

VACATION PURPOSE CHOICE: A MIXED MULTINOMIAL LOGIT MODEL

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ABSTRACT

The share of vacation trips is rapidly increasing in many countries and is expected to further increase due to processes such as increasing wealth, ageing populations, and changing lifestyles. Research into the various facets of vacation travel thus seems timely and warranted. In this study we focus specifically on vacation purpose. The aim is to explore the determinants of choice of vacation purpose as a function of lifecycle stages, income and season. A selection of 838 respondents who participated in the Dutch panel about annual vacation behavior between 2002 and 2009 was used for analyses. A mixed logit model, accounting for panel effects was estimated. Findings suggest that differences given lifecycle stages reflect flexibility/constraints typical of each particular group. Results for season are also in line with one's expectations. Furthermore, income does not have a strong influence on the vacation purpose choice.

Keywords: vacation purpose choice, mixed multinomial logit model, panel effects

INTRODUCTION

The study of vacation has been vastly developed in the literature over the last decades. These activities generate trips, which contribute to emission levels and congestion and consequently, negatively affect the quality of life. Vacation decisions have traditionally been studied in tourism management (Dellaert, Borgers & Timmermans, 1997; Fesenmaier & Jeng, 2000; Bargeman & van der Poel, 2006). However, the topic has recently started to appear on the research agenda of the transportation research community (Böhler, Grischkat, Haustein & Hunecke, 2006; Dargay and Clark, 2012; Wu, Zhang & Fujiwara, 2012), which traditionally has focused mainly on commuting trips and comprehensive activity-travel patterns. This increasing interest in vacation travel reflects the fact that the share of tourist trips is rapidly increasing in many countries, and is expected to further increase due to changes in socio-demographics, lifestyles and other dynamic processes. Technological

advances, information dissemination, the influence of social networks and increasing available free time and budget have further contributed to the rise of tourist activities.

Understanding people's choices is vital for the appropriateness of strategies regarding service provision. Getting insights into the vacation travel patterns and the facets involved in its multitude is important to the development of specific tourism marketing strategies. The facets of vacation travel are numerous, such as the destination, accommodation, length of stay, travel party, transport mode, and many more. However, some of these facets have not been intensively investigated in the literature. The vacation purpose choice is one of those under researched facets. Earlier studies on vacation travel decision-making either do not consider different purposes separately (e.g., Hyde & Laesser, 2009), or focus on one particular type of vacation purpose (e.g., Train, 1998; Decrop and Snelders, 2004). In contrast, the study of LaMondia, Bhat and Hensher (2008) examined how households allocate their vacation time in different activity purposes (visiting, relaxing, sightseeing, recreation, and entertainment) as a function of household demographic, economic and residence characteristics. In that context a vacation could either include one type of purpose or a combination of several purposes. Their data contains one year information regarding respondents' domestic vacation travel (in the United States), where the private automobile is used for about 80-85% of such travel.

The present analysis differs from previous research as it used the information about the vacation trips made by the same respondents during 8 years, i.e., panel data. In addition, it includes both domestic and abroad vacations, as well as other transport modes. Each vacation was labelled by respondents within one of the seven different vacation purpose classes: (1) City trip, (2) Visiting friends/relatives (VFR), (3) Beach (4) Active trip, (5) Nature, (6) Visiting attraction or event, (7) Unknown.

Given the exposed, this study aims to analyse the determinants of choice of vacation purpose as a function of socio-demographic characteristics. A model accounting for heterogeneity in individual preferences was developed. More specifically, a mixed multinomial logit model is used to analyse vacation purpose choice as a function of socio-demographic variables (lifecycle stages and income) and season.

DATA AND SAMPLE

The NBTC-NIPO Research panel called CVO (Dutch: Continu Vakantie Onderzoek) was used in this analysis, and is prompted about the annual holiday behaviour of Dutch vacationers. More specifically, panel members are invited to report for four quarters their socio-demographics characteristics and vacation-related variables. Each year around 6,500 respondents participate in the CVO panel. However, the data required to analyze temporal changes in the vacation choices need to involve the same people for several years. From the overall CVO database, it was found that 838 respondents participated in the panel between 2002 and 2009. The data obtained from these respondents contain 17,576 records, 16,433 of which concern trips made, while 1,143 pertain to respondents who did not have any vacation trip in a particular year. The dataset contains numerous socio-demographic and trip-related variables organized in several categories. In the present study, only some variables were selected and the data was reclassified in fewer categories, in order to simplify the analysis and model estimation.

The selected socio-demographic variables include personal and household characteristics, as shown in Table I. Note that the year 2009 was taken as the reference year. The frequencies of the selected sample of 838 respondents were compared to the total yearly sample (6,721 respondents), which is representative of the Dutch population. Results indicated that, in both samples, males are slightly overrepresented. The annual income of the majority of the households is not higher than 68,000 Euros. As for age group, in the selected sample the group older than 55 years of age is larger in the total sample. Most respondents indicated to live in a household with 2 persons (as a couple).

Instead of using age and household composition, a variable derived from these was created: lifecycle stage. In travel research in general, the use of the lifecycle concept for understanding individual and household travel behavior has also been acknowledged (e.g., Zimmerman, 1982). Kitamura and Kostyniuk (1986) also suggested that lifecycle stage accounts for as much or more variation in travel than variables such as household size, income, number of workers or number of cars. Ortúzar and Willumsen (2011) also identified lifecycle as an important variable explaining trip making behavior.

Age was originally a continuous variable in the CVO data, and household composition had many categorical levels. In order to simplify the classification, age and household composition were categorized in 5 classes, which were derived to create 9 lifecycle classes. The resulted lifecycle stages classification was based on the literature (Wells & Gubar, 1966, Lawson, 1991; Fodness, 1992; Huntsinger & Roupail, 2012). Mature couples (aged over 55) constitute the largest sub-sample, followed by full nest II (families with children aged between 6 and 17) and middle-aged couples (aged between 35 and 54). The “full nest” categories were created based on the age of the youngest child present at home.

There are seven categories for vacation purpose: city trips (visit to touristic points, bars, museums, etc), visit friends/relatives (often labelled in the literature as VFR), beach trips, active trips (ski holidays, cycling, etc), nature trips (forests, rivers, etc), attraction or event visitation (amusement parks, music event, etc) and unknown (respondents who did not categorize their vacation).

The shares of the vacation purpose are presented in Table II. Most respondents did not know how to categorize their vacation, which explains the high occurrence of “unknown” vacation purposes. For those who did classify the purpose of their trip, city trips were the most popular, followed by nature, active vacations and beach vacations. Trips made specifically to visit friends and relatives or to visit an attraction are made with a lower frequency. Furthermore, the average length of stay for each vacation purpose indicates that beach trips are the longest, followed by nature and city/active. Vacation with the purposes of visiting an attraction/ event is in average performed in less than 5 days.

Vacation purpose choice: A mixed multinomial logit model
GRIGOLON, Anna; KEMPERMAN, Astrid; TIMMERMANS, Harry

Table I – Socio-demographic characteristics

Variables	Classes	N=838 (%)	N=6,721 (%)
Gender	Female	47.4	49.7
	Male	52.6	50.3
Age	0-17	9.2	18.9
	18-34	6.1	16.3
	35-54	34.0	32.7
	55-64	23.1	15.4
	65 or more	27.7	16.7
Household composition	Alone	17.2	10.9
	Household with children 0 to 5 years-old	13.7	16.3
	Household with children 6 to 17 years-old	17.8	25.4
	Household all members 18+	7.7	9.5
	Couples	43.6	37.9
Lifecycle stages	Young single (aged between 18 and 34)	1.6	2.1
	Young couple (aged between 18 and 34)	2.2	1.1
	Full nest I (children 0-5 years-old)	9.9	16.3
	Full nest II (children 6 to 17 years-old)	15.3	25.4
	Full nest III (all members aged over 18)	8.5	13.1
	Middle-aged single (aged between 35 and 54)	6.1	4.4
	Middle-aged couple (aged between 35 and 54)	12.6	8.6
	Mature single (aged over 55)	5.5	4.5
	Mature couple (aged over 55)	38.2	24.7
Income (year)	Low (less than €28,500)	37.7	21.5
	Medium (between €28,501 and €68,000)	43.9	67.7
	High (more than €68,001)	18.5	10.8

Table II – Vacation purpose choice participation and average lengths of stay

	Classes	%	Average length of stay (days)
Vacation purpose	City	16.02	9.62
	Visit friends/relatives (VFR)	5.41	7.33
	Beach	11.56	12.39
	Active	12.26	9.48
	Nature	15.63	10.27
	Attraction/ event	3.36	4.88
	Unknown	35.77	7.61

METHOD

A mixed multinomial logit model with panel effects (McFadden and Train, 2000) was applied to analyze the data. The model accounts for heterogeneity in individual preferences and includes different lifecycle groups. To capture time-dependent effects, a panel survey in which a sample of respondents is followed over a longer period of time was used for the analysis.

The dependent variable is vacation purpose choice. The “unknown” category was excluded from the analysis. Therefore, the vacation purpose classes vary within six alternatives. The category “attraction/ event” was considered as the base level alternative. The utility U_{ij} indicates that an individual i ($i=1,2,\dots,838$) associated with alternative j ($j=1,2,3,4,5,6$) is described as:

$$U_{ij} = \alpha_{ij}^* + \beta_{jk}X_{ik} + \theta_{jn}I_{in} + \delta_{js}S_{ijs} + \varepsilon_{ij}$$

The term α_{ij}^* is random alternative-specific constant associated with i individuals and j vacation purpose alternatives. A random parameter means that for the constants not only means were estimated, but also the standard deviations, which allows the estimation of distributions. The other components represent vectors of non-random parameters of individual and alternative-specific attributes. The coefficients that will be estimated are respectively lifecycle stages (β), income (θ) and season (δ). The subscripts k , n and s represent the levels of each of the attributes just cited, respectively. Finally, ε_{ij} is an unobserved random term assumed to be independent from the other components.

The model also allows the analysis of complementarity and substitution between vacation purpose options, by the inclusion of unobserved covariances to its specification. These are interpreted as the increase or decrease on the likelihood for performing one type of vacation in relation to another.

Dummy coding was used for the constants (vacation purpose alternatives). Because the explanatory variables are categorical, effect coding was used to represent these variables. It means that, for example, for every three-level attribute, two indicator variables were constructed. The first of these, coded as (1, 0) is associated with the first attribute level. The second indicator variable, coded as (0, 1) is associated with the second attribute level. The third attribute level is coded (-1, -1) on these two indicator variables. Consequently, the estimated utilities for each attribute sum to zero across the levels of that attribute. The t-statistics of each part-worth utility indicate any significant differences against the overall mean utility of that attribute.

Choice probabilities were calculated using Halton sequences. As suggested by Bhat (2001) and Train (2003) these sequences allow drawing from a distribution random numbers which are more uniformly spread over the unit interval.

RESULTS

A mixed multinomial logit model was estimated using respondents' preferences for vacation purpose, which were varied in the model according to 6 alternatives. The effects of lifecycle stages, income levels and season on the choice of vacation purpose were analysed. Five hundred Halton draws were used to estimate the model, using the Econometric software NLOGIT version 4.0 (Greene, 2007). Estimated coefficients resulted in a McFadden's Rho-square value of 0.25. According to Louviere et al. (2000, p.54) values between 0.2 and 0.4 are considered to be indicative of good model performance. Parameter estimates and their significance are shown on Table III.

The parameters for the constants represent choice behavior of young singles, with high income and travelling in the autumn, which were considered as the reference attributes.

All remaining parameters represent deviations from this reference. The constants were entered in the mixed logit model as random parameters, and coefficients indicate that city trips were the most popular, followed by nature and active vacations. The estimated standard deviations for the constants are also all statistically significant, indicating that respondents differ significantly in their choice of vacation purpose. Estimated unobserved covariances between city trips and all the other purposes are positive, meaning that unobserved factors that increase the likelihood of choosing a city trip also increase the propensity for making the other trip purposes. The same holds between nature, beach and active vacations. However, it is interesting to analyse that when there is an increased likelihood for making VFR vacations, there is a decreased propensity for beach, active or nature vacations, interpreted from the negative and significant coefficients between these alternatives. It means that when holidays are used to visit friends or relatives, there are less available days for beach, active and nature vacations.

The estimated parameters of the non-random parameters are also shown on Table III. Regarding the choice of vacation purpose relative to the lifecycle groups, results show that city trips are more prevalent for middle-aged singles and mature couples and are least popular amongst families with children (full nest I and II). These preferences might reflect the urban character of the activities involved under the label "city trips", such as visiting museums, restaurants etc, which as in general more suitable for other groups other than family with young children. As for VFR and active vacations, parameters are significant only for full nest I and II and the negative sign of the parameters indicate that this vacation purpose is performed less when compared to the reference group (young singles). Coefficients for beach vacation are positive and significant for full nest III, meaning that this seems an interesting vacation purpose for this group. The estimates associated with nature-oriented activities resulted in negative parameters for full nest I, II and young couples, thus, this type of vacation is less prevalent for these groups. On the contrary, the positive sign of the parameters for full nest III and mature couples indicate that nature vacations were popular among these groups.

The effects of income on vacation purpose choice are significant only in the case of city trips. It shows that the utility increases with increasing income, which is an expected finding as people with lower incomes or having financial problems tend to cut expenses, which may imply in less vacation trips.

Regarding the interactions between vacation purpose choice and season, coefficients are significant and positive for city trips made in the spring, beach and nature trips made in the summer and spring and active trips made in the winter. These results are in line with one's expectations as city, beach and nature trips tend to be performed in warmer seasons and active vacations (which are probably represented by ski holidays, very popular among Dutch vacationers) tend to be performed in the winter. Furthermore, the negative and significant parameters estimated by the model indicate, as expected, that beach and nature trips are not likely to be performed in the winter. Parameters for VFR are not significant for none of the seasons, indicating that visiting friends or relatives vacations might be conducted regardless the season.

Vacation purpose choice: A mixed multinomial logit model
GRIGOLON, Anna; KEMPERMAN, Astrid; TIMMERMANS, Harry

Table III – Parameter estimates and their significance – Vacation purpose choice

	City	VFR	Beach	Active	Nature
Random parameters:					
Constants (α)	2.039***	.731***	1.232***	1.358***	1.416***
Standard deviation	1.522***	1.823***	1.805***	2.144***	2.108***
Unobserved covariances:					
VFR	.804***				
Beach	.516**	-.471***			
Active	.995***	-.231	.142		
Nature	1.347***	-.484***	.254*	.573***	
Non-random parameters:					
Lifecycle (β)					
Young single (base)	.763	.472	-.024	.717	.059
Young couple	-.468	-.093	-.097	-.13	-.922**
Full nest I	-1.258***	-.507**	-.207	-.582**	-.499**
Full nest II	-1.011***	-1.125***	-.035	-.412**	-.672***
Full nest III	.339	.231	.495*	.42	.665**
Middle-aged single	.820***	.854	.097	.27	.158
Middle-aged couple	.178	-.376	.135	-.128	.341
Mature single	.289	.502	-.382	-.037	-.01
Mature couple	.349**	.042	.017	-.117	.881***
Income (θ)					
Low	-.219*	-.041	-.181	.021	.015
Medium	-.002	.005	.105	.047	.029
High (base)	.221*	.035	.076	-.068	-.045
Season (δ)					
Summer	-.086	-.084	.615***	.074	.607***
Winter	-.104	.139	-.936***	.523***	-.798***
Spring	.182*	.115	.228**	-.062	.21**
Autumn (base)	.008	-.171	.093	-.535	-.019
Goodness-of-fit statistics:					
Log-likelihood (null model): -18,890.52			Log-likelihood (estimated model): -14,260.36		
McFadden Rho-square: 0.25					

Note: ***, **, *: Significant at 1%, 5% and 10% statistical level

The importance of each attribute on respondents' vacation purpose choice can be indicated by the percentage from relative ranges (range between the highest and the lowest utility of the attribute), as Figure 1 shows. It indicates how much difference each attribute makes in the total utility. Results show that income plays a small role in defining the purpose of the vacation. As for lifecycle stages, it seems that it strongly influences the choice of especially city and VFR holidays. In addition, season seems to play a major role on the choice of beach holidays, but also exerts a very strong impact on the choice of active and nature trips.

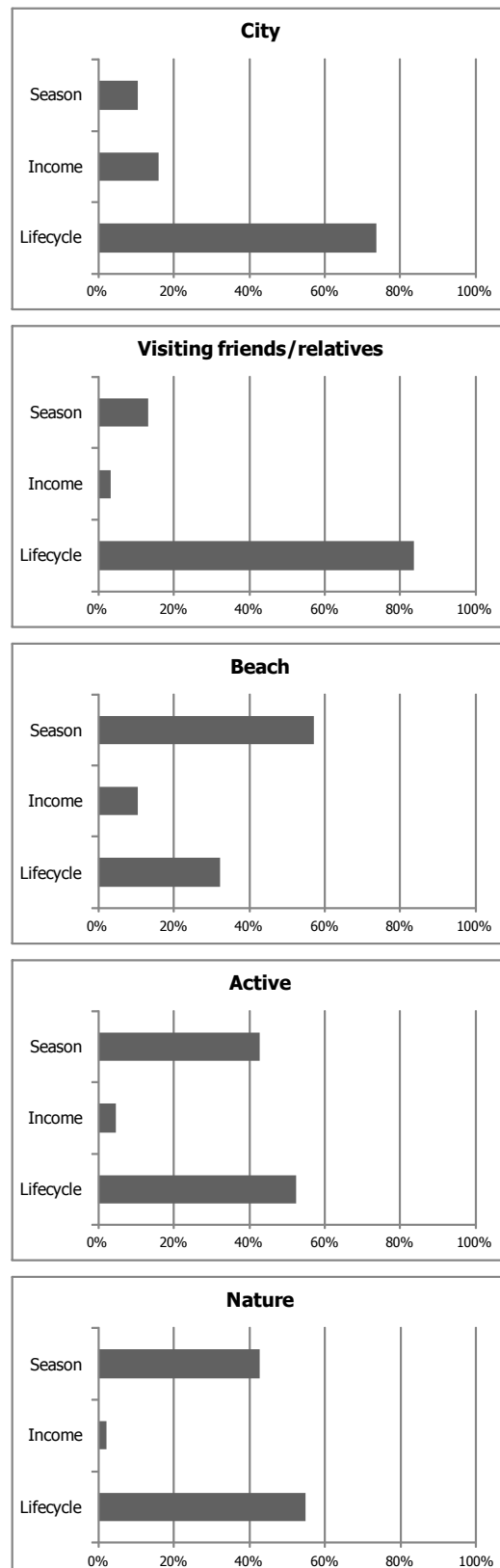


Figure 1 – Figure legend (Use Caption Figure style to insert the figure legend)

CONCLUSIONS

A mixed logit model to analyze differences and commonalities in vacation purpose choice was developed. The effects of vacation purpose choices in relation to lifecycle stages, income and season were examined. In addition, complementarity and substitution between vacation purpose options were analyzed by with the inclusion of unobserved covariances to the model specification.

Results demonstrated that the proposed model formulation is valuable to analyze tourist's choices over time as it allows parameters associated with each variable to vary randomly across individuals. Coefficients show that city trips were the most prevalent for Dutch tourists, although respondents differ significantly, indicated by the high standard deviations values. Unobserved covariances indicate that except for VFR, the other vacation purposes increase the likelihood for performing the others.

Based on the empirical results of the estimated coefficients for the interactions between vacation purpose choice and the socio-demographic variables (lifecycle and income), some conclusions can be drawn. First, the differences in behavior given individual's lifecycle stages can be explained in general by flexibility/constraints given age and/or household composition. Furthermore, it seems that income does not play a major role in defining the vacation purpose. As for season, results are in line with one's expectations.

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