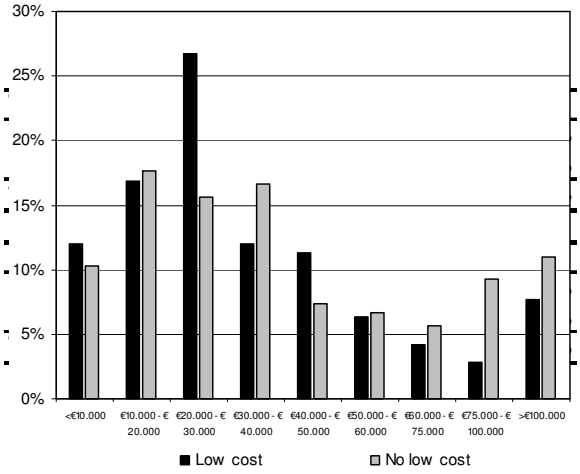
[14] The survey was part of a larger experiment that include another questionnaire with a scenario based on natural and cultural resources. The results of the complete survey will be presented in a future work.

[15] The highest recorded income was 500,000 euros. Hence this result is not affected by the existence of outliers.

the fact that the interviews were mainly conducted in the airport located in the South of island, where the hotel quality is generally high, but in fact, even tourists not lodging in 4 and 5 star hotels actually declared a quite high income (mean 35,662; median 25,000).

Table3: *Summary of information regarding respondents' holidays*.

Official flows and sample distribution	Sample (excluding VFR and Farmhouse)			Official data (ISTAT, 2003)		
	National	Foreign	Total	National	Foreign	Total
5 and 4 stars	17%	17%	34%	22%	9%	31%
3 stars and holiday residence	16%	8%	24%	30%	10%	40%
2 and 1 stars	1%	1%	2%	3%	2%	5%
Camping or village resort	9%	3%	12%	13%	6%	20%
Rented villa or 2nd home	12%	8%	20%	3%	1%	3%
B&B and other accomodation	7%	1%	8%	0%	0%	1%
Total	62%	38%	100%	72%	28%	100%



Use of low cost fly and income	National		Foreign		Total	
	Yes	No	Yes	No	Yes	No
Average	36.725	39.595	41.999	61.127	39.865	44.449
Median	20.500	28.000	30.000	40.000	25.000	30.000

Let us now briefly comment on the information regarding tourists' holidays. Over half of the respondents indicated that they had made use of hotel facilities, in particular 4 or 5 stars hotel (34% of sample). One fifth of respondents stayed in rented houses for their own vacation or at friends/relative's home. Not considering the category "friends and relatives", (which is not recorded in official statistics), nor the quota of rented villa not registered,[16] the sample distribution is generally in line with the distribution of tourist flows according to nationality and

[16] In Sardinia this quota is estimated particularly high

kind of accommodation. Only the 3 star hotel category quota in the sample is underrepresented compared to official flows. The majority of respondents indicated that they did not use a tour operator to book or purchase their accommodation and travel, preferring a self-made holiday We also asked tourists if they made use of low cost companies to reach the island. Over 50% of respondents had chosen this kind of carrier. The low cost customers, as the chart above shows, were relatively more distributed in the lower income classes. Still, mean and median values indicate that even "low cost flight travellers" arriving in Sardinia represent on average a rich niche market.

4. The main empirical results

In this section we present and comment on the main results of our analysis and report some summary descriptive statistics and the econometric estimates obtained by the application of the MNL model on the data described in section 2.

As can be seen in Table 4 below, we have made use of two samples. The first one, encompassing all the observations arising from the 715 completed questionnaires, and the second one involving only tourists who had not stayed in 4 or 5 star hotels. The reason for sampling out the high-spending tourists was to measure a potential different sensitivity to the accommodation costs used in the choice experiment, which were referred to a half board accommodation in a 3 star hotel.

The estimates based on the entire sample are reported in the first half of the table. All attribute levels are inserted as dummies. The cases excluded so as to avoid any singularity in the variance-covariance matrix are "low proximity of the accommodation to the main attraction", "low risk of overcrowding", "maximum level for the quality of natural environment", "minimal availability of recreational services", and "absence of a nature reserve in the vicinity of the holiday location". Finally, an alternative specific constant (ASC) was inserted, in order to ensure that the MNL was able to reproduce observed market shares, and check for the stability of the results. In fact, no changes occur when the ASC is excluded. The "z statistics" values indicate the general high significance of most attribute levels. Moreover, in all cases the signs concord with economic intuition.

In discrete choice models, commenting on the absolute values would be misleading since all utility parameters are actually multiplied by a common unobservable scale parameter related to the variance of the unobservables. However, having a model with only categorical variables (apart from the cost attribute), the estimated coefficients make it easily viable to carry out an evaluation of the importance of the single attribute and attribute levels in relative terms, that is of the characteristics of the "tourist product" each other.

For example, if we set the parameter regarding the availability of hotel accommodation near the sea as being equal to one, we get a value of -1.50 for risk of overcrowding and of 1.16 for the existence of a protected area, of -0.89 for a shift in environmental quality to a discrete level (-1.71 in the case of the lowest level), and of 0.94 for a shift from minimal to good availability of recreational services (1,05 for an ample availability).

Table 4: *Multinomial logit estimation*

	MNL model with all observations			**MNL model without people in 4 and 5 star hotels**		
Variable	**Coeff.**	**z-value**	**Prob**	**Coeff.**	**z-value**	**Prob**
Proximity of the beach (0 low, 1 high)	0,3633	10,70	0,000	0,3481	8,85	0,000
Risk of overcrowding (1 if no guarantee of access)	-0,5433	-16,53	0,000	-0,4944	-12,98	0,000
Good quality of natural environment (excluding dummy "maximum quality")	-0,0762	-1,40	0,161	-0,0819	-1,30	0,195
Discrete quality of natural environment (excluding dummy "maximum quality")	-0,3237	-4,96	0,000	-0,3085	-4,08	0,000
Minimal quality of natural environment (excluding dummy "maximum quality")	-0,6226	-10,59	0,000	-0,5633	-8,26	0,000
Low availability of recreational services (excluding dummy minimum availability)	0,0423	0,76	0,449	-0,0183	-0,28	0,779
Good availability of recreational services (excluding dummy minimal availability)	0,3426	5,11	0,000	0,2612	3,36	0,001
Ample availability of recreational services (excluding dummy minimal availability)	0,3806	6,52	0,000	0,4085	5,98	0,000
Protected natural area in the surroundings (1 if present)	0,4202	12,92	0,000	0,4361	11,52	0,000
Daily cost of half board accommodation in a 3 star hotel	-0,0044	-3,57	0,000	-0,0087	-5,94	0,000
Alternative specific constant	-0,0052	-0,13	0,893	0,0100	0,23	0,821
Diagnostic statistics and tests	**Value**			**Value**		
Log likelihood function	-2839,95			-2099,66		
Pseudo R-squared	0,1195			0,1151		
Number of observations	9306			6846		

We can surmise that what the sample of interviewed people mostly dislikes is a high risk of overcrowding and a shift from maximum to minimal environmental quality. An interesting observation on this latter attribute is that tourists do not seem to be particularly perturbed by slight modifications of the original environment, given that the coefficient is quite low and only slightly significant. What respondents have shown to be averse to are the substantial modifications of an untouched environment (i.e. from very high to low quality levels). Similar remarks can be made for the availability of recreational services, although with smaller values in absolute terms. There is a dichotomy between low and substantial endowment of services, so that only good and ample availability seem likely to affect the choice probability of a given destination. Finally, the vicinity of a natural protected area shows a quite relevant effect. This result has obvious important policy implications, both for a proper distribution of new accommodation services, and for the purpose of assisting a destination in difficulties. This high value could be partly determined by an option value effect, that is tourists appreciate *the possibility to choose to visit* a protected area, rather than the direct use they actually make of it. As a note of caution, however, we suspect that at least part of the estimated effect could depend on effects that contingent valuation analysts call "symbolic bias" and "part-whole bias", i.e. a tendency by respondents to express their support to environmental protection in general, rather than a precise evaluation of the benefit arising from a specific environmental good.[17]

The estimates based on the sub-sample of tourists not staying in luxury accommodation are reported on the right hand side of the table. In fact, no striking differences emerge with respect to the sample as a whole. As expected, the only strong difference is in the sensitivity to the price of the half board accommodation, which is doubled. As is clear from the considerations made above, it is likely that this coefficient provides a more reliable measure of the marginal utility of income. On the other hand, this difference could also be interpreted as an indication of the quite low importance attributed by high spending tourists to variations in accommodation costs.

One property of the previous "main effects" estimation is that of ensuring a constant marginal utility of income. In order to check if our results are robust to this condition, we could also relate the cost attribute to respondents' income. A common solution is to divide the cost attribute by the individual's income so that the coefficient of cost depends on income. We have found that parameters' estimates are robust to this alternative specification.[18]

[17] See for example Bateman and Willis (1999).
[18] Results are available on request. Given that a share of the respondents refused to answer the related question, this

Simulations of the probability of choice for a few hypothetical sites.

The relative size of the various coefficients also provides an indication of which attributes and level variations determine the major effects on choice probabilities and market shares. A particularly interesting exercise is to predict choice probabilities for new or existing combinations of characteristics and study how different combinations of the attributes may affect the probability of choosing one or another site, as defined by some particular combination of the attributes. This simple exercise may be very useful for policy considerations regarding the shaping of main accommodation locations, with the caveat that the sample of tourists already arriving in Sardinia may suffer from self-selection problems, so that it would not be correct to extend the following analysis to the more general forecast of the behaviour of current national and international tourism flows.

As was outlined in section 2, it must be stressed that, in order to perform this exercise, the exploitation of the IIA hypothesis is of basic importance, given that it enables the researcher, on the basis of the estimated parameters only, to perform simulations regarding alternatives not actually chosen by the individuals. Of course, with IIA, what is unaffected by the addition of new choice alternatives in the choice set is the relative probability between two alternatives.

Table 5: *Simulation of the distribution of choice probabilities in a case with 6 choice alternatives*

Attributes	**Paradise Resort**	**West City**	**East City**	**By the stars**	**Lonely Beach**	**100,000 Beach**
Proximity of main tourist attraction	Low	High	High	High	Low	Low
Risk of overcrowding in main point of attraction	Low	High	High	High	Low	High
An uncontaminated natural environment	Maximum	Good	Fair	Minimum	Good	Minimum
Availability of additional services	Minimal	Good	Good	Ample	Low	Ample
A nature reserve in the vicinity of your holiday location	Yes	No	Yes	No	Yes	No
Choice probabilities						
Whole sample, no difference in accommodation price	21,2%	15,2%	18,1%	9,1%	30,0%	6,4%
Subsample without high quality hotels, no difference in accommodation price	23,7%	15,9%	19,6%	11,4%	21,5%	8,0%

approach of course involves a reduction of the estimation sample. We are also aware that problems of measurement error, mainly due to rounding effects, cannot be ruled out. Finally, as Train (2003) remarks, if the cost coefficient depends on income, there is a violation of the assumptions needed for deriving welfare measures of the type expressed by equation (4). The violation may not be important for small level changes, but certainly relevant for large changes.

In practice, choice probabilities are determined by the expression (2) in section 2. It is straightforward to obtain estimated choice probabilities for different scenarios simply by inserting the levels of interest into the formula. For example, let us carry out a model simulation by hypothesising that tourist could choose among six holiday locations, which we have indicated with imaginary labels. There is no systematic structuring for all the hypothetical sites, but "Paradise Resort" represents a situation where tourism is scarcely present, whereas "100,000 Beach" is the name of mature location. The choice probabilities must of course be commented under a "ceteris paribus" condition, that is a situation where there are no systematic differences among the destinations, beyond the attributes considered in the study.

As an example of how choice probabilities may be varied when intervening on some attributes, the first graph (Figure 2) considers a situation where the risk of overcrowding (where present) is eliminated by using the estimates on the whole sample.

Figure 2: *Effects of the elimination of overcrowding (where present) on choice probabilities*

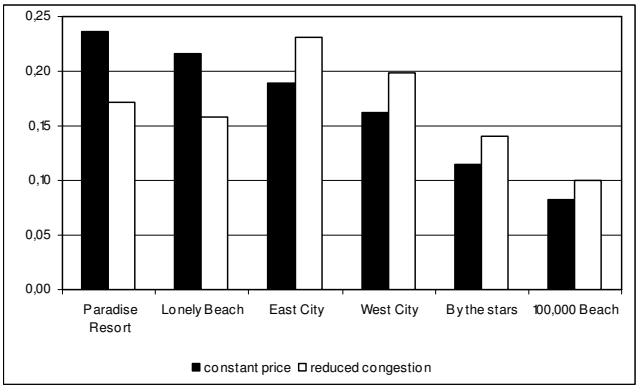
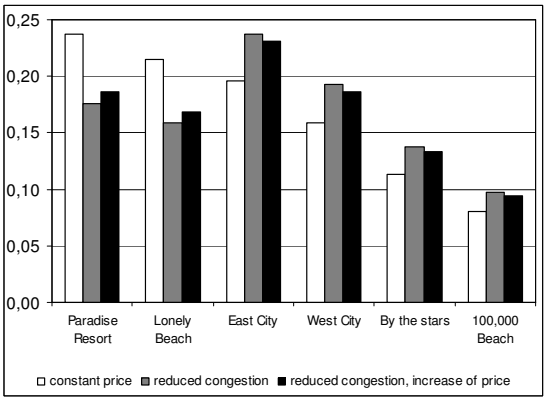


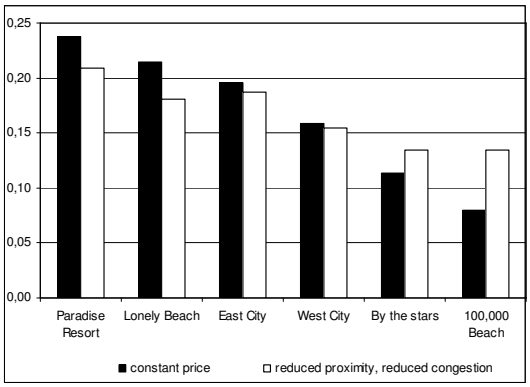
Figure 3, based on sub-sample estimates to show that the quality of the results is unchanged, is modified introducing the effect of a 10 euro price variation as a tool to get rid of overcrowding.

Figure 3: *Elimination of overcrowding without and with a price increase (where possible)*



Finally, Figure 4 considers the case where overcrowding (where present) is eliminated in compensation for the greater distance of lodging to the beach.

Figure 4: *Elimination of risk of overcrowding by reducing proximity to the main attraction (if possible)*



WTP estimates for the main characteristics

Let us now turn to the computation of implicit prices for the different qualitative levels of the attributes and of overall welfare measures for some representative scenarios. Table 6 below was constructed using expression (4), whilst confidence intervals were estimated by means of the Krinsky-Robb (1986) procedure. What needs to be kept in mind is that we are dealing with discrete variations, but the hypothesis of constant marginal utility of income is mostly reliable when small level changes are considered.

As an indicator of marginal utility of income we use the "conservative" estimates presented on the right hand side of Table 6, which refer only to tourists not staying in 4-5 star hotels.[19] We have already pointed out that our sample (reflecting Sardinian tourism) consists of a large proportion of tourists who had lodged in expensive hotels. This practice has probably resulted in an "anchoring" effect regarding the evaluation of the price of daily accommodation in the hypothetical scenario, regarding a 3 star hotels, leading to a weak consideration of the cost attribute in the choice alternatives.

The table was mainly built reporting willingness to pay (WTP) values for "improvements" in individual utility functions, but it must be remembered that, with a constant marginal utility of income, the estimates obtained with the choice modelling approach yield the same result when the willingness to accept (WTA) case is considered (e.g. the environmental quality

[19] With the estimates from the whole sample, it is easy to verify that implicit prices would be more and less doubled.

characteristic). Though based on the conservative estimates, we can see that the monetary values are quite large. However, for policy indications, 95% confidence intervals (whose width roughly depends on the MNL estimation of the standard errors of parameters) can offer a useful lower bound by means of which to assess the feasibility of some policy interventions. For example, "packaging" solutions which guarantee 'no risk' of overcrowding seem to be easily ready to satisfy an unmet demand. Besides, proximity of the lodging to the sea clearly matters, but given the size of the aversion to the overcrowding effect, this could outweigh the value losses associated to accommodation which lacks proximity to the main tourist attraction. Finally, as expected from its international reputation, the environmental quality of Sardinia's sea is highly evaluated.

Table 6: *Value of level changes for the various characteristics of the holiday locations*

Level Changes	*MNL estimation on subsample luxury hotels*	
	Marginal WTP/WTA in Euros	*95% Krinsky-Robb confidence intervals*
Proximity of the main attraction	40.01	27.27 62.40
No risk of overcrowding	56.83	40.97 87.08
Variations in natural environmental quality		
From maximal to minimal	-64.75	-103.43 -4.60
From maximal to discrete	-35.46	-62.54 -17.81
From maximal to good	-9.33	-26.06 4.74
From discrete to minimal	-29.29	-59.25 -6.09
From good to discrete	-26.05	-54.82 -3.94
From good to minimal	-55.33	-93.57 -31.69
Variations in availability of recreational services		
From minimal to ample	46.95	28.93 76.23
From minimal to good	30.02	11.83 55.13
From minimal to low	Not significantly different from 0	
From good to ample	16.93	-6.39 44.12
Existence of a protected natural area in the surroundings	50.13	35.73 75.97

5. Discussion and conclusion

This study has aimed to assess the potential of the discrete choice modelling approach in the analysis of international tourism preferences for a destination characterised by important natural resource endowments. Namely, the focus was on the demand-side economic effects of some broad characteristics of tourism supply which, according a growing stream of theoretical research, is likely to make the development of tourist destinations more sustainable from an environmental as well as an economic point of view.

The analysis was carried out on a sample of tourists interviewed when leaving Sardinia after their holiday. Therefore, in the first place, a note of caution is needed about the external validity of our results, as is generally the case for the outcomes of choice experiments. As was pointed out in the section 2, we were faced with a rather rich niche of tourists that went beyond our original expectations. Moreover, the name "choice experiments" must remind us that we are still dealing with a "laboratory tool", where not all particularities of sites and accommodations can be modelled and captured.

Nevertheless, interesting indications about the relationship between the analysed attributes and destination choice have emerged. Results were all in accordance with economic theory, but what is even more important is the relative size of the various characteristics in determining consumer utility. We found that what tourists appreciate most is lack of overcrowding, in the form of being sure to have a fair access to the main attraction that motivated their holiday destination choice. Environmental quality is important, but real sensitivity seems to take place only where substantial losses with respect to original conditions are prospected. On the contrary, only high levels of accessory recreational facilities seem to be a relevant determinant of destination choice.

Useful policy indications emerge from such clear-cut effects. We know that an almost necessary condition for ensuring the physical carrying capacity of a site is that the concentration of accommodation and buildings near the main attractions (i.e. near the beaches and the coast) should be limited. Our results show, as expected, that giving up the proximity of the sea is not a "free lunch". In fact, the estimates indicate a quite relevant effect.[20] However, this is not a predominant one. Tourists seem well ready to give up having their room by the beach, if they can get a certain access to the natural resource, or if environmental quality is only slightly affected by tourism activities. Therefore, compensating effects in the form of granting access to the main attractive areas or ensuring the conservation of high standards of environmental quality seem to be feasible.

In general, we feel that the interest for this kind of approach should be fostered, both from the practitioner's and the academician's point of view. On the one hand, policy-makers and specialised agencies need to stay better informed about the determinants of tourists' behaviour,

[20] Given the recent debates in Sardinia, where severe legislation has been established in order to limit the exploitation of costal areas, this attribute was put in clear evidence in the choice set cards, in order to minimize the risk of underestimating the related aversion effects.

given the growing level of competition nourished by new tourist destinations, and the necessity to limit the market failures usually associated to a *laissez faire* management of natural resources. On the other hand, theoretical contributions can probably offer new useful insights if they would partially change the way how environmental quality effects are framed in demand functions, in particular by shaping them more as a trade-off in comparison to other component characteristics, than as a simple upwards shift of consumer's willingness to pay.

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