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Mixed effects of low-cost airlines on tourism in Spain.

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Abstract

This article presents an estimate of the impact of low-cost airlines on Spanish tourism arriving from the principal EU-15 member states during the first decade of the 21st century by means of a multivariate analysis of tourist demand. The effects of low-cost companies (LCCs) on expenditure and on the number of tourists are separated. The expansion in low-cost airlines have had a positive and strong effect on the number of tourists but seems not to have influenced at all the aggregate expenditure made by them as the expenditure by tourist has decreased perhaps due to an increasing number of tourist with higher frugality or lesser income. This result could be regarded as a useful guide to policy makers when they subsidize LCCs.

JEL Classification: D12, F14, L83, L93.
Key words: Air Transport, Low Cost Airlines, Tourist demand

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1. Introduction

In the last decade the so-called "low-cost companies" (LCCs) have successfully challenged the firms already established in the market ("network companies"),with a different business model based on lower management and operating costs and lower prices, initially focusing on short-haul routes and the use of smaller planes, secondary airports and more frequent flights, along with a high load factor (Maliaghetti, 2009;Aguiló, Rey et al., 2008; Francis, Humphreys et al., 2007; Casadesus-Masanell and Ricart, 2007).

Initially started in the US market with Southwest Airlines, the "low-cost company model" has spread all over the world and particularly to Europe, where a group of those companies has grown very rapidly since 1995- mainly located in the UK and Ireland –with remarkable performers among them being Ryanair, EasyJet and Air Berlin. Compared with its counterparts in the U.S., European companies exhibit a more aggressive direct sales approach (Francis, Humphreys et al., 2006).

The LCC's success has been analyzed using different approaches, particularly the business model, the study of pricing techniques and its impact on airports (Francis, Humphreys et al., 2004, 2006; Franke, 2004; Doganis, 2006; Gudmundson, 2004). But there are few works focusing on their effects on economic activity and economic welfare and so on in one of the aspect more directly influenced by them, tourism.

A pioneer analysis can be found in Aguiló, Rey and others (2008) where some interesting hypotheses concerning several effects of LCC's are pointed out, although using the scarce information available in 2005. Here, the odds of mixed effect are suggested, positive on the number of tourists and negative or none on the

expenditure by tourist, as the tourists response to cheap fares could be shorter and more frequents flights. Recently, Rey, Myro and Galera (2011) have shown evidence of a strong impact on the number of tourist, but the positive impact on expenditure remains unexplored in spite of being crucial to economic activity and growth.

This paper deals with this last unexplored aspect. By means of a dynamic panel data model for tourism demand, the LCCs effect on the Spanish´s number of tourist, aggregate expenditure and expenditure per tourist are estimated. The panel data used comprises the tourist flows coming from the EU-15 countries towards the six main Spanish tourist regions.

The article is organized as follows. In section two, there is a succinct description of the evolution of tourism and LCC activity in Spain during the present decade. Subsequently, the model to be estimated is presented and the statistical sources of information employed are described along with the econometric methods applied. Finally, the results obtained are presented and some concluding remarks made.

2. Tourism and LCCs in Spain

From 2000 to 2007, the number of tourists entering Spain increased by an annual rate of 3.4%, reaching a record figure of 58.6 million people in 2007. Nevertheless, in 2008 and 2009 this figure has shown a remarkable fall due to the effects of the international financial crisis to start to grow again since 2010, reaching to recover in 2012 the numbers of 2007. The increasing number of tourists went mainly to Catalonia, which became the top Spanish region by number of entries among the six

considered in this study (i.e. Andalusia, Balearic Islands, Canary Islands, Catalonia, Valencia and Madrid) accounting for more than 90% of the total.

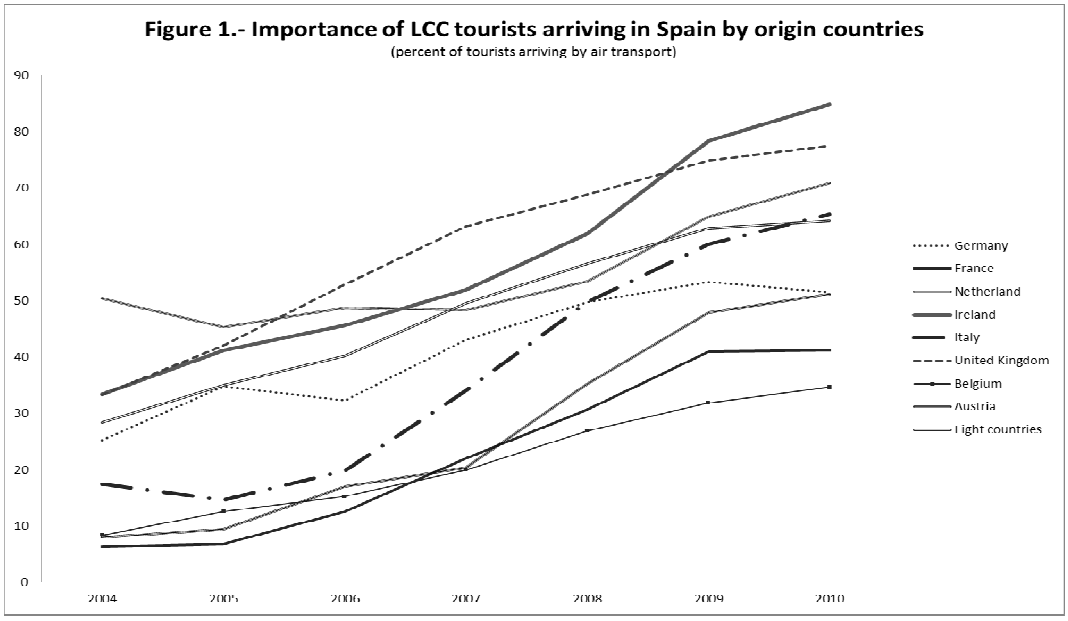
Although noticeable, the annual growth in the volume of tourists registered did not follow the pattern of world economic activity, since it was high in 2001 and 2002, years of slow growth and also marked by the 9/11 attacks[7], and on the other hand, became sluggish in the most expansive years, 2006 and 2007, which might have been due to a greater increase in prices in the Spanish market and tougher competition from other emerging countries. In the same way, the last strong increase happened in 2012, a year of pronounced recession.

Tourists arriving in Spain come mainly from Europe (around 85%), more specifically from the EU-15 countries and in particular from three of them, Germany, France and the United Kingdom, which account for nearly 60% of the total[8].

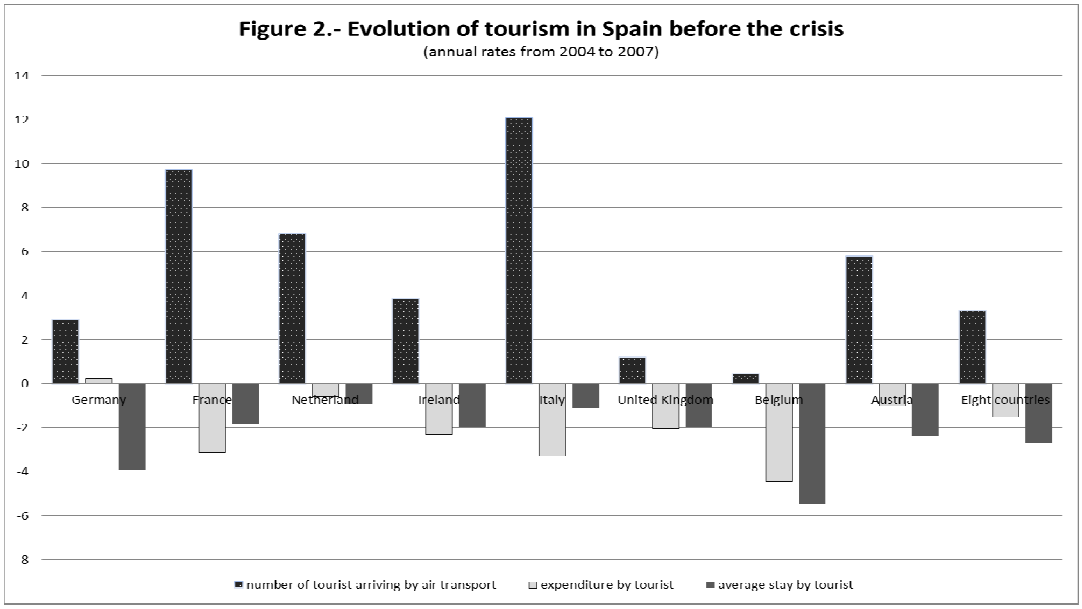
The evolution of tourism as described above must embody the growing influence of low cost airline companies too. Their weight in air traffic between Spain and the tourists' countries of origin of those heading for Spain has shown considerable growth, and currently accounts for more than 50% of that traffic, except for France, Denmark, Finland and the rest of the World (Figure 1)

[7] As a result of these attacks, the people arriving in Spain by air transport decreased in 2002,while the total amount of visitors increased by 3.6%.

[8] Their importance is greater in tourism in the Balearic Islands, Canary Islands and Valencia, and slightly above 50% in Andalusia and Catalonia. It is markedly lower in Madrid.



As can be seen in Figure 2, the arrivals by air transport from any of the European countries considered in this study strongly increased in the years before the current crisis but the expenditures by tourist decreased for most of them –the exception is Germany- as so did as well the average stay by tourist in Spain . The addition of the years 2009 and 2010 to this calculation changes the picture as the number of tourists from the United Kingdom and Ireland decreased from 2004 to 2010 while the expenditure by tourist and its average stay increased for some of the countries.



Subsequently, the evidence seems to point to decreasing effect on the expenditure per tourist that could offset the positive effect of an increasing number of tourists on the aggregate expenditure. In the next section, procedures and results of estimates addressed to clarify this hypothesis are exposed.

3. Analysis model and data sources

As in any other type of demand analysis, the amount of tourism consumption in a specific country depends on consumer's income in the countries of origin and the relative prices of travel to the destination place (i.e. Spain) so that the general specification of the econometric model is as follows (Song et al., 2009):

$$TOUR_{i,t}=F(GDP_{i,t};PRC_{i,t};X_{i,t}) \quad [1]$$

Where $TOUR_{it}$ represents the tourism consumption from country *i* relative to its total population, that can be measured as expenditure (EXP) or as number of tourists (NUMBTOUR) or expenditure by tourist (EXPPT); GDP_{it} is the per capita GDP of the country of tourists origin, PRC_{it} are the relative prices in common currency of the destination country with respect to that of origin. Finally, X_{it} is a set of other variables containing additional information regarding other costs of this special service which is tourism, such as distance between host and dispatching country, price of air transport, the dotation of infrastructures of host country, etc.

The expected coefficients are positive for consumer's income and infrastructures in the host country and negative for the relative prices and transport costs, which are often approximated by means of the price of crude oil as air transport fares are not available.

The estimated model in this article follows the econometric steps of the works of Garín-Muñoz (2006, 2007), but it is applied to a set of six Spanish regions, called Autonomous Communities (Comunidades Autónomas), according to their legal status (hereafter CCAA). These six regions account for 90% of tourism originating from the eight EU-15 countries taken, those for whom enough information is provided by the database (i.e. Austria, Belgium, France, Germany, Ireland, Italy, the Netherlands and the United Kingdom). Moreover, a variable that measures LCC activity in each of the flows of tourists considered is introduced in order to record its effect. The period covered is from 2004 to 2010, as data on expenditure by tourist, parsed by origin countries and region of destination, are not available before 2004.

Obviously, the combination of different destination regions with different countries of origin throughout a period of six years makes our approach more complex than those considering merely one destination and several countries of origin or those considering several destinations and only one country of origin. Such a panel cannot be estimated without distinguishing between each country in every region, and so a set of dummies referred to n-1 regions (i.e. five regions, avoiding the trap of the dummies) has been added in a first estimate. Then, the model has also been estimated with a set of n-1 dummies for countries and n-2 dummies for regions (seven counties and four regions). The excluded regions has been the last two, Catalonia and Madrid.

The final form of the general model [1] to be estimated is as follows:

$$\ln TOUR_{ij,t} = \alpha + \beta_1 \ln GDP_{ij,t} + \beta_2 \ln PRC_{ij,t} + \beta_3 \ln OP_t + \beta_4 \ln LCC_{ij,t} + \beta_5 \ln I_{j,t} + \beta_6 \ln D + \beta_7 \ln GREG_{j,t} + \mu_{ij} + e_{ij,t} \quad [2]$$

where subindexes refer to the dispatching country *i* and the host region *j* and the variables integrated in $X_{i,t}$ are: OP, the oil price; LCC the percentage of tourists flying with LCCs; D, the average distance in kilometers between the country of origin and the destination region, and GREG the value of the relative per capita income of each region (CCAA) in comparison with the Spanish average. As the variables are expressed in logarithms the coefficients may be interpreted as demand elasticities.

Below, the chosen form for measuring each of these variables is put forward and their statistical sources mentioned. The dependent variable is measured in three different ways: the number of tourists using air transport emanating from each

country as a percentage of the latter's population (NUMBERTOUR), their total expenditure also related to the population (EXP), and a measure of individual consumption resulting from the division of total expenditure and the number of tourists, the expenditure by tourist (EXPPT). The data on number of arrivals and expenditure by tourist at any CCAA from any country contemplated has been facilitated directly by the Tourism Studies Institute of Spain (Instituto de Estudios Turísticos, IET), the main agency in charge of the data regarding tourism in Spain. Among the explanatory variables, the most important in light of the studies carried out so far, and displayed above, is consumer's income - here approximated by the per capita Gross Domestic Product of each of the countries from which the tourists originate -collected from the World Economic Outlook Database provided by the International Monetary Fund (IMF), measured in Purchasing Power Parity (PPP). As a common practice, the relevant price for tourism is divided into two components. First, there is an index expressing the cost of living of tourists in every CCAA, related to the cost of living in each of the countries of origin adjusted for the exchange rate (the variable PCR). This has been built using harmonized price indexes for every country (also collected from the IMF cited databases) and a relevant index for tourism consumers in every CCAA in Spain. This last index is a simple average of the price indexes for two items; on the one hand, services of domestic transport and restaurants, cafeterias, hotels and other areas on the other hand, both taken from the Spanish National Institute of Statistics (Instituto Nacional de Estadística, INE). To express such indexes in the same currency, the exchange rates provided by the IMF database have been used only for those of the United Kingdom and Denmark - the countries not belonging to the Euro zone.

Another important component of tourism prices is the cost of travel. However, due to the unavailability of travel cost data, in this study the price of crude oil (OP) is used as a proxy for this variable; the distance variable, D, is approximated through the kilometers separating the most important Spanish cities by air within each CCAA (Seville, Manacor, Santa Cruz de Tenerife, Valencia, Barcelona and Madrid) and the European capitals from which tourists originate: Vienna, Brussels, Paris, Berlin, Dublin, Rome, Amsterdam, London.

Finally the key variable to capture the influence of LCCs is built as the percent of tourist arriving by low-cost companies over the total tourist arriving by air transport. Both variables are calculated by IET from the database of passengers by flight provided by AENA, assigning the passenger to their origin countries through a survey. However, this variable performs closely to the percent of passenger by low-cost companies used in a previous work (Rey, Myro, Galera, 2011).

The panel is estimated first considering the existence of a static causal relationship. The static-type estimation is carried out either with the Random Effects Method (RE) and the Within - Groups Transformation (WG). The first approach assumes the vector of explanatory variables to be strictly exogenous. Nevertheless, the WG allows the unobserved heterogeneity μ_{ij} to be arbitrarily correlated with the explanatory variables. Since the key consideration in choosing between a RE and WG is whether there exists correlation between μ_{ij} and the vector of explanatory variables, the Sargan-Hansen test (1978)[9] helps to discern the most suitable estimation method.

[9]If the null hypothesis is rejected, the WG is consistent while RE does not. Otherwise, there is no reason for selecting the WG instead of RE due to the more relative efficiency of the latter one.

Secondly, the dependent variable is added to the explanatory ones, lagged one year. In doing this there is a better capture of a phenomenon that shows a clear dynamic, as consumption of tourism depends on previous levels that are gradually moving in conformity with a backing that values reached currently. If past tourism is neglected, the effect of the relevant variables considered will tend to be overestimated, as the coefficients will capture for direct and indirect effects (Garín-Muñoz, 2006).

Nevertheless, when we proceed in that way, not only the FE but the RE estimators become biased and inconsistent (even if the rest of the regressors are assumed to be strictly exogenous), unless the number of time periods is large, tending towards infinity (Garín-Muñoz, 2006). The OLS estimator, which omits both the country-specific effects and the region-specific effects,is also biased if such effects are relevant. One solution to this problem is first to differentiate the model and use lags of the dependent variable as instruments for the lagged dependent variable. The solution given in this study is to use the one-step version of the GMM-DIFF of Arellano and Bond (1991). This procedure makes use of the fact that values of the dependent variable lagged two periods or more are valid instruments for the lagged dependent variable, avoiding the endogeneity caused by the correlation between the error term and the lagged dependent variable. This will generate consistent and efficient estimates of the parameters of interest. Although the two-step version of the Arellano – Bond improves the efficiency of the estimates and converges consistently faster to the true population parameters, the data dimension advise against using this method in not very large samples. For that reason, we only present the one-step version estimates.

Then the dynamic model to be estimated is as follows:

$$\Delta \ln TOUR_{ij,t} = \beta_1 \Delta \ln TOUR_{ij,t-1} + \beta_2 \Delta \ln GDP_{ij,t} + \beta_3 \Delta \ln PRC_{ij,t} + \beta_4 \Delta \ln OP_t + \beta_5 \Delta \ln LCC_{ij,t} + \beta_6 \Delta \ln I_{j,t} + \beta_8 \Delta \ln GREG_{j,t} + e_{ij,t} \quad [3]$$

where $\Delta \ln TOUR_{ij,t} = \ln TOUR_{ij,t} - \ln TOUR_{ij,t-1}$

and TOUR is measured alternatively as number of tourists from any country with destination to any region as percentage of population in the origin country (NUMBERTOUR), their total expenditure, EXP, and the expenditure by tourist (EXPPT).

4. Empirical results

As reference information, in Table 1 the descriptive statistics of the variables used are presented. It can be seen that there is a considerable variation for most variables except for GDP and relative prices as all the origin countries have high per capita income levels and most of them are integrated in the Euro zone, which makes the evolution of their prices similar.

Table 1.-***Descriptive statistics: variations over origin countries, destination regions and years for the period of time 2004-2010***

Variable	Mean	SD (OV)	SD (BG)	SD (WG)	Min	Max
LnNUMBERTOUR	-7.561	1.680	1.686	0.167	-10.378	-3.570
Ln EXP	-0.772	1.667	1.674	0.161	-3.463	3.355
Ln EXPPT	6.788	0.177	0.154	0.088	6.424	7.166
Ln GDP	10.449	0.111	0.093	0.062	10.211	10.674
Lln PRC	4.617	0.050	0.027	0.041	4.562	4.866
Ln GREG	4.610	0.184	0.185	0.014	4.327	4.883
Ln D	7.377	0.368	0.372	0	6.715	8.193
Ln OP	4.157	0.278	3.21e-07	0.2785	3.631	4.575
Ln LCC	11.284	1.971	1.772	0.916	4.060	14.716

S.D: standard deviation; OV: overall; WG: within groups; BG: between groups

In Table 2 the results from the different estimations performed on the impact of LCC's on the number of tourist are offered. Thus, in the first column those for the RE static model are shown. All the variables have the expected sign, except the price of crude oil, which is statistically not significant. Moreover, the variable accounting for the distance it also appears to be not significant. The elasticities of GDP and relative prices are in line with other works but far from the high values shown in a recent estimate for the period 2000-2009 (Rey, Myro and Galera, 2011). The relative income per capita of each region is positive and significant, indicative of greater capability for attracting tourists by regions with larger income per capita relative to the national average, perhaps due to higher quality of their equipment and their infrastructures. Besides, dummy referred to Andalucía show a positive y significant effect, the opposite to Valencia.

Regarding the variable which is of greatest interest (i.e. LCC) measuring the effect of the activity of this type of companies, it shows the expected sign, indicating that a

greater percent of tourist travelling with low cost companies has been accompanied with an increase on the number of per capita tourist arriving by air transport. This result can be extended to the total per capita number of tourists (Rey, Myro and Galera, 2011).

The coefficients got through the Fixed Effects estimates (WG, second column) are very similar to those of the Random Effects. Hausman test for systematic differences among both types of estimators has been rejected because the data fail in the asymptotic properties of such statistic. However, we present the Sargan-Hansen test for over-identifying restrictions instead. In GMM-speaking terms, the extra orthogonality conditions are responsible for the increased efficiency of the random effects against the fixed effects estimator. The null hypothesis is that the extra orthogonality conditions are valid. The rejection makes more confident the fixed effects approximation.

The column 3 offers the result of RE estimate when dummies for countries and regions are simultaneously introduced. They are very similar to those of the first model and all the dummies for countries and regions get significance. Besides the explanatory power of the model increases in part due to the restriction of the degrees of freedom. However, again the Sargan-Hansen test backs the WE model. For that reason country and region dummies are not included in Table 2 making easier its reading.

It is worth noticing that the explanatory power of the model could be improved taking in account a probable dynamic structure in the explanation of the dependent variable (the number of tourists per capita).

Table 2. – ***Estimates for the static and the dynamic models of number of tourists per capita, 2004-2010***

Variable	*1* *RE GLS* *only regional dunnies*	*2* *WG*	*3* *RE GLS* *country and regional dummies*	*4* *AR-Bond* *1 step*
$lnNUMBERTOUR_{ij,t-1}$				0.113
				(0.137)
lnGDPi	1.754***	1.437***	1.365***	1.496***
	(0.330)	(0.314)	(0.319)	(0.334)
lnPRCij	-0.909***	-0.919***	-0.961***	-0.364
	(0.257)	(0.242)	(0.246)	(0.290)
lnGREGj	4.955***	4.712***	4.000***	5.646***
	(0.913)	(0.861)	(0.843)	-1.107
lnOPi	-0.001	0.053	0.047	0.002
	(0.072)	(0.068)	(0.069)	(0.063)
lnDj	2.315**		3.944***	.
	(0.968)		(0.840)	
lnLCCij	0.026**	0.026**	0.025**	0.032**
	(0.012)	(0.012)	(0.012)	(0.015)
_cons	-61.352***	-40.435***	-5.820	
	(9.042)	(5.922)	(7.847)	
R^2	0.28	0.24	0.88	
Sargan (df)				40.28***
M1				-1.007
M2				-2.854***
Wald test (d.f) and F-test	105.24*** (11)	18.06***(F-test)	445,5***	74.15***(6)
Sargan Hansen test (df)	45.879***(5)		17.554***(5)	
Numb. Obser.	334	334	334	240
Long run parameters				
ln GDP				1.686
ln GREG				6.365
ln LCC				0.036

Dependent variable (lnNUMBERTOURij,t): log of per capita number of tourists from country *i* to region *j* at time *t*. Standard errors in parentheses. Wald test denotes the joint significance of the independent variables.

*** Indicates statistical significance at the 1% level.
** Indicates statistical significance at the 5% level.
* Indicates statistical significance at the 10% level.

The introduction of a dynamic model is made through the Arellano-Bond stages indicator and the results are recorded in columns 4 in Table 2. They show some changes in relation to the static estimates shown in columns 1, 2 and 3. Short-term GDP elasticity slightly increases and gives rise to a long-term value of 1,68. Oil prices continue being non-significant while relative prices become now. The short term elasticity of LCCs is similar to that got in the static estimates but show a greater long run value. Now a 10% increase in the percentage of tourists carried by LCCs leads to a short-term 0.32% per capita rise in the number of tourists and a 0.36% long-term rise.

This last estimate, surprisingly does not allows us to confirm tourism as a dynamic process because the lagged of the dependent variable is not statistically significant. That does not mean this process is irrelevant. When dependent variable is replaced by just the number of tourist its lagged value reveals as significant. However in both cases the Sargan test for over-identifying restrictions indicates an excess of instrument, suggesting that a carefully selection of them could reach more accurate results. Obviously this is not one of our aims in this paper.

Summarizing, all the estimates show an important and significant influence of LCC companies in the demand for tourism in Spain. Apparently the potential negative effect of increasing oil prices was at least partially offset by growing competition in the air transport market coming from the LCCs that enabled a rapid increase in the number of tourists heading for Spain. Therefore, this last factor together with the rapid economic growth in the EU origin countries and the maintenance of their consumption patterns seem to be key elements in the explanation for the rapid growth of tourism in Spain throughout the present decade, in spite of the financial crisis that stopped such expansion for two critical years, 2009 and 2010.

In Table 3, we present the results of the estimation of equations [2] and [3] in which the endogenous variable lnNUMBERTOURij,t has been replaced by lnEXPij,t, which denotes the natural logarithm of the total expenditure of tourists also taken in per capita terms. In this way, we try to evaluate to what extend the observed increase in the number of tourist coming to Spain, and associated to the activity of LCCs, has been accompanied by an improvement in the total amount of resources spent.

As can be observed in columns 1, 2 and 3 of Table 3, most of the explanatory variables show the expected sign. Thus, consumer's income measured through the GDP of the countries of origin appears to be positive and highly significant. Likewise, the relative prices are negative and significant at conventional statistical levels.

Furthermore, the relative income per capita of each Spanish region is positive and significant, whilst the distance is negative and also significant. The oil price and our variable of interest, the LCCs, are both not significant. Moreover, the dummies variables for countries and regions are all significant with the exception of The Canary Island. Again these dummies are not included in the Table 3 as the Sargan-Hansen test prevents us to select the RE estimates.

The explanatory power of the static model may be increased capturing some of the potential dynamic of the phenomenon analyzed by introducing the dependent variable lagged one period (i.e. ln EXPij,t-1) among the explanatory ones. In column 4 of Table 3, the one-step of the GMM-DIFF of Arellano and Bond (1991) is

Table 3. – ***Estimates for the static and the dynamic models of per capita tourists' expenditure, 2004-2010***

Variable	*1* *RE GLS* *only regional dunnies*	*2* *WG*	*3* *RE GLS* *country and regional dummies*	*4* *AR-Bond* *1 step*
$lnEXP_{ij,\ t-1}$				-0.225*
				(0.130)
lnGDPi	1.929***	1.608***	1.552	1.241***
	(0.328)	(0.312)	(0.315)	(0.341)
lnPRCij	-1.173***	-1.181***	-1.212	-0.370
	(0.255)	(0.241)	(0.243)	(0.318)
lnGREGj	3.082***	2.839***	2.304***	3.196**
	(0.907)	(0.856)	(0.833)	-1.272
lnOPi	-0.103	-0.048	-0.052	-0.002
	(0.072)	(0.068)	(.069)	(0.070)
lnDj	2.318**		-3.405***	
	(0.942)		(0.827)	
lnLCCij	-0.004	-0.003	-0.004	0.019
	(0.012)	(0.012)	(0.012)	(0.017)
_cons	-45.841***	-25***	4.842	
	(8.880)	(5.887)	(7.734)	
R^2	0.31	0.19	0.89	
Sargan (d.f.)				52.346***(14)
M1				0.578
M2				-4.433***
Wald test (d.f) and F-test	90.06*** (11)	13.68*** (F-test)	435.56*** (F-test)	34.70***(6)
Sargan-Hansen	45.511***(5)		95.805***(5)	
Numb. Obser.	334	334	334	240
Long run parameters				
ln GDP				1.013
ln GREG				2.609

Dependent variable (lnEXPij,t): log of expenditure of tourists from country *i* to region *j* at time *t*; standard errors in parentheses. Wald test denotes the joint significance of the independent variables.

*** Indicates statistical significance at the 1% level.
** Indicates statistical significance at the 5% level.
* Indicates statistical significance at the 10% level.

estimated. Accordingly, we make use of the fact that values of the dependent variable lagged two periods or more are valid instruments for the lagged dependent variable.

Thus, this will generate consistent and efficient estimates of the parameters of interest.

In that estimate all the variables that do not present time variation, as the distance between capitals and the dummies for regions and countries are dropped. The GDP and the relative income of the regions appear to be significant. On the contrary relative prices and our variable of interest, the effect of LCCs on per capita total tourists' expenditure, are not significant even though they exhibit the expected sign. Finally, in this model the lagged values of the dependent variable is significant, apparently confirming the relevancy of a dynamic process in per capita tourists´s expenditure, but the Sargan test prevents us to be conclusive in such aspect rejecting the set of instruments used.

In brief, it seems that the percentage of passengers flying with LCCs for the period 2004-2010 did not significantly increase the expenditure of tourists travelling to the Spanish regions considered in this study. Apparently, the positive effect of LCCs on the numbers of tourists would have been offset by their negative effect on the expenditure by tourist.

In order to better know if that was what happened, in Table 4 the results of the estimation regarding the influence of LCCs on the expenditure per tourist are analysed. It is worth noticing that according to the results previously obtained (i.e. a positive and significant impact on the number of tourist and a not significant effect on the total expenditure), a priori we expect a slight negative effect of LCCs activity on the expenditure per tourist.

Thus, in columns 1, 2 and 3 of Table 4 we present the estimates for the static-type model. In this case, the RE model seems to perform better when dummies for countries and region are included (column 3). GDP, Oil Prices and LCC are significant and exhibit the expected sign (negative for LCC). Most of the dummies are significant, particularly those for countries. Nevertheless, the Sargan-Hansen test force us to select the WG estimate whose results are closer to the RE when only regional dummies are included. Then the relative per capita income of regions presents a negative sign, instead of positive as expected in response to better services and higher prices, which is due to a lower expenditure by tourist in the richest regions, particularly Catalonia and Madrid, related to a shorter stays, perhaps linked to more cultural tourism as those regions do not show higher activity of LCCs. Both regions exhibit higher expenditures by tourist and day.

Paying now more attention to the variable of our interest, the percentage of passengers flying with LCCs, it seems to be significant in determining the expenditure per tourist. The estimated coefficient equals -0.029 in the chosen third estimate, similar to this obtained in calculating its impact on the per capita number of tourists (Table 1) but with opposite sign what may be seen as very expressive of its offsetting effect pointed above, that is, from the perspective of total expenditure, the increase in the number of tourist promoted by LCC has been offset with decreasing expenditure by tourist.

Table 4. – ***Estimates for the static and the dynamic models of expenditure per tourist, 2004-2010***

Variable	*1* *RE GLS* *only regional dunnies*	*2* *WG*	*3* *RE GLS* *country and regional dummies*	*4* *AR-Bond* *1 step*
$lnEXPPT_{ij,\,t-1}$				0.423***
				(0.099)
lnGDPi	-0.046	0.170	0.335	-0.182
	(0.112)	(0.177)	(0.178)	(0.205)
lnPRCij	-0.381***	-0.261*	-0.155	-0.118
	(0.131)	(0.137)	(0.138)	(0.133)
lnGREGj	-2.200***	-1.872***	-0.059	-2.185***
	(0.475)	(0.486)	(0.272)	(0.711)
lnOPi	-0.054*	-0.101***	0.089	0.013
	(0.031)	(0.038)	(0.398)	(0.042)
lnDj	0.065		0.227	
	(0.070)		(0.098)	
lnLCCij	-0.034***	- 0.029***	0.0247	-0.028**
	(0.006)	(0.006)	(0.003)	(0.010)
_cons	19.317***	15.435***	2.931	
	-2.792	-3.345	-2.286	
R^2	0.61	0.14	0.692	
Sargan (d.f.)				36.22*** (14)
M1				-3.50***
M2				-1.11
Wald test (d.f) and F-test	188.98 (11)***	9.21*** (F-test)	325.46	41.98*** (6)
Sargan-Hansen (df)	11.15 (5)**		23.282***(5)	
Numb. Obser.	334	334	334	240
Long run parameters				
ln GREG				-3.786
ln LCC				-0.048

Dependent variable (lnEXPPTij,t): log of expenditure of tourists from country *i* to region *j* at time *t*; standard errors in parentheses. The Wald test denotes the joint significance of the independent variables.

*** Indicates statistical significance at the 1% level.

** Indicates statistical significance at the 5% level.

* Indicates statistical significance at the 10% level.

The introduction of a lagged dependent variable seems to be in this case very appropriate as the coefficient on ln EXPPT shows to be positive and significant

implying that previous levels of expenditure per tourist are a good indicator of current values. More precisely, it seems that the higher the expenditure per tourist of the previous period the larger the contemporaneous value of the variable. However, as in the previous estimates, here the Sargan test prevent against this result, demanding further research to detect the exact dynamic of the model.

Decreasing expenditure by tourist might be due to lower cost of the trip by air transport (included in the expenditure), shorter stays or lesser expenditure per day, pointing perhaps to a different kind of tourist. To distinguish such effects we have replied the same estimates without including the cost of flights in the expenditure per tourist, and adding the average stay by tourist as a new regressor. Nothing is changed in a significant way, and the elasticity of EXPPT to LCCs takes now the value of –0,031 in the Arellano-Bond estimate. Further, taking as dependent variable the expenditure by tourist and day, the correspondent elasticity is increased to 0,061 in this same estimate, leading to the conclusion that LCCs have strongly reduced the diary expenditure of the tourists.

Summarizing, the estimates show the negative influence of LCC's in the average expenditure per tourist for the period 2004-2010, of a similar amount to its positive effect on the number of tourist per capita. That result would explain its null influence on the aggregate per capita expenditure. Accordingly, the strong impact LCCs had on the tourists arriving to Spain in that period did not lead to an increase in the aggregate expenditure due to a reduction of expenditure by tourist of the same amount what perhaps can be explained because an increase of tourists with higher frugality or lesser income.

Final remarks

In the previous pages a study has been carried out regarding tourism in Spain during the 2004-2010 period and relating it to the expansion of low-cost airlines by mean of a tourism demand model into which a variable has been introduced to measure the percentage influence of LCCs in the volume of airline passenger traffic.

We have worked with data of tourists originating from the eight of the EU-15 countries exhibiting the highest volume of tourists to Spain and six Spanish Autonomous Communities (Comunidades Autónomas, CCAA), which are the main tourist destinations accounting for 90% of total tourism. Accordingly, a panel data has been drawn up which consists of countries of origin, destination CCAA and years.

In the six-year period we have considered, tourism in Spain, which is one of the world's top countries when measured by the number of visitors, has undergone a noticeable expansion, despite the vigorous emergence of competing countries, several of them in Central and Eastern Europe. This expansion halted in 2008 with the outbreak of the international financial crisis but strongly recovered in 2011 and 2012.

Throughout the period contemplated, the low-cost airlines, led by EasyJet, Ryanair and Air Berlin, have developed remarkably, and in 2010 accounted for slightly more than 60 percent of tourists arriving to Spain by air transport from EU-15 countries. It seems that undoubtedly this expansion must be tourism-related.

By estimating a demand function for tourism in the period 2004-2010, the LCCs are revealed to have influenced positively and strongly the number of tourist arriving to Spain but this positive effect has not been transferred into the total expenditure made by them, as the expenditure by tourist decreased on the same amount perhaps as a consequence of an increasing number of tourists with higher frugality or with lesser income. This means the destination country is not maximizing the benefits from increasing arrivals of tourists. This result should take policy makers to improve prices and non price competitiveness of the destination places, a true determinant variable, as a way to make longer the average stay of a tourist and increase its expenditure. At the same time it should lead to rethink subsidies given to airline companies by local governments.

References

-Aguiló, E., B. Rey, J. Roselló, C.M. Torres, 2007. "The impact of the Post Liberalization Growth of LCCs on the Tourism Trends in Spain".*Rivista di PoliticaEconomica.* January-February, 39-59.

-Arellano, M., S. Bond, 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58, 277–297.

-Balestra, P., M. Nerlove, 1966. Pooling cross section and time series data in the estimation of a dynamic model: the demand for natural gas.*Econometrica*, 34, 585–612.

-Casadesus-Masanell, R., J.E. Ricart, 2007. "Competing through Business models".IESE Business Scholl- University of Navarra, Working Paper, nº 713.

-Doganis, R., 2001. The Airline Industry in the 21st Century. First Edition. Routlege, Londres.

-Doganis, R., 2006. The Airline Business. Second ed. Routlege, Londres

-Francis, G.A.J., A. Fidato, I. Humphreys, 2003. "Airport airline interaction: the impact of low cost carriers on two European airports". *Journal of Air Transport Management*, 9 (4), 267–273.

-Francis, G.A.J., I. Humphreys, S. Ison, 2004. "Airports' perspectives on the growth of low-cost airlines and the remodelling of the airport–airline relationship".*Tourism Management*, 25, 507–514.

-Francis, G., I. Humphreys, S. Ison, M. Aicken, 2006. "Where next for low cost airlines?.A spatial and temporal comparative study".*Journal of Transport Geography*, 14, 83-94.

-Franke, M.,2004. "Competition between network carriers and Low-cost carriersretreta battle or breakthrough to a new level of efficiency". *Journal of Air Transport Management* 10, 15-21.
-Garín-Muñoz, T., 2006."Inbound international tourism to Canary Islands: a dynamic panel data model". *Tourism Management*, 27, 281-291.
-Garín-Muñoz, T., 2007. "German demand for tourism in Spain".*Tourism Management* 28, 12-22.
-Gillen, D., Morrison,W., 2003. "Bundling, integration and the delivered price of air travel: are low cost carriers full service competitors?".*Journal of Air Transport Management*, 15-23
-Malighetti, P, Paleari, S., Redondi, R. 2009. "Pricing strategies of low cost airlines: The Ryanair case study".*Journal of Air Transport Management* 15.195-203.
-Maloney, W.F., G.V. Montes Rojas, 2005. How elastic are the sea, sand and sun? Dynamic panel estimates of the demand for tourism. *Applied Economic Letters*, 12, 277-280.
-Morley, C.L.,1998. "A dynamic International Demand Model". *Annals of Tourism Research*, vol. 25, 1, 70-84.
-Morrison, S.A., 2001. "Actual, Adjacent and Potential Competition.Estimating the Full Effect of Southwest Airlines".*Journal of Transport Economics and Policy*, 35, Part 2. 239-256.
-Pels, E Rietveld, P., 2004. "Airline pricing behaviour in the London- Paris Market".*Journal of Air transport Management* 10, 15-21.
Rey, B.; R. Myro and A. Galera, 2011. "Efeect of Low Cost Airlines on tourism in Spain. A dynamic panel data model", *Journal of Air Transport Management*, 17, 3, pp. 163-168.
-Rose, J.M, Hensher, D.A., Greene, W.H., 2006. "Recovering costs through price and service differentiation: Accounting for exogenous information on attribute processing strategies in airline choice". *Journal of Air Transport Management*.
-Song, H., S. F. Witt, G. Li, 2009. "The advanced econometrics of tourism demand", Routledge-Young P. and D. Pedregal,1997. "Comments on ´An analysis of the international tourism demand in Spain by P. González and P. Moral". *International Journal of Forecasting* 13, 551-556.
- Vowles, T. M., 2001. "The "southwest Effect" in multi- airport regions".*Journal of Air Transport Management.*251-258.