E-COMMERCE AND TOURIST PURCHASE DECISION: AN EMPIRICAL MICRO ANALYSIS

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The development in the tourism industry linked with the rapid growth in e-commerce has put in evidence the existence of a new costumer. We empirically investigate the microeconomic determinants of the internet purchased tourist goods, a subject we know very little about. We adopt a reduced form demand for online goods model, extended to incorporate possible selectivity biases stemming from interactions between unobserved individual heterogeneity associated with specific internet use choice. The model is estimated using a very rich dataset from EGATUR (Encuesta de gasto turístico), the Spanish Foreign Tourist Expenditure Survey. The sample allows us to explore the influence of price and income related variables as well as personal characteristics on internet purchased goods. Price and income results are consistent with theory. Unobserved individual heterogeneity linked with the use of the internet is significantly correlated to unobserved individual heterogeneity related with the online purchased. This primary attempt to apply selectivity models in investigating on line commerce's offers insights and raises new empirical and theoretical questions

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1. Introduction

One of the main features of the tourism is intangible nature when purchased; because it is a confidence good and a priori comprehensive assessment of its qualities is impossible, moreover, if we take into account the fact that the tourist is normally not able to try the product until the moment agreed. At the instant of decision making, only an abstract model of the product is available, based on information acquired through multiple channels, such as brochures or the Web. Tourism products require information gathering on both the consumer and supply sides and thus entail high information search costs.

The invention of the Internet, enabling the subsequent development of e-business, has had an impact on the tourism industry. The Internet has provided suppliers in the industry with direct access to the customer and a cost reduction by disintermediation of travel agents and operators, etc. The use of Internet is twofold: it can act as a promotional tool or it can be used focusing on its capacity to do e-commerce. At first, the promotional application was the reason why the tourist became so interested in the Internet. The second form with the e-commerce, which should be understood as the reservations and/or shopping for tourist products, has increased by as much as 34% from 2004 to 2005 (Marcussen (2006)).

Given that the relatively new phenomenon of e-commerce has important repercussions for tourist travel decisions, the aim of this paper is to analyse the microeconomic determinants of the tourists' purchase choice for foreign tourism arriving to Spain. The empirical literature on this subject is very scarce. It reduces to some mainly descriptive papers, see, for

example for Spain, IBIT (2001), or others on very specific questions not related with tourism subject, see, for example, Goolsbee (2000) and Alm and Melnik (2005).

The purpose of the article focuses on the influence that the e-commerce is having on the tourist sector by assuming that they compare the stochastic utility of several alternatives and select the one that maximizes their utility. We use a probit model with sample selection in which the probability of the e-commerce choice is conditional to the access to Internet.

The model has been estimated with Spanish data on foreign tourism. We utilize the 2004 wave of a very rich database coming from EGATUR (*Encuesta de Gasto Turístico*) the Spanish Foreign Tourist Expenditure Survey. The survey is a questionnaire answered by more than a sixty thousand foreign tourists visiting Spain and requests information on tourists' socioeconomic characteristics, attributes of the trip and other relevant variables including the e-commerce choice. The Egatur sample doesn't have problems of selection bias because the data include all type of tourist arriving to Spain and not only those that use Internet.

The paper proceeds as follows: we outline a conceptual framework that allows one to explain tourists' choice of commerce mode in section 2. We describe in section 3 the database and we present the empirical results and analyse the main determinants of e-commerce choice. Finally, in section 4 we conclude with our conclusions of the impact of e-commerce on the tourist purchase decision experience in Spain.

2. The Model

Online commerce presents Internet users with another method for purchasing goods. Most all goods traded online can also be purchased in traditional commerce. In this respect, the Internet presents simply another venue for purchasing the same goods, and hence Internet-purchased goods can be considered as perfect substitutes to some goods purchased in traditional commerce.

We can therefore structure the consumer decision to purchase goods online in the following way. First, we assume that the utility function of the representative tourist is

$$U=U(q_1, \ldots, q_k, z_1, \ldots, z_n, d_1, \ldots, d_r),$$

where $q=(q_1, \ldots, q_k)$ represents the vector of goods that can be purchased only in traditional commerce, for example restaurant meals; $z=(z_1, \ldots, z_n)$ denotes consumer goods that can be purchased in online commerce and in traditional commerce, they are perfect substitutes, for example, hotel beds; and , $d = (d_1, \ldots, d_r)$ represents a good that can be purchased in online commerce only, for example, low-cost airlines.

The consumer balance will be reduced to:

$$Max\ U= U(q_1, \ldots, q_k, z_1, \ldots, z_n, d_1, \ldots, d_r)$$

$$Subject\ to: \quad p_q\, q + p_z\, z + p_d\, d = Y$$

where p_q, p_z *and* p_d are the vector of prices, and Y represents the income level.

In this setting each tourist is assumed to have to make a choice tourist goods that can be purchased in online commerce and in traditional commerce. Due to the cross-sectional nature of our database we assume a myopic behaviour. For any given tourist, defined by means of individual observed characteristics, his/her utility is derived from a number of observed good attributes and travel features and a set of unobservables.

The probability that a tourist i will choose to buy online equals the probability associated with a positive difference in the comparisons between the utility derived from buying online and the utility related with a traditional commerce. The difference between the online commerce and the traditional commerce can be represented as an unobserved latent variable Y_i*. So

$$Y_i^* = X_i'\beta + W_i'\delta + u_{i,} \qquad [1]$$

such that one observes only the binary outcome,

$Y_i = 1$ if $Y_i^* > 0$ and

$Y_i = 0$ if $Y_i^* \leq 0$.

However, one only observes Y_i for observation i if tourist has decided to obtain access to the Internet (C_i =1), where C_i^* follows

$C_i^* = X_i'\gamma + Z_i'\pi + \varepsilon_I,$ [2]

where

$C_i = 1$ if $C_i^* > 0$ and

$C_i = 0$ if $C_i^* \leq 0$.

X_i is a vector of individual characteristics; W_i is a vector of variables that are not included in [2] and Z_i is a vector of variables that are not included in [1]. u_i and ε_i are the error terms for equations [1] and [2], respectively, distributed as bivariate normal with mean zero, unit variance, and $\rho = Corr(u_i,\varepsilon_i)$. After controlling by observables our model allows for correlation between unobservables in equations [1] and [2].

As it is well known, when $\rho \neq 0$, standard probit techniques applied to equation [1] yield biased results, and the probit model with sample selection provides consistent, asymptotically efficient estimates for all the parameters in such models.

3. Empirical analysis

In this section we present results from a probit model with selectivity, equations [1] and [2] above, in which the primary equation represents the probability of online shopping conditional on the probability of Internet access with a tourism purpose. The model is estimated by maximum likelihood and it is adapted from the article of Van de Ven and Van Pragg (1981), in which both equations have binary dependent variables.

All specifications include a group of common variables X_i which have related with characteristics that can influence tourist' purchase choices and the possibility to undertake certain activities. This type of variables is included in equations [1] and [2] because they are common in the two decisions (Internet access versus not Internet access, and online commerce versus traditional commerce).

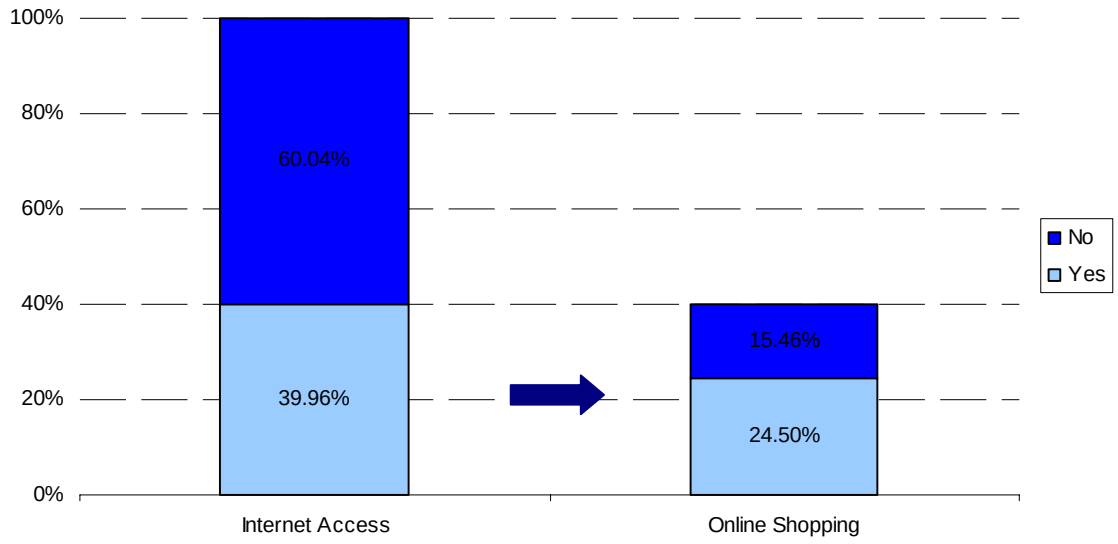
They include variables related with tourists' characteristics and trip attributes, for example: age, level of education, level of income, length of stay, purpose and organization of the trip, size of travel group, type of accommodation, seasonality, fidelity, country of residence and main destination. Some of these common variables are not included with the same specification in the main and in the selection equations because we assume that there are a different influence way, in that sense, those variables can be characterized as W_i and Z_i variables.

In the other side, a group of variables W_i shows specific characteristics related with the main decision: the choice between e-commerce as opposite to traditional commerce. Variables included in this vector are, for example, travel to Spain with a low cost company because this type of companies doesn't works frequently with the traditional commerce.

The data has been collected from the 2004 wave of EGATUR (*Encuesta de Gasto Turístico)* the Spanish Foreign Tourism Expenditure Survey, whose main objective is the quantification of non resident visitors coming to Spain and of their travel expenditure. It provides a very rich data set to estimate the empirical model in order to answer why to choose the e-commerce for tourism activities.

To highlight the importance of the tourist access to the Internet and tourist use of online shopping, Figure 1 presents a structured view of these variables. It is important to remark the importance of the Internet use in general as a way to obtain information to visit Spain, with forty percent of tourist, if we analysed these tourists who use Internet, we show that the greater number of those correspond to tourist who purchase with e-commerce (24.5%).

Figure 1: Percentage of Tourist with Internet Access and Online Shopping



Source: EGATUR and own elaboration.

In general independent variables have been defined as dummy variables which take a value of 1 if the tourist belongs to the category specified and 0 otherwise[1]. Table 1 presents the percentage of the tourist with purchase online analysed in the whole sample and in the

[1] See Appendix for variables definition and a descriptive analysis of the sample.

access to Internet sample and we distinguish three types of independent variables: tourist' characteristics, trip attributes and other control variables. While most of the characteristics are similar across the samples, it is important to remark the growing importance of the e-commerce in products related to tourism in both of sample (the Internet and in the total sample) of the tourist who has those characteristics: country of residence United Kingdom, main destination the Community of Valencia, travel in low cost company, without package tour, don't use tourism resort and with university education.

[Insert Table 1]

The results of the estimations of a probit model with sample selection are reported in Table 2 and Table 3 shows the marginal effects and the pseudo-elasticities estimate for the model.

[Insert Table 2]

[Insert Table 3]

The demographic characteristics of tourists were introduced to explore differences in sensitivity to different aspects of e-commerce. Differences by age show coefficients significant and with the predictable signs. The results show that being younger make a tourist more likely to have access to Internet and, also, more likely to bought online when the purpose of the trip is sun and beach. On the other hand, if the purpose of the trip is work and business relations, tourist with an age between 24 and 64 (principal working age) has less probability to buy online the tourist product. Business tourists behave differently than

those leisure tourists, the reason could be found in the higher price sensitivity of leisure travellers, and, as a consequence, the e-commerce acts as a determinant in the decision-making processes of this type of tourist. The same result is found if we look for the probability of access to Internet and the purpose of the trip, leisure tourist look for tourist information at Internet more than business travellers.

Education has a consistently positive and statistically significant impact on the Internet access rate and on the probability of buying online. More level of education implies more knowledge about Internet and its utilities for looking information and, in that sense, make a tourist more likely to have bought online.

Income level has not an impact on the decision to buy online, conditional on Internet access and relative to the omitted income category[2]. But it is important to remark the different behaviour of the income level on the decision to Internet access, these variables have a statistically significant and a positive impact, with the magnitude of the coefficient on income increasing as income increases. This result suggests that the wealthy segments of the tourist are more likely to benefit from the access of Internet for tourist information but not for the online purchases.

Differences by origin market show that tourist who comes from United Kingdom presents the greater probability to the use of Internet and to buy online, as Marcussen (2006) points out the UK became the largest online travel market in Europe in the last years. At the other

[2] It is not rejected the test hypothesis jointly equal zero ($\chi^2(2) = 1.07$). Inclusion of Income level combined with Purpose of the trip instead of the direct form has no significant impact on any of the coefficients reported in Tables 2 and 3.

side, tourist which comes from France has the lowest. French tourists are about 8% and 18% less likely to buy online and to access to Internet, respectively, than the Netherlands (the reference category) and the British tourist are about 10% and 3% more likely to the e-commerce and to the use of Internet, respectively.

The Community of Valencia is the main destination for tourist which access and buy using Internet whilst Canary Islands shows the lowest probability for the tourism e-commerce and Andalusia shows the lowest probability for tourist information using Internet.

The trade-off among package holidays has a negative effect on the probability of the Internet access and on the probability of buying online, with a marginal effect of -15.6% and -22% respectively. The explanation of this result can be found in the different way of planning a travel, directly or indirectly thorough distribution channels such as travel agents. A new tourism distribution system has emerged that required a better knowledge of their environments and Internet can act as a promotional tool and/or it can be used focusing on its capacity to do e-commerce for individual tourists that planned their tourism without a package.

It may be assumed that the cost of searching for new alternatives is generally too high and the expected gains associated with new alternatives too uncertain. If we analyse tourists with ten or more visits to Spain, we can observe than they prefer to use the e-commerce with a marginal effect of 6% on the probability of buying online.

Also evidenced in Table 2 is the fact that the use of a low cost airline to come to Spain increases the probability of the e-commerce. This is one of the most important characteristics of this type of companies, which prefers direct access to a consumer only through call centers and the Internet.

The lowest the length of the stay the greatest the probability to buy online, with positive means marginal effects ranging from 6.8% (between 1 and 3 days) to 5.3% (between 4 and 7 days).

Finally, the statistical significance of the correlation coefficient suggests that controlling for the likelihood of the use of Internet is critical to determining the e-commerce effects. Also, the positive point estimate of ρ implies that the unobserved factors affecting the probability of internet access or online shopping are positively correlated. In other words, the two outcomes are positively correlated after controlling for tourists' characteristics and the attributes of the destination itself.

4. Conclusions

The impact of Internet in activities related to tourist has been a significant growth in the last years. Given that the online commerce has important repercussions for tourist decisions, the aim of this paper is to analyse the microeconomic determinants of the tourists' e-commerce choice for foreign tourism arriving to Spain in 2004.

The econometric analysis employed to obtain these results use a probit model with sample selection. This model it is necessary with the aim of control the e-commerce effects for the likelihood of the use of Internet, we came to this conclusion showing the statistical significance of the correlation coefficient. Using a probit model with sample selection we have estimated the probability of e-commerce choice, for the tourists that use Internet with a tourism purpose, as opposite to buy tourist's products using traditional commerce.

Our results allow us to define characteristics influencing e-commerce. In general, the results show that tourist users of online shopping meet the following requirements. Younger people are more likely to buy by internet, tourists who come to Spain looking relax or beach and sun (leisure tourists) prefer to purchase online the tourist product, tourists without package holidays and who travel by low cost company have more probability to buying online than tourists to planning the travel with package holidays or travel by air, in a full service airline, or by road. Furthermore, geographical characteristics shows that tourist which comes from United Kingdom and goes to the beach in Community of Valencia have the greater probability to use Internet for looking information and also to bought online.

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Table 1: Percentage of e-commerce by tourist' characteristics, trip attributes and other control variables

Tourists' characteristics	Total tourists	Internet access	*Trip attributes*	Total tourists	Internet access
Age			**Size of travel group**		
<= 24 years	36,19%	23,91%	Alone	39,53%	38,32%
24 < age <= 44	29,69%	23,59%	Couple	29,64%	30,90%
44 < age <=64	21,60%	24,75%	More than two	30,83%	30,78%
>= 65 years	12,52%	27,76%	**Tourist main destination**		
Purpose of the tripe			Rest of Spain	13,43%	13,18%
Work and Business	22,74%	30,66%	Andalusia	12,06%	16,25%
Sun and beach (or relax)	32,39%	30,17%	Balearic Island	16,44%	16,70%
Other motives	44,87%	39,17%	Canary Island	8,16%	7,76%
Age & Purpose of the tripe			Catalonia	15,88%	14,64%
<= 24 years & Sun and beach (or relax)	32,56%	22,59%	Community of Valencia	22,46%	18,31%
24 < age <= 44 & Sun and beach	31,35%	23,18%	Madrid	11,57%	13,16%
44 < age <=64 & Sun and beach	23,16%	25,51%	**Length of stay**		
>= 65 years & Sun and beach	12,93%	28,71%	1 < days < 3	28,94%	35,46%
			4 < days < 7	37,96%	32,71%
<= 24 years & Work and Business	38,19%	26,15%	>= 8 days	33,10%	31,83%
24 < age <= 44 & Work and Business	23,68%	23,91%	**Type of accomodation**		
44 < age <=64 & Work and Business	20,32%	25,21%	Other type of accomodation	33,50%	33,27%
>= 65 years & Work and Business	17,81%	24,72%	Freee accomodation	41,62%	40,43%
			Tourism resort	24,88%	26,30%
<= 24 years & Other motives	37,61%	23,57%	***Other control variables***		
24 < age <= 44 & Other motives	33,53%	25,56%	**Seasonality**		
44 < age <=64 & Other motives	18,78%	24,19%	First Quarter	24,20%	26,16%
>= 65 years & Other motives	10,07%	26,68%	Second Quarter	24,57%	24,63%
Level of education			Third Quarter	23,90%	23,67%
Basic education	20,62%	27,16%	Fourth Quarter	27,33%	25,54%
Médium education	35,00%	35,99%	**Number of visits**		
University education	44,38%	36,85%	Number of visits >=10	47,58%	55,55%
Country of residence			Number of visits < 10	52,42%	44,45%
France	6,84%	13,40%			
Germany	14,29%	14,58%			
United Kingdom	24,09%	20,90%			
Italy	17,98%	17,44%			
Netherlands	21,69%	18,30%			
Rest of the world	15,11%	15,38%			
Level of income					
High	30,07%	31,01%			
Médium	32,81%	31,99%			
Low	37,12%	36,99%			
Organization of the trip					
without package tour	70,19%	66,49%			
with package tour	29,81%	33,51%			
Type of travel					
Full Service Airline	26,01%	31,09%			
Low Cost Company	67,26%	51,64%			
Road	6,73%	17,28%			

Table 2: Estimation of the probit model with sample selection

E-commerce	**Coef.**	**Std. Err.**		**Internet access**	**Coef.**	**Std. Err.**	
Age & Purpose of the tripe				**Age**			
<= 24 years & Sun and beach (or relax)	0,1994	(0,048)	***	<= 24 years	1,1751	(0,029)	
24 < age <= 44 & Sun and beach	0,1427	(0,033)	***	24 < age <= 44	0,9609	(0,024)	***
44 < age <=64 & Sun and beach	0,0984	(0,035)	***	44 < age <=64	0,5836	(0,024)	***
<= 24 years & Work and Business relations	-0,2038	(0,125)		**Level of education**			
24 < age <= 44 & Work and Business relat.	-0,5062	(0,045)	***	Basic education	-0,3718	(0,020)	***
44 < age <=64 & Work and Business relat.	-0,4441	(0,073)	***	Medium-High education	-0,2868	(0,013)	***
Level of education				**Country of residence**			
Basic education	-0,2641	(0,042)	***	France	-0,8092	(0,030)	***
Medium education	-0,0646	(0,026)	**	Germany	-0,1312	(0,027)	***
Country of residence				United Kingdom	0,0945	(0,026)	***
France	-0,2326	(0,063)	***	Italy	-0,2623	(0,034)	***
Germany	0,0186	(0,042)		Rest of the world	-0,2643	(0,027)	***
United Kingdom	0,2602	(0,040)	***	**Level of income**			
Italy	-0,1976	(0,052)	***	High	0,2142	(0,052)	***
Rest of the world	-0,2270	(0,042)	***	Medium	0,1591	(0,050)	***
Level of income				**Organization with package tour**	-0,6599	(0,019)	***
High	-0,1021	(0,099)		**Purspose of the trip**			
Médium	-0,0959	(0,097)		Work and Business relations	-0,5606	(0,024)	***
Organization with package tour	-0,7892	(0,039)	***	Sun and beach	0,0761	(0,018)	***
Type of travel				**Size of travel group <=3**	0,0998	(0,015)	***
Full Service Airline	1,0015	(0,040)	***	**Tourist main destination**			
Low Cost Company	1,7268	(0,046)	***	Rest of Spain	0,1120	(0,025)	***
Size of travel group				Andalusia	-0,4450	(0,025)	***
Alone	0,0671	(0,032)	*	Canary Island	0,1409	(0,018)	***
Couple	0,0185	(0,025)		Catalonia	0,0959	(0,022)	***
Tourist main destination				Community of Valencia	0,1966	(0,024)	***
Rest of Spain	-0,2219	(0,042)	***	Madrid	-0,1903	(0,030)	***
Andalucía	-0,2107	(0,051)	***	**Length of stay**			
Canary Island	-0,6237	(0,036)	***	1 < days < 3	-0,1862	(0,019)	***
Catalonia	-0,0710	(0,037)	*	4 < days < 7	0,0610	(0,013)	***
Community of Valencia	0,1940	(0,042)	***	**Type of accomodation**			
Madrid	-0,3672	(0,048)	***	Free accomodation	-0,1250	(0,017)	***
Length of stay				**Seasonality**			
1 < days < 3	0,1806	(0,034)	***	Second Quarter	0,0696	(0,017)	***
4 < days < 7	0,1411	(0,021)	***	Third Quarter	0,0129	(0,016)	
Type of accomodation				Fourth Quarter	0,1613	(0,017)	***
Free accomodation	-0,0124	(0,041)		**Number of visits >=10**	-0,1709	(0,013)	***
Tourism resort	-0,1227	(0,039)	***	**Constant**	-0,6922	(0,069)	***
Seasonality							
Second Quarter	-0,0833	(0,030)	***	rho	0,2411	(0,077)	***
Third Quarter	-0,1356	(0,029)	***	Log pseudolikelihood	-477860,49		
Fourth Quarter	-0,0557	(0,030)	*	Number of obs. 60011			
Number of visits>=10	0,1661	(0,026)	***	Censored obs.	36031		
Constant	-0,4411	(0,131)	***	Uncensored obs.	23980		

[a]Individual reference: more than 64 years old, other motives of travel, University education, Netherlands, low level of income, without package tour, travel by road, size of travel group over two, Balearic Island, length of stay over 8 days, other type of accommodation, first quarter, less than ten visits.
***Level of significance 1%, **level of significance, 5%, *level of significance 10%.

Table 2: Marginal effects and pseudo-elasticities of the probit model with sample selection

E-commerce	Marginal Effects	Pseudo elasticity	Internet access	Marginal Effects	Pseudo elasticity
Age & Purpose of the tripe			**Age**		
<= 24 years & Sun and beach (or relax)	0,075	22,7%	<= 24 years	0,441	180,4%
24 < age <= 44 & Sun and beach	0,053	16,1%	24 < age <= 44	0,362	147,9%
44 < age <=64 & Sun and beach	0,036	11,0%	44 < age <=64	0,212	86,9%
<= 24 years & Work and Business relations	-0,070	-21,3%			
24 < age <= 44 & Work and Business relation	-0,158	-47,9%			
44 < age <=64 & Work and Business relations	-0,142	-42,9%			
Level of education			**Level of education**		
Basic education	-0,089	-27,1%	Basic education	-0,101	-41,2%
Medium education	-0,023	-7,0%	Medium-High education	-0,081	-33,0%
Country of residence			**Country of residence**		
France	-0,079	-24,1%	France	-0,178	-72,7%
Germany	0,007	2,0%	Germany	-0,039	-16,1%
United Kingdom	0,099	29,9%	United Kingdom	0,031	12,5%
Italy	-0,068	-20,7%	Italy	-0,074	-30,5%
Rest of the world	-0,078	-23,5%	Rest of the world	-0,075	-30,7%
Level of income			**Level of income**		
High	-0,036	-10,9%	High	0,072	29,4%
Medium	-0,034	-10,3%	Medium	0,053	21,5%
Organization with package tour	-0,220	-66,8%	**Organization with package tour**	-0,156	-63,9%
Type of travel			**Purspose of the trip**		
Full Service Airline	0,383	116,2%	Work and Business relations	-0,139	-57,0%
Low Cost Company	0,571	173,3%	Sun and beach	0,025	10,0%
Size of travel group			**Size of travel group <=3**	0,032	13,3%
Alone	0,025	7,5%			
Couple	0,007	2,0%			
Tourist main destination			**Tourist main destination**		
Rest of Spain	-0,076	-23,0%	Rest of Spain	0,036	14,9%
Andalusia	-0,072	-21,9%	Andalusia	-0,117	-47,7%
Canary Island	-0,186	-56,5%	Canary Island	0,046	19,0%
Catalonia	-0,025	-7,7%	Catalonia	0,031	12,7%
Community of Valencia	0,073	22,1%	Community of Valencia	0,066	26,9%
Madrid	-0,120	-36,4%	Madrid	-0,056	-22,8%
Length of stay			**Length of stay**		
1 < days < 3	0,068	20,5%	1 < days < 3	-0,055	-22,3%
4 < days < 7	0,053	15,9%	4 < days < 7	0,020	8,0%
Type of accomodation			**Type of accomodation**		
Free accomodation	-0,004	-1,4%	Free accomodation	-0,037	-15,3%
Tourism resort	-0,043	-13,1%			
Seasonality			**Seasonality**		
Second Quarter	-0,030	-9,0%	Second Quarter	0,022	9,2%
Third Quarter	-0,048	-14,4%	Third Quarter	0,004	1,7%
Fourth Quarter	-0,020	-6,0%	Fourth Quarter	0,053	21,8%
Number of visits>=10	0,062	18,8%	**Number of visits >=10**	-0,050	-20,6%