

# The determinants of **length of stay** in the **Azores**: A **count model** approach

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**Abstract** | This paper employs count data models to estimate the determinants of length of stay, as count models overcome censoring and truncation data issues associated with the positive integer nature of length of stay. Length of stay is critical to study consumption of local resources. This paper employs a rich micro dataset on tourists departing the Azores, a group of small Portuguese islands, widely perceived as a tourist destination with high growth potential due to its unique nature, which, hence, must be addressed with care given its small carrying capacity. This paper looks after the relationship between destination image and tourists' behavior, focusing on the influence of destination image on length of stay. Environmental attitudes and destination image, constructed from a factor analysis exercise, also influence length of stay. It is found that sociodemographic profiles and trip attributes are important determinants of length of stay. The results suggest that promoting the Azores for its nature, landscape, remoteness, weather and safety may increase length of stay, unlike cultural heritage. Our framework provides an interesting tool for policymakers to analyse the determinants of length of stay, and, concomitantly, consumption of local resources. Policy implications are discussed.

**Keywords** | Length of stay, Sustainable tourism, Tourism demand modelling, Destination image, Environmental initiatives, Count data models, Factor analysis, Azores.

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## 1. Introduction

The overall impact of tourists in a given economy hinges on length of stay. Length of stay is an important determinant, for instance, of tourists' overall expenditure and consumption of local resources, as the number of possible experiences to be undertaken by tourists depends on their length of stay (Davies & Mangan, 1992; Legohérel, 1998; Gokovali et al., 2007; Saarinen, 2006). Uncovering the determinants of length of stay is critical to the design of marketing policies that promote longer stays, associated with higher occupancy rates and revenue streams: an enterprise ever more valuable given the increasingly pervasive pattern of shorter lengths of stay (Alegre & Pou, 2006). However, there are relatively few studies that estimate the determinants of length of stay resorting to microeconomic techniques (Gokovali et al., 2007). This paper contributes to fill this gap. In particular, this paper uncovers how different individual sociodemographic profiles, actual trip experiences, attitudes toward sustainability practices (or environmental initiatives) and destination image influence length of stay. Length of stay is one of the questions resolved by tourists when planning or while taking their trips (Decrop & Snelders, 2004). Hence, length of stay is best recorded when tourists depart, and, quite likely, is influenced by tourists' sociodemographic profiles, on the one hand, and their experiences while visiting their destination as well as by their expectations and concomitant reported destination image, on the other (Decrop & Snelders, 2004; Bargeman & Poel, 2006). This paper accounts for such insights by employing micro data, rich on individual sociodemographic characteristics, actual trip experiences and reported destination image, built from individual surveys answered by a representative sample of tourists departing from the Autonomous Region of the Azores: the Portuguese touristic region with the highest growth rate in the last decade.

Destination image has aroused plenty of interest in the recent years. In fact, several authors have

investigated the relationship between destination image and tourists' behavior (see, among others, Pike, 2002; Hui & Wan, 2003; Beerli & Martín, 2004; Castro et al., 2007; Chen & Tsai, 2007). In the present case, it is interesting to note that the Azorean Government has been actively promoting brand awareness in the sense that the Azores are an infant holiday destination and, hence, the Azorean Government has been investing in promoting the Azores as a household name on the economic rationale that promotion is akin to a public good. Therefore, it is most pertinent to assess how different marketing strategies that convey different images of the Azores as a holiday destination influence an important dimension of tourists' behaviour, namely length of stay. This paper contributes, thus, to the literature on the relationship between destination image and tourists' behaviour, focusing on the influence of destination image on length of stay, complementing, hence, the aforementioned studies that focus, in turn, on the influence of destination image on overall satisfaction, repeat behaviour and recommendation intentions.

The small island nature of the Azores warrants deserved attention to environmental initiatives that seek to promote the sustainability of the Azores as a tourist destination. The Azorean Government, like many other regional governments, has put in place a mix of sticks and carrots policies with respect to the adoption of sustainability practices by tourist facilities. Yet little is known about the economic impacts of such recent policies, despite the vigor of the associated policy debate. This paper sheds light on this issue by uncovering the influence of a large number of sustainability practices on length of stay.

To uncover empirical relationships between tourists' sociodemographic characteristics, actual trip experiences, reported destination image, attitudes towards sustainability practices and length of stay, the empirical work must employ some sort of a formal statistical model. However, the most popular statistical tools, such as the linear regression

model, are not appropriate to model length of stay, since they do not take into account that length of stay is a non-negative variable, and, hence, lead to biased estimation (Greene, 2000). To overcome such problem, this paper employs count data models. This paper argues that count data models are suitable to model length of stay since length of stay is usually recorded as the number of days spent at a given destination: a positive number. It should also be noted that the count data models employed in this paper take into account that only tourists who did spend some days at the destination were interviewed, and, hence, the econometric approach employed formally controls for such truncation of the data. This paper capitalizes on Smith (1988), Hellerstein (1991), Hellström (2006), and Palmer-Tous et al. (2007), with respect to the econometric approach<sup>1</sup>, and innovates by focusing on individual behavior and by considering important, novel issues such as destination image and attitudes towards environmental initiatives.

The empirical work carried out in this paper produced statistically significant and economically important results. Several sociodemographic individual characteristics and trip attributes turn out to be statistically important determinants of length of stay, and, carry, thus, important policy implications. More to the point, the results found in this paper may be used to aid the design of marketing policies that may promote longer stays. In addition, there are results that shed light on enduring research topics, such as repeat visitor behavior. In fact, it should be noted that repeat visitors display higher probabilities of experiencing longer stays, a fact in line with the findings in Lehto et al. (2004). By the same token, it is interesting to note that different dimensions and attributes of destination image influence differently

length of stay. Therefore, the results found suggest that marketing policies may have different effects on length of stay depending on the conveyed destination image.

This paper is organized as follows. Section 2 reviews the literature. Section 3 describes the contextual setting and the data used in the econometric work. Section 4 discusses the econometric model approach. Section 5 comments the results. Section 6 concludes.

## 2. Literature review

Tourism demand is a broadly defined subject that considers a variety of objects: tourist arrivals, tourist expenditure, travel exports, and length of stay, just to name some of the most important (for extensive reviews of research on tourism demand see, among others, Crouch, 1994; Witt & Witt, 1995; Lim, 1997; Crouch & Louviere, 2000; Song & Witt 2000). Length of stay is an interesting research topic for, at least, two reasons. First, length of stay conditions the overall socioeconomic impact of tourism in a given economy. In fact, and as Davies and Mangan (1992) argue, an increased length of stay may allow tourists to undertake a larger number of activities which may affect their overall spending, sense of affiliation and satisfaction. Therefore, several authors consider length of stay an important market segmentation variable in estimating the determinants of tourist spending (Davies & Mangan, 1992; Legohérel, 1998; Mok & Iverson, 2000). Second, models of length of stay are important to the research on sustainable tourism since they are useful to forecast tourists' on-site time, and, concomitantly, the stress caused by tourism activity on local resources: an important issue in the context of carrying capacity analysis (Saarinen, 2006).

Alegre and Pou (2006) claim that most studies on tourism demand fail to pay attention to length of stay, at least at a microeconomic level, where

<sup>1</sup> Apparently, there are very few studies in the tourism literature that employ count data models. In fact, in their bibliometric study on tourism and statistics, Palmer et al. (2005) review 1 790 articles in 12 leading tourism journals by means of a taxonomy with 24 statistical categories and fail to explicitly mention count data models a single instance.

one is able to control for individual heterogeneous behavior. Moreover, the few studies available in the literature on the length of stay are mainly descriptive (Oppermann 1995, 1997; Seaton & Palmer, 1997; Sung et al., 2001). These studies show how length of stay varies with nationality, age, occupation status, repeat visit behavior, stage in the family life cycle and physical distance between place of origin and destination, among other variables. While these studies do find interesting results, their descriptive nature hinders formal inference tests on the causal relationships between individual sociodemographic profiles and actual trip experiences and length of stay. Recently, however, some authors have employed microeconomic models to estimate the determinants of length of stay. Fleischer and Pizam (2002) employ a Tobit model to estimate the determinants of the vacation taking decision process for a group of Israeli senior citizens. The Tobit model in Fleischer and Pizam overcomes the fact that several individuals in the study group do not take vacations at all, and, thus, the model allows a corner solution case, with many individuals experiencing zero days of vacation. Fleischer and Pizam conclude that age, health status and income have a positive effect on the length of stay. In the present case, only departing tourists were surveyed, and, hence, all tourists experienced a strictly positive length of stay. Therefore, the Tobit model, employed in Fleischer and Pizam, is not applicable. Alegre and Pou (2006) analyze length of stay for a pooled cross-section of tourists visiting the Balearic Islands. Alegre and Pou employ a logit model, where the explanatory variable is binary (0 if length of stay is shorter than one week and 1 otherwise). By doing so, the ensuing policy implications are less far reaching, in the sense that all length of stays, say, shorter than one week are treated alike, be them one day stays or six day stays. This loss of information may be particularly worrisome when length of stays are not obviously dichotomized or clustered, and are, instead, roughly evenly distributed over several days, leaving the researcher with no obvious cut-off to arbitrarily

partition length of stays. In any event, Alegre and Pou find, among other results, that labour status, nationality and repeat visitation rate are statistically significant determinants of length of stay. Gokovali et al. (2007) estimate parametric survival analysis models, for a cross section of tourists departing from the Turkish region of Bodrum, and find that experience as a tourist; past visits to destination, overall attractiveness and image of destination country, all increase the probability of staying longer. While innovative and informative, the work by Gokovali et al. is, by construction, restricted to models with constant or monotone hazard rates – in a nutshell, the rate at which stays are terminated given that they lasted up to a given point –; a noninnocuous assumption. Alternatively, and like this paper, other authors successfully employed count data models to study tourism demand. Smith (1988) employs count data models to estimate per trip consumer surplus for a sample of households in Pennsylvania. Hellerstein (1991) also employs count data models to estimate a county-level travel cost model, based on aggregate data from the state of Minnesota. More recently, Hellström (2006) estimates a bivariate count data model for household tourism demand with Swedish data to study households' joint choice of the number of leisure trips and the number of total nights spent in these trips. Finally, Palmer-Tous et al. (2007), employ count models to estimate the demand for car hires in the Spanish island of Mallorca. However, and unlike this paper, Palmer-Tous et al. do not deal with zero truncation and, more importantly, focus on the demand for car hires and not on length of stay. In sum, several authors have recently applied count data models to study certain aspects of tourism demand. This paper capitalizes on such studies and innovates in the sense that it focuses on the role of the micro determinants of length of stay, such as individual sociodemographic profiles, actual trip experiences, and, quite interestingly, on novel issues such as attitudes towards sustainability practices and destination image.

### 3. Contextual setting

The Azores, with their strikingly beautiful nature and sea, are the Portuguese region where tourism has grown more rapidly in the last decade. Tourist arrivals have increased from 159 000 in 1995 to 260 000 in 2005, while tourists nights spent in touristic accommodations increased from 407 000 in 1995 to 936 000 in 2005 and will well exceed, for the first time ever, the 1 000 000 mark in 2006. Despite the obvious tourist growth potential, until the early 1990s tourism was not promoted by the Azorean regional government and the Azores were strapped in an inferior Nash equilibrium with virtually no hotels and no air connections. In the mid 1990s, a change in the Azorean regional government led to a change in tourism policy, with the adoption of tourism growth enhancing policies, such as the provision of air connections and promotion of brand awareness, which led to a boom in hotel construction, with the total number of hotels beds growing from 3 000 in 1995 to 10 000 in 2005.

Traditionally, length of stay has been relatively short – about 3-4 days – and was mostly explained by the predominant tourists from Mainland Portugal whom routinely took regular flights, mostly over the weekend or around holidays, for short stays. Recently, length of stay has increased and is bound to increase even further in the near future as the tourist landscape changes. Nowadays, there are several charter carriers offering direct connections and tour packages to, among others, the Nordic Countries (Sweden, Norway, Finland and Denmark), Germany, UK, Spain, and the Netherlands, where people keenly appreciate the Azorean pristine natural surroundings and mild weather year round. Despite the recent successes, several challenges remain. Ranking high among the most pressing issues lays a desire by public officials and hotel operators to increase average length of stay, which is perceived as crucial to increase occupancy rates and make operations smoother to run. Hence, learning the determinants of length of stay is critical to improve the effective-

ness of regional tourism policy. In order to do so, it is important to uncover variables that not only do explain length of stay but also may be used in the design of marketing policies that effectively influence of length of stay.

### 4. Data

The questionnaire used to construct the data set employed in the empirical part of the paper was carried out in the summer of 2003 and was built as a representative sample of the tourists who visited the Azores, by nationality, routes and gateways used, in the year of 2002. The total number of questionnaires ministered – 400 – was determined according to the methods discussed in Hill and Hill (2002) and, as mentioned above, it was designed as a representative sample of the entire tourist population by nationality and gateway visited, with a 5% margin error. In the summer of 2003 there were 3 gateways – Ponta Delgada, Lajes, Horta – in the 3 main islands of São Miguel, Terceira and Faial, respectively. The questionnaires were carried out at these airports, near the boarding gates, in three languages: Portuguese, English and Swedish. Each questionnaire was ministered by a professional consultant in personal interviews, of the tourists' waiting to be boarded in their trips outbound. Respondents were selected to make sure that the interviewed sample was indeed representative of the tourist population. The questionnaires were carried out until the desired number of valid questionnaires by nationality cell was reached. Each questionnaire covered individual sociodemographic profiles – by including variables such as gender, age, education, occupation sector, type of profession, marital status, among others – and actual trip experiences – by including variables such as travel party composition, travel motive, repeat visitation rate, tourist experience, overall satisfaction, revisit intention, among others.

The questionnaire contained a detailed section that asked the tourist to rank the importance of a given sustainability practice or environmental initiative in the tourism industry as an integral part of a high quality holiday experience. In particular, the interviewee was asked to rank each of a total of 24 factors or environmental initiatives in a Likert scale from 1 (not very important) to 5 (highly important) according to its importance for a quality holiday experience. Annex A contains the list of the environmental initiatives considered in the questionnaire. The set of environmental initiatives included may be perceived as exhaustive, given Azorean natural idiosyncrasies, on the one hand, and relevant policies set up in place, on the other, and was defined along the lines found in Agenda 21: A Guide to the United Nations Conference on Environment and Development (UNCED, 1992): a manifesto that has forcefully shaped policy and research around the globe in the recent years. As is usual in the literature, given the large number of dimensions and attributes included in the questionnaire pertaining to the importance of environmental initiatives and the quality of holiday experiences, a standard factor analysis exercise was carried out to collapse such wealth of information into a smaller, operational number of factors to be employed as right-hand-side covariates, and, thus, save on degrees of freedom. The factor analysis exercise produced satisfactory results and suggested the inclusion of the following three factor-based regressors regarding environmental initiatives: waste management; quality of environmental management; and water savings and tourists' awareness (towards water savings).

Finally, and in an analogous manner to environmental initiatives, the questionnaire also contained a detailed section on destination choice motives and concomitant destination image. In particular, the interviewee was asked to rank each of a total of 25 potential reasons for choosing the Azores as his or her trip destination in a Likert scale from 1 (not very important) to 5 (highly important).

The set of potential reasons for choosing the Azores as a trip destination can be thought of as an extensive set and is found in Annex B (for a rich discussion on dimensions and attributes determining the perceived tourist destination image see Beerli & Martin, 2004). Once more, a standard factor analysis exercise was carried out to collapse such wealth of information into a smaller, operational number of covariates to be employed in the count models regressions, and, hence, further save on degrees of freedom<sup>2</sup>. The factor analysis exercise led to the inclusion of the following six factor-based regressors into our econometric model: cultural heritage; nature and landscape; availability of packages and flights; safety and hospitality; quality and price; and weather and ultra-periphery (remoteness). It should be noted that the Azores are an infant tourist destination and, not surprisingly, the Azorean Government has been investing intensively in brand awareness, on the economic rationale of destination promotion being akin to a public good, with sub-optimal private provision in a decentralized equilibrium. Therefore, and if one is interested in the socioeconomic returns of such brand awareness investment, in making Azores a household name, it is important to assess how different marketing strategies, say, one that highlights the uniqueness and remoteness of the Azores, influence length of stay.

Table 1 lists the highest frequencies of length of stay. As expected, the highest frequency is 7 day stays, typically associated with tourists visiting on tour operator packages, with an in sample frequency of 28%. The combined frequency of 14-15 day stays is also quite high: about 20%. About half of the stays last no longer than 8 days.

Table 2 contains descriptive statistics of respondents' sociodemographic profiles and trip attributes.

Overall, mean stay is about 11 days; median stay is just 10 days while the standard deviation of stays

<sup>2</sup> To save on space, details of the factor analysis exercise are provided upon request.

Table 1 | Distribution of stays

Length of Stay (days)	Observations (Total=400)	Frequency (%)	Accum. Frequency (%)
1	1	0,25	0,25
2	6	1,50	1,75
3	12	3,00	4,75
4	11	2,75	7,50
5	14	3,50	11,00
6	16	4,00	15,00
7	114	28,50	43,50
8	21	5,25	48,75
9	7	1,75	50,50
10	38	9,50	60,00
11	7	1,75	61,75
12	15	3,75	65,50
13	4	1,00	66,50
14	65	16,25	82,75
15	19	4,75	87,50
≥16	50	12,50	100,00

Source: authors' elaboration.

Table 2 | Selected descriptive statistics of respondents' sociodemographic profiles and trip attributes

Variables	Obs.	Freq. (%)	Avg Stay (days)	Med Stay (days)	SDev Stay (days)	Avg Age (years)
<b>(1) Sociodemographic Profiles</b>						
Portugal (Mainland)	150	35,50	11	10	11	34
Sweden	95	23,75	9	7	3	57
Other Nordic Countries	49	12,25	9	7	3	47
Germany	21	5,25	14	8	24	41
Other Countries	85	21,25	17	14	14	44
Male	203	50,75	11	8	11	44
Marital Status (Married)	264	66,00	11,8	9,5	12	49
Azorean Ascendancy	70	17,50	18,7	15	13,2	43
Education1. Secondary	127	31,75	10,9	10	6,8	40
Education2. Tertiary	183	45,75	10,6	7	10,3	45
Education3. Technical	8	2,00	8,6	7	3	48
Education4. Other (lesser)	82	20,50	16,8	13	17	47
High level Profession	127	31,75	10,2	8	6,5	48
<b>(2) Trip Attributes</b>						
Motive1: Leisure	294	73,50	10,6	8	8,6	45
Motive2: Visit friends or relatives	57	14,25	17,4	15	14	44
Motive3: Business	35	8,75	15,6	10	22	36
Motive4: Other	14	3,50	8,5	6	6,2	37
Repeat visitor	141	35,25	16,5	14	16,7	41
Charter flight	150	37,50	11,2	7	6,9	52
<b>Total</b>	<b>400</b>	<b>100,00</b>	<b>11</b>	<b>9</b>	<b>11</b>	<b>43</b>

Source: authors' elaboration.

is about 11 days, due to some quite long stays. The largest group of tourists in the sample are tourists from Mainland Portugal, who experience stays similar to those of the overall sample and are the youngest group. Tourists from the Nordic Countries are the second largest group in the sample and exhibit a mean stay of 9 days, a median stay of 7 days and a relatively low standard deviation of 3 days, as most of these tourists visit with either

one or two week tour packages. German tourists' experience, typically, longer stays than tourists from the Nordic Countries. In sum, there are interesting differences in length of stays across nationalities. There are roughly the same numbers of male tourists in the sample as there are female tourists. More than half of the tourists in the sample are married: 66%. A significant number of the tourists interviewed claimed to have some sort of Azorean

ascendancy: 70 tourists or 17.50% of the total. Most tourists in the sample have high levels of education. In fact, more than 45% of the tourists in the sample have tertiary education, which is perhaps not surprising given that these tourists tend to come from the Nordic Countries, where tertiary education has relatively high incidence rates. This sample composition – with a high proportion of tourists exhibiting high education levels – suggests that compliance to environmental initiatives may indeed condition overall holiday experiences, as more educated tourists tend to be more sensitive towards such issues, especially in small, arguably fragile, islands such as the Azores. High level profession flags occupations associated with high income and status. Almost a third of the tourists in the sample have such high level professions and tend to experience stays similar to the overall pattern, but with smaller variance. With respect to trip attributes, it should be noted that most tourists in the sample visited the Azores for leisure: 73.50%. Repeat visitors accounted for 35.25% of the tourists in the sample and reported a relatively high average stay of 16.5 days. Finally, tourists who took charter flights accounted for only 37.50% and experienced, on average, 11 day stays.

## 5. Econometric approach

As Hellerstein (1991) argues, estimators of recreational demand models frequently use continuous functional forms, such as ordinary least squares. However, the nature of trip demand introduces complicating factors. First, stays occur in nonnegative quantities (usually, days). Failure to control for this censoring will lead to biased estimation (Greene, 2000). Second, because stays are available only in integer quantities, the usual demand models are, in general, inapplicable. In order to control for censoring and the integer nature of length of stay the use of count models is attractive

(Cameron & Trivedi, 1998). The Poisson distribution is a very convenient distribution to work with and, hence, forms the foundation for most of the count models found in the literature. Let the random variable  $W$  follow a Poisson distribution. Then  $W$  has the following density function  $F_p(w)$ :

$$\Pr(W_i = w) = F_p(w) = \frac{\exp(-\lambda_i) \lambda_i^w}{w!}, i = 1, 2, \dots, N \quad (1)$$

where  $N$  is the number of observations, and  $\lambda$  is both the mean and the variance, parameterized as follows:

$$\lambda_i = \exp(X_i \beta) \quad (2)$$

where  $X$  is a matrix of  $N \times K$  covariates and  $\beta$  is a vector of  $K$  coefficients to be estimated from the data. However, the Poisson distribution hinges on strong assumptions. In particular, the Poisson distribution assumes that the variance of the dependent variable is equal to the mean. Quite often, this assumption is rejected in favour of overdispersion, which corresponds to the case when the variance exceeds the mean. In such a case, the more general negative binomial distribution should be employed to ensure proper estimation of the standard errors (Cameron & Trivedi, 1998). In fact, the Poisson distribution is a special, nested case of the negative binomial distribution, namely, when there is no overdispersion (nor underdispersion: when the mean exceeds the variance). In the present case, inspection of Table 2 suggests a significant degree of overdispersion in the data, in the sense that the variance of length of stay largely exceeds the mean, as there are some quite long stays in the sample. Hence, this paper takes an agnostic approach and estimates both the Poisson and the negative binomial models that are formally tested against each other.

However, it should be noted that, and to best record length of stay, the tourists were interviewed at the boarding gate, just before departing. Hence, and given the remoteness of the Azores, all tourists in the sample reported staying at least one day: the

dependent variable is a strictly positive number. To account for this zero truncation, two alternative models were estimated: a zero truncated Poisson model and a zero truncated negative binomial model. Our choice is based on the existing literature and given the data structure we see no need for random effects estimation. The models estimate relate to the idiosyncrasies of the data, in particular, the non-negativity of length of stay and the observed decay in length of stay in the histogram. More formally, the density of the zero truncated Poisson model,  $F_p(w)$  reads:

$$\Pr\left(W_i = \frac{W}{W} > 0\right) = F_{TP}(w) = \frac{\exp(-\lambda_i) \lambda_i^w}{W!} [1 - F_p(0)]^{-1} \quad (3)$$

and, in the case of the zero truncated negative binomial model,  $F_{TNB}(w)$ :

$$\begin{aligned} \Pr\left(W_i = \frac{W}{W} > 0\right) &= F_{TNB}(w) = \\ &= \frac{\Gamma\left(W + \frac{1}{\theta}\right)}{\Gamma(W+1)\Gamma\left(\frac{1}{\theta}\right)} (\theta\lambda_1)^w [1 + \theta\lambda_1]^{-(W+1/\theta)} [1 - F_p(0)]^{-1} \quad (4) \end{aligned}$$

where  $\theta$  is an ancillary parameter, to be estimated from the data,  $F_{NB}(w)$  is the density of the negative binomial, and  $\Gamma$  is the gamma function. Given the parametric nature of the zero truncated Poisson model and of the zero truncated negative binomial model, estimation was done via maximum likelihood. To ensure comparability across models, both models were estimated employing the same set of covariates. Overall, 37 covariates were selected given the available data, on the one hand, and a reading of the literature, on the other. Since the zero truncated Poisson model is a nested case of the more general zero truncated negative binomial model, a likelihood ratio test was carried out to discriminate between these two competing models, as discussed in the next section.

<sup>3</sup> Estimation was done in Stata v. 9.0. Please refer to Stata v. 9.0. for more details on terminology and a formal definition of the  $\alpha$  parameter.

## 6. Results

### Model Selection

Table 3 reports the results obtained from the zero truncated Poisson model and from the zero truncated negative binomial model. Both models produce statistically significant results, as the  $\chi^2$  tests of the null hypothesis of all coefficients being statistically equal to zero are firmly rejected. The zero truncated negative binomial model produces a higher log-likelihood than the zero truncated Poisson model. The zero truncated Poisson model is a nested case of the zero truncated negative binomial model. In particular, the zero truncated Poisson model corresponds to the special case when the  $\alpha$  parameter of the zero truncated negative binomial model is equal to zero as the larger  $\alpha$  the larger overdispersion<sup>3</sup>. The point estimate of  $\alpha$  is 0.19 and, hence, the results suggest that there is indeed some degree of overdispersion in the data. In addition, a formal likelihood ratio test that  $\alpha = 0$  produces a  $\chi^2(1) = 725.49$  with an associated  $p$  - value of 0.0000. Hence, the zero truncated negative binomial model is the preferred model. Nevertheless, we keep both models in the discussion that follows, to gauge how robust the results are to model selection. We note that both models produce acceptable pseudo  $R^2$  values, much in line with what is found in the literature (Palmer-Tout et al., 2007).

Table 3 displays not the regressions coefficients,  $\beta_i$  but, instead,  $\exp(\beta_i)$ , the so-called incidence rate ratios. The incidence-rate ratio gives the increase in the expected length of stay for a unit increase in a given covariate  $x_i$ . Hence, an incidence rate ratio greater (smaller) than one obtains for variables that promote longer (shorter) expected length of stays. Quite reassuringly, the regression coefficients are strikingly similar across models, both at a quantitative level and at a qualitative level. In fact, in a total of 37 regressors, only twice the signs of the regression coefficients differ across models, with only marginal, non-statistically significant differ-

Table 3 | Regression results

Variables	ZTP (exp ( $\beta_k$ ); (t-stat))	ZTNB (exp ( $\beta_k$ ); (t-stat))
<b>(1) Sociodemographic Profiles</b>		
Male	.8686(4.21)***	.8926(1.88)*
Married	.9065(2.26)**	.8808(1.45)
Age1: 25-35 years	1.0195(0.32)	1.0172(0.15)
Age2: 35-45 years	.9512(0.74)	.9833(0.13)
Age3: 45-55 years	.8498(2.46)**	.8605(1.18)
Age4: $\geq 55$ years	.9655(0.51)	.9755(0.19)
Sweden	.7641(3.28)***	.7676(1.70)*
Other Nordic Country	.8440(2.05)**	.8327(1.19)
Germany	1.080(1.05)	1.0591(0.39)
Portugal (Mainland)	.8112(4.24)***	.8363(1.89)*
Azorean ascendancy	1.1336(2.24)**	1.2045(1.70)*
Educatio1: Secondary	.7240(7.24)***	.7824(2.85)***
Education2: Tertiary	.7081(7.19)***	.7481(3.23)***
Education3: Technical	.7078(2.15)**	.7226(1.21)
High level profession	.9211(2.02)**	.9651(0.49)
<b>(2) Trip Attributes</b>		
Motive1: Leisure	1.1936(1.80)*	1.2114(1.17)
Motive2: Visit friends or relatives	1.3247(2.59)***	1.3592(1.62)*
Motive3: Business	2.0867(6.68)***	1.9788(3.51)***
Repeat visitor	1.4300(7.74)***	1.3523(3.53)***
Charter flight	1.1667(2.65)***	1.2957(2.10)**
Number of islands visited	1.1914(10.20)***	1.1844(4.89)***
Travel party 1: with spouse	.9577(0.83)	1.0233(0.23)
Travel party 2: with family	1.0369(0.66)	1.0911(0.81)
Travel party 3: with other adults	.7183(5.46)***	.7689(2.35)***
Travel party 4: with business partners	.5655(6.16)***	.6451(2.79)***
Not coming back off-season	1.1921(3.39)***	1.1491(1.35)
Highly satisfied with visit	1.1282(3.43)***	1.0816(1.20)
Intends to revisit	.8952(2.10)**	.9576(0.47)
<b>(3) Sustainability Practices (SP) (Factors)</b>		
SP1: Waste management	1.0806(3.72)***	1.0810(2.01)**
SP2: Quality of environmental management	1.0751(3.72)***	1.0602(1.63)*
SP3: Water savings and tourists' awareness	.9667(1.72)*	.9721(0.76)
<b>(4) Destination Image (DI) (Factors)</b>		
DI1: Cultural heritage	.8602(4.93)***	.8935(2.00)**
DI2: Nature and landscape	1.1645(5.78)***	1.1190(2.46)***
DI3: Availability of packages and flights	1.005(0.20)	.9881(0.25)
DI4: Safety and hospitality	1.0739(2.56)**	1.0388(0.74)
DI5: Quality and price	.9963(0.14)	1.0108(0.22)
DI6: Weather and ultra periphery	1.1356(4.48)***	1.1087(1.99)**
<i>N</i>	400	400
<i>Log – Likelihood</i>	1590.70	1227.96
<i>LR<sub>2</sub><sup>2</sup> (37)</i>	1004.43	203.16
<i>Pseudo R<sup>2</sup></i>	0.2400	0.0764
$\alpha$		.1908

ZTP means zero truncated Poisson; ZTNB means zero truncated negative binomial.

\*, \*\* and \*\*\* mean significant at the 1%, 5% and 10%, respectively.

Source: authors' elaboration.

ences at a quantitative level. In the zero truncated Poisson model, 29 of the 37 regression coefficients are statistically significant at the conventional significance levels, whereas in the zero truncated negative binomial model only 19 of the same 37 regression coefficients are statistically significant at the conventional significance levels.

There are four groups of regressors, for the sake of clarity of discussion. The first group pertains to the tourists' sociodemographic profiles. The second group characterizes actual trip experiences. The third group relates to tourists' reported importance of environmental initiatives to the overall quality of their holiday experience. Finally, the fourth group relates to tour-

ists' reported destination choice underlying motives and concomitant perceived destination image.

### Sociodemographic profiles

Male tourists tend to experience shorter stays. This is a statistically significant result, obtained for both the zero truncated Poisson model and for the zero truncated negative binomial model. Married tourists also tend to experience shorter stays. However, this last result is only statistically significant for the zero truncated Poisson model.

The age coefficients are not individually statistically significant in both models, with the exception of the age class for people between 45 and 55 years old, under the zero truncated Poisson model, who are associated with shorter expected stays. As Alegre and Pou (2006) suggest, this may owe to the inclusion of other covariates closely related with age. The excluded class is less than 25 years and, overall, the results suggest no clear pattern between age and expected length of stay.

Tourists from the Nordic Countries, Sweden included, experience shorter stays, under both models. These results are statistically significant and have important policy implications given the strategical importance of these markets in the overall regional tourism policy context. In turn, German tourists exhibit longer stays. However, this result for German tourists is not statistically significant in both models. Tourists from Mainland Portugal, who constitute the largest group in the sample, exhibit shorter stays, under both models; a result statistically significant in both models. Overall, the regression coefficients on nationalities do not follow any clear pattern, at least not according to the physical distance between the tourist's place of origin and destination. In fact,

*ex ante* one would imagine that tourists who live far away from the Azores would experience longer stays, to make up for the increased overall travel cost: the sum of travel time and on-site time related costs. Hence, while it is indeed the case that tourists who live close to the Azores, such as tourists from Portugal Mainland, do tend to experience shorter stays than tourists who live farther away as, say, tourists from the Nordic countries, when one controls for socio-demographic profiles and trip attributes, this pattern becomes less blunt. This is indeed the present case. In particular, it is found that the binary variable charter that equals 1 if the tourist took a (direct) charter flight (and 0 otherwise) significantly increases the length of stay; a result statistically significant in both models. Considering that virtually all tourists from the Nordic Countries took charter flights, it becomes less of a paradox that having a nationality from the Nordic Countries is associated with shorter length of stays. The reverse could be said about tourists from Mainland Portugal. This remark highlights the importance of controlling for a significant number of covariates.

Azorean ascendancy is a binary variable that equals 1 in case the tourist claims to have some sort of Azorean ascendancy. The Azorean diaspora far outnumber the current Azorean population and there are many Azorean descendents, typically residing in North America, who visit the Azores. It is found, in both models, that having an Azorean ascendancy increases expected time to termination of stays. This result is statistically significant in both the zero truncated Poisson model and in the zero truncated negative binomial model.

With respect to the education variables, it should be noted that the excluded class is other education, an education class associated with a lesser degree of education. Hence, it follows that both models suggest that higher levels of education are associated with shorter expected stays.

High level profession is a binary variable that takes the value of 1 for professions associated with high income and social status. In this sense, high level profession proxies top incomes.<sup>4</sup> In both models, a

<sup>4</sup> A first group of 50 tourists were interviewed in a first stage of the field work in order to validate the questionnaire. From this validation exercise, it followed that not all tourists were willing to report directly their income, and, hence, such proxy for income, based on current professional status, was built in the questionnaire.

high level profession is associated with shorter expected stays; a result with statistical significance only in the case of the zero truncated Poisson model.

### Trip attributes

Travel motive was divided into four classes: leisure; visiting friends or relatives; business and, the excluded class, other motives (which includes, for instance, religious festivities). It is found that, compared to the excluded class, all travel motives explicitly considered increase expected duration of stays. As Seaton and Palmer (1997) suggest, tourists visiting friends or relatives tend to exhibit longer stays if they are international tourists, as it is generally the case in the Azores. Somewhat surprisingly, the incidence-rate ratio associated with travel motive business is quite high: about 2.0. In fact, among the several travel motives considered, the incidence-rate ratio is highest, by far, in an economic and statistical sense, for travel motive business and lowest for travel motive leisure. However, at the 5% significance level, one cannot distinguish between travel motive leisure and travel motive visiting friends and relatives.

Repeat visitor is a binary variable that takes the value of 1 if the tourist visited the Azores at least once in the past, and 0 otherwise. Quite interestingly, in both models it is found that repeat visitors stay for longer periods; a result highly statistically significant. In fact, everything else the same, being a repeat visitor increases the expected length of stay by about 43% in the zero truncated Poisson model and 35% in the zero truncated negative binomial model.

According to the results in Table 3, taking a charter flight increases expected stay by 16% in the zero truncated Poisson model and 29% in the zero truncated negative binomial model; this result is statistically significant in both models.

Number of islands visited is a continuous variable ranging from 1 to 9, since there are nine islands in the Azores. In both the zero truncated Poisson model and in the zero truncated negative binomial

regression model an increase in the number of islands visited leads to an increase in the expected length of stay. This result is statistically significant in both models. Moreover, in both models the size of this island hopping effect is quite large: visiting one more island increases expected length of stay, everything else constant, by about 18% – 19%.

“Not coming back off-season” flags tourists who said that they do not consider visiting the Azores off-season, when the weather is not as nice as in the summer, when the questionnaire took place. Hence, this binary variable should be inversely related to a certain sense of unconditional satisfaction. In both models, not coming back off season decreases expected stays; a result statistically significant only in the zero truncated Poisson model. “Highly satisfied with visit” is a binary variable that directly captures overall tourists’ satisfaction with respect to their visiting experience. While in the zero truncated Poisson model being highly satisfied has a positive and statistically significant impact on expected length of stay, in the zero truncated negative binomial model being highly satisfied has no statistical significance. Overall, the results suggest that being highly satisfied is associated with longer stays, a result in line with the findings of Gokovali et al. (2007).

### Environmental initiatives

From a total of 24 environmental initiatives, a factor analysis exercise led to the construction of three factor based regressors. The first is associated with waste management; the second with environmental management; and, finally, the third with the importance of water savings and associated tourists’ awareness. A higher value for any of these factor based regressors means that the tourist attached more importance to such factor as a part of a quality holiday experience. Overall, the results suggest that attitudes regarding sustainability practices have some predictive power over length of stay. Moreover, it is also true that a higher awareness towards such

sustainability practices leads to longer stays, with the exception of water savings and associated tourists' awareness. In fact, while waste management and the quality of environmental management exhibit statistically significant and greater than one incidence-rate ratios, the result for water savings is only marginally significant in a statistical sense in the zero truncated Poisson model, and not statistically significant at all in the zero truncated negative binomial model. Hence, the results suggest some payoff to implementing such sustainability practices in terms of prolonged stays, with the aforementioned exception of water savings and associated tourists' awareness.

### Destination image

A total of 25 dimensions and attributes were used to characterize destination image. A factor analysis exercise was carried out in order to synthesize the plethora of information gathered. A total of six factors were considered as regressors. There are several results worth noting. First, the results indicate that tourists who choose the Azores as a holiday destination for its nature and landscape experience the longest stays, everything else constant. This result is statistically significant in both models. By the same token, tourists who choose the Azores as a holiday destination for its weather and remoteness also experience longer stays. Again, this result is statistically significant in both models. It is also the case that tourists who visit the Azores for its safety and hospitality experience longer stays, everything else constant; a result statistically significant only in the zero truncated Poisson model. Hence, marketing investments in brand awareness along these dimensions and attributes may promote an increase in expected length of stay. In the contrary, tourists who attach high importance to cultural heritage in their holiday destination choice process tend to experience shorter stays, everything else constant. This result is statistically significant in both models. Finally, the factors quality, price, availability of prices

and flights do not display any statistically meaningful predictive power regarding length of stay.

## 7. Conclusions and final remarks

This paper estimated microeconomic count data models to learn the determinants of length of stay, formally tackling the censoring and truncation data issues associated with the non-negative, integer nature of length of stay. The results are statistically significant and economically important. The richness of the information embedded in the covariates used allows the design of effective marketing policies, in the sense that the regression results allow one to estimate, for a given synthesized, policy relevant individual or target group, the impact on expected length of stay of a change in sociodemographic profiles, actual trip experiences, attitudes towards sustainability practices and destination image.

Among the several results found, it can be argued that being a repeat visitor is an important criterion to identify tourists who are likely to experience longer stays. In fact, it is shown that being a repeater increases, everything else constant, expected length of stay by about 35% – 43%. Repeat visitor behavior is an interesting topic in its own right that has attracted researchers' attention in the literature in the recent years (see, among others, Oppermann, 1997; Kozak, 2001; Lehto et al., 2004). Thus, future research should characterize such groups and their economic and activity involvement. Taking a (direct) charter flights also plays a highly statistically significant role in determining length of stay. In particular, taking a charter flight increases expected stay by more than 16%, *ceteris paribus*. This result is very important as the Azorean government, in its quest to promote air connections to the Azores, subsidizes charter flights, and, must, therefore, assess the socioeconomic implications of such subsidies. Apparently, such policy is successful in terms of promoting longer stays. This is true regardless of nationalities, which were controlled

for in the regressions. A higher degree of education is associated with shorter expected stays. Visiting more islands leads to an increase in the expected length of stay. In particular, visiting one additional island increases expected length of stay by about 18% – 19%. This island hopping effect suggests that there is no crowding-out behavior from the part of tourists, in the sense that tourists do not trade a larger number of islands visited for a shorter visit per island, keeping, hence, overall length of stay in the Azores constant. In the contrary: tourists are willing to visit more islands at the expense of longer stays. This result is interesting when one takes into account that the Azorean Government actively promotes inter-island mobility since it regards island hopping as a way to spread the economic benefits from tourists across the islands, and, in the process, to alleviate regional economic asymmetries. Future research should try to uncover what leads tourists to visit a different number of islands. It is also found that higher degrees of satisfaction with the holiday are associated with extended stays. This result may owe to the fact that tourists who were more likely to derive higher degrees of satisfaction with their holiday experience scheduled longer stays from the onset or to the fact that tourists who postponed their return trips due to their enjoyment. Future research ought to control for such potential endogeneity issue.

A factor analysis exercise was carried out in order to construct an operational set of factor based regressors that capture tourists' attitudes towards environmental initiatives as important ingredients of a quality holiday experience. The results suggest that there are indeed some payoffs to such sustainability practices in terms of longer stays.

By the same token, a similar factor analysis exercise was undertaken in order to build a small set of factor based covariates that capture tourists' reported destination image. Overall, the results suggest that the image of the Azores associated with its nature, landscape, remoteness, weather and safety promotes longer expected stays. In contrary, tourists who attached high importance to the Azorean

cultural heritage as a reason for visiting the Azores experienced shorter stays. Finally, the factors quality and price and availability of packages and flights do not seem to have any statistically meaningful predictive power over length of stay. As far policy implications are concerned, and based on this evidence, one may argue that marketing strategies that promote the Azores for its nature, landscape, remoteness, weather and safety increase length of stay, whereas cultural heritage has the opposite effect.

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## Annex A. Environmental Initiatives (Sustainability Practices) in the Tourism Industry

**Question:** How important do you think each of the following factors is for holiday-makers to have a high quality holiday?

Answers from 1 (very low importance) to 5 (very high importance).

- a. Separating recyclable or re-usable materials from other solid waste
- b. Re-using materials and containers to reduce solid waste
- c. Adequate treatment and disposition of solid waste
- d. Reducing energy and fuel consumption
- e. Using energy efficient technologies
- f. Using alternative/renewable energy sources
- g. Reducing water consumption
- h. Using undrinkable water when possible (for irrigation, laundry, etc.)
- i. Adequate sewage treatment
- j. Using environment friendly products
- l. Using recycled material where possible
- m. Substituting hazardous materials with environmentally preferable alternatives
- n. Reducing noise (improving sound insulation levels, etc.)
- o. Monitoring/reducing external air emissions
- p. Purchasing local products when possible
- q. Educating and training staff to meet these sustainable practices
- r. Employing local people and building materials
- s. Creating non-smoking areas and rooms
- t. Encouraging guests to adopt water and energy reduction practices (to re-use bathroom linen, etc.)
- u. Providing environmental guidelines for tourists
- v. Motivating tourists to use public transportation
- x. Informing tourists about the local attractions (natural and cultural)
- y. Implementing quality management systems
- z. Introducing eco-labels, to indicate tourist facilities and sites using environmental management systems successfully

**Annex B. Attributes of Destination Choice**

**Question:** How important was each of the following factors when you made your choice of the Azores as a holiday destination?

Answers from 1 (very low importance) to 5 (very high importance).

- a. Originality/uniqueness of destination (natural and cultural features)
- b. Isolation/remoteness of the region
- c. Climate
- d. Accessibility of the Azores
- e. Package tours
- f. Available information
- g. Availability/quality of accommodation
- h. Availability/quality of local transportation
- i. Contact with friends and relatives
- j. Value for money
- l. Quality of service
- m. Sports facilities and activities (golf, etc.)
- n. Scenery, landscape
- o. Gastronomy
- p. Entertainment, night life
- q. Historic and architectural heritage, monuments, museums
- r. Nature, fauna and flora, volcanic nature of the islands
- s. Cultural attractions, festivals, special events
- t. Oceans, beaches and other water activities
- u. Religious attractions, religious events
- v. Shopping facilities
- x. Hospitality/friendliness of local people
- y. Peacefulness, tranquility, pace of life
- z. Safety and security
- aa. Activities for families with children