

A NONLINEAR DYNAMIC MODEL FOR INTERNATIONAL TOURISM DEMAND ON THE SPANISH MEDITERRANEAN COASTS

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Introduction

The Mediterranean is one of the main destinations for international tourism in Spain. According to the Spanish Statistics Institute (INE, 2016), more than half of international tourists staying at hotels chose the Mediterranean coastal provinces as a destination in 2015. Spain has about 3,500 km of Mediterranean coastline (INE, 2016). As shown in Fig. 1, these kilometers are distributed between the peninsular coast (2,058 km) and the archipelago of the Balearic Islands (1,428 Km).

Tourism is an important economic sector on the Spanish Mediterranean coasts and it has become one of the most important sources of employment. For example, in Balearic Islands the tourism sector contributed 44.8%

to the gross domestic product (GDP) and created 150,346 jobs (32.0% of total), in 2014. These data are significantly higher than the national average (11.1% to the GDP and 13% of the employment). According to the Hotel Occupancy Survey (INE, 2016), in 2015 the provinces of the Mediterranean coasts account for 47.15% of the total staff employed in hotels in Spain, and 47.36% of hotel beds offered. Moreover, the number of visitors is increasing every year. International tourists staying at hotels have grown by 26.3% from 2010 to 2015, with a mean annual growth rate of nearly 5% during this period (INE, 2016). In this context of a consolidated destination with a growing tourism demand, we consider it very interesting to gain a better knowledge of the determinants of its demand.

Fig. 1: The Spanish Mediterranean coasts



Source: own

Since the 1990s, tourism demand modelling studies have shifted from static regression models to more sophisticated dynamic specifications. Dynamic demand models can account for habit persistence and word-of-mouth recommendations from previous visitors. The most common way to bring a dynamic structure into demand models is to include the lagged demand in a linear fashion as an explanatory variable (Morley, 2009; Garín-Muñoz, 2006; 2007; 2009, among others). This proposal implies that the effect of previous tourists on the current tourism demand is constant (Albaladejo, González-Martínez, & Martínez-García, 2016). However, several studies (Morley, 1998; 2009; Albaladejo, González-Martínez, & Martínez-García, 2016) affirm that a linear model is not enough to account for the dynamics of tourism demand.

We argue that the constant effect assumption is not appropriate for analyzing tourism demand. The influence of past tourists will be larger or smaller depending on the reputation or attractiveness of the tourism destination. The attractiveness of a destination depends not just on its natural features (weather, beaches, natural areas...) but also on characteristics like quality of accommodations, quantity of tourism services, diversity of supply, and congestion or overcrowding, among others. The quality of tourism services is one of the main factors affecting the success of tourism destinations and many destinations are adopting a policy of quality service in order to consolidate themselves as an alternative option in the highly competitive markets of tourism (Albaladejo, González-Martínez, & Martínez-García, 2014). Another important factor is overcrowding (Santana-Jiménez & Hernández, 2011). Today, there is concern about the congestion suffered by several traditional destinations (Barcelona, London, Paris...). In a destination like the Spanish Mediterranean coasts, it is important to know if these attributes influence the effect of the past tourists on current demand and how.

In this paper, the international tourism demand in the Spanish Mediterranean coasts is analyzed using annual data for the period 2005 to 2015. A dynamic tourism model is proposed which allows the effect of previous tourists to vary with the characteristics of the destination. Our model is an extension of the standard dynamic equation for tourism demand to include interaction effects between previous

tourists and two features: quality of tourism services and tourism congestion. The aim of the work is to study how both attributes affect the relationship between previous tourists and current tourism demand on the Spanish Mediterranean coasts. Empirical findings on quality and congestion play an important role in policy decisions.

A system GMM dynamic panel data analysis (Blundell & Bond, 1998) is carried out to estimate the model. The data are disaggregated both by province of destination (the 11 Spanish provinces that make up the Mediterranean area) and by country of origin. Since the main tourist market is the European Union (EU), we consider European tourists from the following countries: Belgium, France, Germany, Holland, Italy, Portugal and United Kingdom. In 2015, more than 86% of European Union tourists came from one of these countries (INE, 2016). The results show evidence of a strong persistence in tourism demand. Previous tourists have an important positive and non-constant effect. It is positively influenced by the quality of the tourism services and negatively by tourism congestion.

Our analysis provides evidence that the previous tourists effect depends on the attraction or reputation of the destination. This result supports a nonlinear dynamic tourism demand model. In addition, to the best of the authors' knowledge, this is the first recent study to consider the Spanish Mediterranean coasts as a whole. Most previous studies have tried to explain the demand in different Mediterranean countries (Gatt & Falzon, 2014; Papatheodorou, 1999). Other studies on Spain analyze the major tourist centers of the Mediterranean, especially the Balearic Islands (Garín-Muñoz & Montero-Martín, 2007; Rosselló, Aguiló, & Riera, 2005; Aguiló, Riera, & Roselló, 2005).

The paper is organized as follows. The following section discusses the role of the previous tourists on tourism demand. It summarizes the empirical literature for the panel data case, and our dynamic model is proposed. Section 2 presents the data and some descriptive statistic for the variables considered in the study. It also provides the empirical model and describes the econometric method used for estimation. Section 3 contains the results and their interpretation. Finally, the last section draws some conclusions.

1. The Impact of Previous Tourists

1.1. Literature Review

There is a widespread agreement that tourism demand is likely to be affected by previous tourists, either because of their influence on other potential visitors, or because they repeat destinations (Morley, 2009; Garín-Muñoz, 2006; 2007; 2009, among others). Previous tourism flows increase information about a destination, thereby reducing uncertainty for potential visitors (word-of-mouth recommendations). Besides, since there is less uncertainty associated with a destination with which you are already familiar, habits might induce tourists not to vary their destination over time (habit persistence).

Regarding tourism demand modelling, dynamic econometric models allow us to take into account the causal relationship between previous visitors' flows and the current demand. Most common dynamic specifications include the previous tourists as an explanatory variable in the model. Focusing on the panel data analysis, there is an important number of studies that have estimated a lagged dependent variable model. As examples, we have the work by Maloney and Montes Rojas (2005) for tourist demand at Caribbean destinations; Naudé and Saayman (2005) for tourist demand in 43 African states; Garín-Muñoz (2006; 2007; 2009) for tourism demand at different Spanish destinations; Garín-Muñoz and Montero-Martín (2007) for tourism demand in the Balearic Islands (Spain); Massidda and Etzo (2012) for domestic tourism in Italy; and Rodríguez, Martínez-Roget and Pawlowska (2012) for academic tourism demand in Galicia (Spain). More recently, Capacci, Scorcu and Vici (2015) includes two lags of the dependent variable to analyze the impact of the Blue Flag on foreign tourists on the Italian coasts; and Poprawe (2015) uses a panel data set of over 100 countries to test the hypothesis that corruption has a negative effect on tourism. Since all these studies include the previous tourists in a linear fashion, the effect of this variable on the current tourism demand is assumed constant over time and for the cross-section. Thus, it is independent of variables like the quality of tourism services and tourism congestion, which may affect the destination's reputation.

Morley (1998; 2009) and Albaladejo, González-Martínez and Martínez-García (2016) have questioned this way of incorporating dynamics into the model. Morley (2009)

argues that the simple inclusion of the lagged dependent variable allows repeat visits to be incorporated into a model, but not word-of-mouth recommendations. He shows that this information flow has generally been neglected in the literature. Using the diffusion model (Bass, 1969; Mahajan, Muller, & Bass, 1990), Morley (1998; 2009) incorporate relevant tourism information flows in a traditional tourism demand model. The result is a nonlinear model that includes quadratic functions of previous tourists as terms. Morley (1998), Rosselló, Aguiló and Riera (2005), Aguiló, Riera and Roselló (2005) and Hsu and Wang (2008) have estimated the model with time series data and find evidence to support this model.

Albaladejo, González-Martínez and Martínez-García (2016) argue that the constant effect of the previous tourists resulting from the usual dynamic econometric model is not in accordance with the Tourism Area Life Cycle (TALC) theory of Butler (1980), one of the most accepted theories in tourism literature. Taking into account both this theory and the traditional tourism demand model, Albaladejo, González-Martínez and Martínez-García (2016) propose a new dynamic specification that includes a quadratic function of previous demand. They test the model using panel data from Spanish regions during the period 2000-2013. Their empirical results show a positive and decreasing effect of the previous tourists.

Both approaches (diffusion model and TALC model) suggest that usual constant elasticity demand models are likely misspecified. Therefore, a nonlinear dynamic specification is preferred. We agree with this general conclusion, but we add a new argument not present in the previous literature. A linear model does not allow one to link the effect of past tourists to reputation or attractiveness of the tourism destination, assuming a constant effect. However, the influence of previous tourists may be affected by changes in the reputation of the tourism destination. Investment in the tourism industry can improve the destination's reputation (Albaladejo & Martínez-García, 2016), implying a more positive effect of previous tourists on the current demand. The quality of tourism services of a destination and its tourist overcrowding are two characteristics with a high impact on its visitors (Vajčnerová, Žíran, Ryglová, & Andráško, 2014; Beerli & Martin, 2004).

1.2 A Nonlinear Dynamic Demand Model

In this paper, we propose a nonlinear dynamic model where current tourism demand can be influenced by previous tourists. Our model allows us to study how the number of previous tourists interacts with two important features of the tourist destination: tourism services quality, and tourism congestion. For this purpose, we add to the standard dynamic tourism model two interaction terms. The model can be expressed as

$$T_t = \beta_0 + \beta_1 T_{t-1} + \beta_2 T_{t-1} \cdot Q_{t-1} + \beta_3 T_{t-1} \cdot O_{t-1} + \gamma' X_t + \varepsilon_t, \quad (1)$$

where subscripts t and $t-1$ denote the time period. The dependent variable is T , the number of tourists, Q is the services quality, O is the destination's overcrowding, and $X=(x^1, x^2, \dots, x^k)$ is the vector of the remaining k explanatory variables (price, income, etc.), which can also include lagged explanatory variables and dummy variables. Thus, $T_{t-1} \cdot Q_{t-1}$ captures the interaction between previous tourists and quality of tourism services, and $T_{t-1} \cdot O_{t-1}$ the interaction between the previous tourists and the overcrowding of the destination.

In this model, the marginal effect of T_{t-1} on T_t is affected by two characteristics of the destination. It is measured by the expression:

$$\frac{\partial T_t}{\partial T_{t-1}} = \beta_1 + \beta_2 Q_{t-1} + \beta_3 O_{t-1}, \quad (2)$$

This effect measures the impact of the previous tourists on the current demand. It is not constant. Both previous levels of quality and overcrowding at the destination can modify this effect. If, as expected, β_1 and β_2 are positive and β_3 is negative, it is a marginal effect increasing with Q_{t-1} and decreasing with O_{t-1} . (Note that the most common dynamic specification sets $\beta_2 = \beta_3 = 0$, omitting interaction effects. In the resulting linear model, the marginal effect is constant.). Note that, if T is measured with logarithms, as is usual in empirical tourism demand studies, Equation (2) means that the elasticity of tourism demand with respect to lagged demand is not constant but dependent on quality and congestion.

The greater the services quality perceived by the tourist and/or the smaller the massification in the tourist destination,

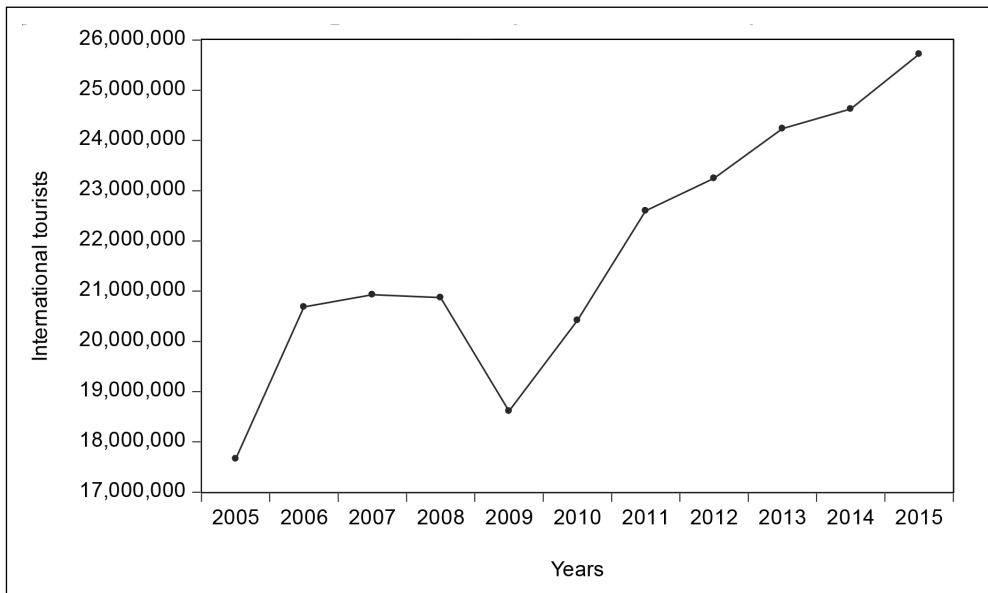
the better the reputation that this destination will have. A better reputation implies a higher impact of the previous tourists on the current demand. In contrast, if the increases in the visitors to a destination are not accompanied by an adequate investment in quality and quantity of the tourism services, tourists' opinion about the destination will be worst, and their positive effect on the future demand will be lower. That is, a destination can cushion the downward dynamics of this effect by investing in tourism.

2. Data and Methodology

2.1 Data and Variables

The Mediterranean coasts are the main destination for international tourism in Spain. According to the INE (2016), in 2015, about 25.7 million international tourists stayed at hotels in the Mediterranean provinces. They represent 55% of the international tourists arriving in Spain and staying in hotels (The international tourists who chose hotels and similar establishments as accommodation in Spain represented 67% of total arrivals in 2015 (INE, 2016)). The evolution of these tourists from 2005 to 2015 is presented in Fig. 2. Tourism rose sharply from 2005 to 2006, but stagnation is observed in 2007 and 2008, and a sharp drop occurs in 2009, as result of the financial crisis and the economic recession. Since 2010, the number of tourists seems to be experiencing a new growth phase.

To explain the international tourism demand for the Spanish Mediterranean coasts, we estimate the model proposed in Section 1.2 using annual data disaggregated by province of destination and country of origin. We use a balanced panel data set consisting of the 11 provinces that make up the Spanish Mediterranean coasts and the 7 European countries which are the main origin markets for the period 2005-2015. Panel data have some advantages over cross sectional or time series data. One is that they enable us to control for unobservable cross sectional heterogeneity, which is common in provincial data. Time series and cross section studies not controlling for this heterogeneity run the risk of obtaining biased results. Moreover, panel data usually give a large number of data points, so increasing the degrees of freedom, reducing the collinearity among explanatory variables and improving the efficiency of econometric estimates (Hsiao, 2003; Baltagi, 2008).

Fig. 2: International tourists lodged at hotels in Spanish Mediterranean provinces

Source: own from the data provided by the INE (2016)

Our model includes economic demand variables, such as income and prices, a dummy variable for controlling the effects of the economic crisis, and a nonlinear term to capture the effect of previous tourists. This term means the effect of the previous tourists can be not constant, but can depend on the quality of the tourism services and the tourist congestion at the destinations (Equation 2).

The dependent variable is the number of international tourists (T) who choose hotels and similar establishments as accommodation (We are aware that using only the data of tourists staying at hotels is a limitation. However, in this paper we have chosen to be synthetic and to present only hotel demand data. In any case, in Spain hotel demand data are quite significant because they represent around 70% of the international demand registered in Spain throughout the period (INE, 2016)). Data are taken from the Hotel Occupancy Survey (INE, 2016). Two traditional economic factors are included among the explanatory variables: origin income and price. To measure origin income, we use the real per capita GDP of each origin country (GDP). This variable was taken

from OCDE (2016). The price variable included in our model reflects the cost of living of tourists at the different destinations relative to the cost of living in the country of origin (IP):

$$IP_{destination/origin} = \frac{CPI_{destination}}{CPI_{origin} \cdot EX_{Spain/origin}} \quad (3)$$

where $CPI_{destination}$ and CPI_{origin} are the consumer price indices (CPIs) for each of the 11 destinations considered and each origin country, respectively; $EX_{Spain/origin}$ is the nominal effective exchange rate of Spain vs each country (The nominal exchange rate between Spain and Eurozone countries is equal to 1. Therefore, we only need to multiply the CPI of the origin country by the nominal exchange rate in the case of the United Kingdom). Data on exchange rates and CPIs for each country were collected from Eurostat (2016). Data on CPI for the 11 Spanish provinces were collected from the INE (2016).

Additionally, based on Fig. 2, we consider a dummy variable to capture the influence on tourism of the financial and economic crisis.

This variable, $D2009$, takes the value 1 from 2009 onward and 0 in other years.

To build the interactions included in the nonlinear term of our model, a measure of quality of tourism services (Q) and a measure of tourist congestion (O) have to be defined. Measuring both features is not an easy task. There is no universal definition of either of these attributes in tourism.

With regard to quality, we focus on the supply of tourism services, specifically on the quality of tourism accommodations. Nicolau and Sellers (2010), and the references therein, highlight that quality of accommodations is strategic for increasing tourism competitiveness. We have followed this idea in our paper. The percentage of luxury hotels is utilized as a proxy of quality of tourism accommodations. We use the official classification system in Spain from 1 to 5 golden stars and from 1 to 3 silver stars to define the category of hotels. Considering as luxury hotels the four and five golden stars hotels, the quality of tourism services is defined as

$$Q = \frac{\text{four and five golden stars hotels}}{\text{total number of hotels}} \times 100 \quad (4)$$

Data on hotels were collected from the INE (2016). The ratio (4) has also been used as quality measure in the paper of Albaladejo, González-Martínez and Martínez-García (2014).

Congestion or overcrowding of a destination increases when the number of visitors is excessive in relation to the space or capacity of the destination to accommodate those tourists, especially during peak periods. In order to obtain an idea about the congestion in each province, we consider the relationship between its tourism demand and its tourism supply, specifically we use the ratio between the total number of tourists lodged at hotels and the total number of hotel beds as proxy of tourist congestion at each destination province

$$O = \frac{\text{domestic and international tourists}}{\text{total number of beds}} \quad (5)$$

Data on hotel beds and tourists were collected from the INE (2016). The ratio (5) can be considered as a measure of the density of tourists lodged at hotels. It reports on the relationship between tourism demand and tourism supply in each province. The greater

the number of hotel beds in a destination, the higher the chance of accommodating visitors suitably.

A relevant advantage of using both measures (Q and O) is that their homogeneous character allows comparisons among several provinces.

2.2 Methodology and Model Specification

Following the model proposed in Section 2 and considering the variables defined above, the econometric model is represented as

$$T_{ij,t} = \eta_{ij} + \beta_1 T_{ij,t-1} + \beta_2 T_{ij,t-1} \cdot Q_{i,t-1} + \beta_3 T_{ij,t-1} \cdot O_{i,t-1} + \beta_4 GDP_{j,t} + \beta_5 IP_{j,t} + \beta_6 D2009_t + \varepsilon_{ij,t} \quad (6)$$

where the subscript i denotes the destination province (Alicante, Almeria, Balearic Islands, Barcelona, Castellon, Girona, Granada, Malaga, Murcia, Tarragona and Valencia); j denotes the origin country (Belgium, France, Germany, Holland, Italy, Portugal and United Kingdom), and t indicates the time period ($t = 2005-2015$). η_{ij} is the unobserved provincial-specific variable (or fixed effects) that varies across provinces and origin countries, but is invariable over time, and $\varepsilon_{ij,t}$ is a disturbance term. A key assumption throughout this paper is that the disturbance $\varepsilon_{ij,t}$ is uncorrelated across provinces, but provincial heteroscedasticity and serial correlation are allowed for. All variables are expressed in natural logarithms so that the coefficients may be interpreted as elasticities.

As discussed in Section 1.2, the effect of the previous tourist ($T_{ij,t-1}$) depends on β_1 , β_2 , β_3 , and the previous quality and congestion of the destination (see Equation 2). Since a log-log model is used, this effect represents the elasticity of current tourism demand with respect to previous demand. A positive sign is expected for β_1 , thus a positive β_2 would imply that this elasticity increases with the previous level of quality of the tourism supply, given a level of tourist congestion. Likewise, a negative β_3 would imply that the elasticity decreases with the previous tourist congestion, given a level of quality. If β_2 and β_3 are zero, the elasticity is constant across the destinations and through time. As usual in demand models, we expect a positive sign for β_4 and a negative sign for β_5 and β_6 .

A generalized method of moments (GMM) panel data estimation (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998) was applied to conduct our empirical analysis. Ordinary Least Squares (OLS) is not appropriate to estimate dynamic panel models with the lagged dependent variable among the regressors. The lagged dependent variable is correlated with the unobservable provincial effect (η_i), which gives rise to “dynamic panel bias” (Nickell, 1981). The within groups and random effects estimators do not eliminate the “dynamic panel bias” and are also biased and inconsistent. To solve this problem, Arellano and Bond (1991) suggest first differencing the model to remove the unobserved fixed effects (η_i). As the differenced lagged dependent variable is still potentially endogenous, it is instrumented with lagged levels of the endogenous variable to solve the problem of autocorrelation. If the $\epsilon_{ij,t}$ are not serially correlated, we can use lags 2 and upwards of the endogenous variable as instruments. Blundell and Bond (1998) extended this estimator by building a system of equations formed by the equation in first differences and the equation in levels. The extended GMM estimator, called system GMM, uses lagged first-differences as instruments for equation in levels, in addition to the usual lagged levels as instruments for equation in first-differences.

In this paper, we apply the system GMM (Blundell & Bond, 1998) procedure to estimate the model (6). We use the one-step robust to heteroscedasticity estimator and the two-step estimator for comparison (One-step GMM estimator is based on the assumption that the $\epsilon_{ij,t}$ are i.i.d. In this paper, we use one-step robust estimators, where the resulting standard errors are consistent with panel-specific autocorrelation and heteroscedasticity). Although the two-step estimator is theoretically preferred, it is appropriate to consider the one-step results when making inferences, since the asymptotic standard errors of one-step GMM estimators are virtually unbiased (Arellano & Bond, 1991).

A crucial assumption for the validity of GMM is that the instruments are exogenous. We conduct two diagnostic tests: Hansen (1982) J-tests of the over identifying restrictions for the GMM estimators, and the Arellano and Bond (1991) test for autocorrelation in the disturbance term, $\epsilon_{ij,t}$ (The Hansen statistics is

a chi-squared test to determine if the residuals are correlated with the instrument variables. If nonsphericity is suspected in the errors, the Hansen overidentification test is theoretically superior to the Sargan (1958) test).

3. Results

We show two different GMM estimates: one-step and two-step versions of the system GMM (GMM-SYS). In both estimates the lagged dependent variable and the two lagged interaction terms are treated as endogenous. Since the usual formulas for coefficient standard errors in two-step GMM tend to be downward biased when the instrument count is high, we use the Windmeijer (2005) standard errors correction.

The empirical results from the estimation of the model are shown in Tab. 1. The estimated coefficient of the lagged dependent variable is significant and positive, and the estimated coefficients of the interaction terms are both significant and have opposing signs. As expected, the effect of the lagged dependent variable depends positively on the percentage of luxury hotels, and negatively on the ratio between tourists and hotel beds. Thus, there is a non-constant effect of the previous number of tourists over current tourists. Additionally, the results reveal a generally satisfactory performance of the econometric models. The autocorrelation tests (Arellano & Bond, 1991) do not detect any serial correlation problem in the residuals. As expected, the residuals in differences are autocorrelated of order 1, while there is no autocorrelation of second order. In addition, the Hansen (1982) J-test does not reject the null for joint validity of the instruments.

Both estimates (one-step and two-step) yield similar results. All variables are statistically significant. Estimated β_1 (0.9626, 0.9674) and β_2 (0.0149, 0.0147) are positive, and estimated β_3 (-0.0159, -0.0182) is negative. Thus, the elasticity of tourism demand with respect to the lagged demand is positive, increasing with the percentage of luxury hotels, and decreasing with the ratio between tourists and hotel beds at the destination. This means that quality of tourism services and tourist congestion are relevant for explaining international tourism demand in the Mediterranean coasts. The implication of this result is that, in order to attract more tourists, the suppliers of tourism products should improve their service quality

Tab. 1: Estimation results for international tourism demand model, 2005-2015

Dependent variable: $T_{ij,t}$	GMM-SYS	
	one-step	two-step
Explanatory variables		
$T_{ij,t-1}$	0.9626***	0.9674***
$T_{ij,t-1} \cdot Q_{i,t-1}$	0.0149***	0.0147***
$T_{ij,t-1} \cdot O_{i,t-1}$	-0.0159**	-0.0182**
GDP_{jt}	0.0301***	0.0294**
$IP_{ij,t}$	-0.1752**	-0.2148**
$D2009_t$	-0.0989***	-0.0971***
Hansen test (p-value)	0.076	0.076
AR(1) (p-value)	0.000	0.000
AR(2) (p-value)	0.208	0.222
Number of observations	770	770
Number of groups	77	77

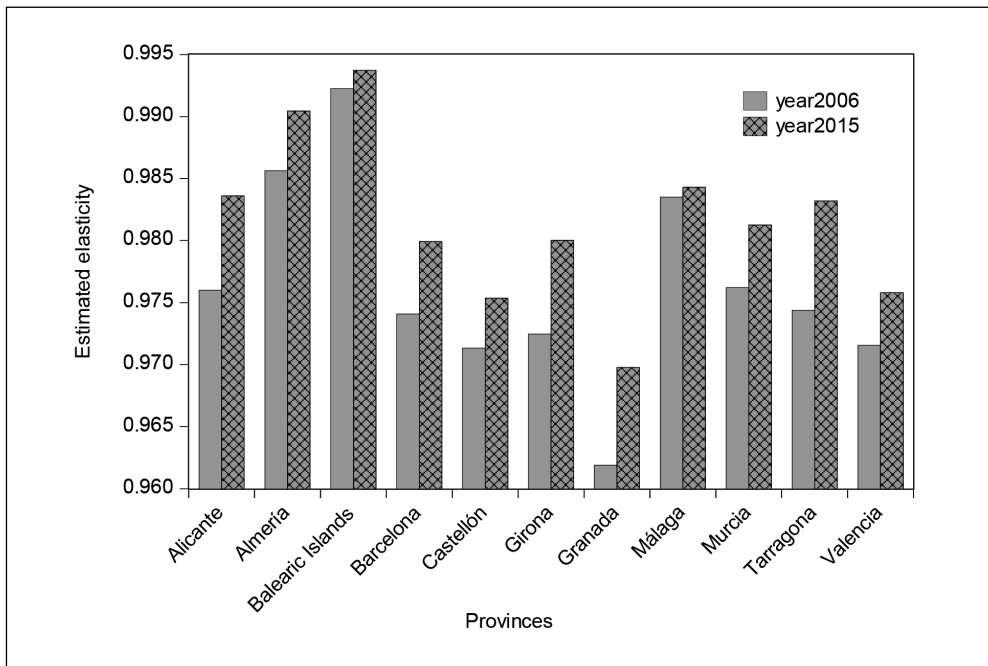
Source: own using the xtabond2 command in STATA10 (Roodman, 2009)

Note: *, **, *** denote significant at the 10%, 5% and 1% level respectively.

and adapt hotel capacity. The estimated income elasticity (0.0301, 0.0294) is positive, showing that the arrival of European tourists to Spanish Mediterranean coasts depend positively on the wealth of its origin country. As expected, negative price elasticity is estimated with values of -0.1752 and -0.2148, suggesting that tourist arrivals are also sensitive to price changes. Finally, the dummy variable representing the impact of the global crisis has the expected negative sign (-0.0989 and -0.0971).

One of the most important determinants of the international tourism on the Spanish Mediterranean coasts seems to be the lagged dependent variable, which controls both the effect of the word-of-mouth recommendations and the effect of habit persistence. Since β_2 and β_3 are significant, the effect of this variable is non-constant, but varies across the destinations and over time. In any given year, it varies between the different Mediterranean provinces depending on its percentage of luxury hotels and the relationship between its tourism demand (tourists) and tourism supply (hotel beds). Moreover, given a particular destination, it increases with the quality of services offered by hotels, and decreases when the increase in the tourists is not accompanied by a proportional increase in the number of

hotel beds. In order to show these results, the elasticity of tourism demand with respect to the previous tourists has been calculated in each of the provinces using the estimated coefficients from the second column of Tab. 1. Fig. 3 shows these estimated elasticities for the years 2006 and 2015 (Since elasticity depends on characteristics of the tourist destination, for each province the elasticity of previous tourists is the same for tourists arriving from different origin countries). The estimates for both years show a very similar ranking. Granada is the province with the lowest estimated effect of previous tourists, while the Balearic Islands have the highest estimated effect every year. In this province, the influence of previous tourist is very similar for both years showing that its attractiveness as a tourist destination has remained stable for the last ten years. The same happens in Malaga, which is the third province with greatest elasticity after the Balearic Islands and Almeria. The rest of the provinces show a larger increase in the estimated elasticity during the period of analysis. This result indicates that improvements carried out in the Mediterranean coasts hotels have been appropriate for satisfying the growing tourism demand that this area is experiencing.

Fig. 3: Estimated elasticity of tourism demand with respect to previous tourists

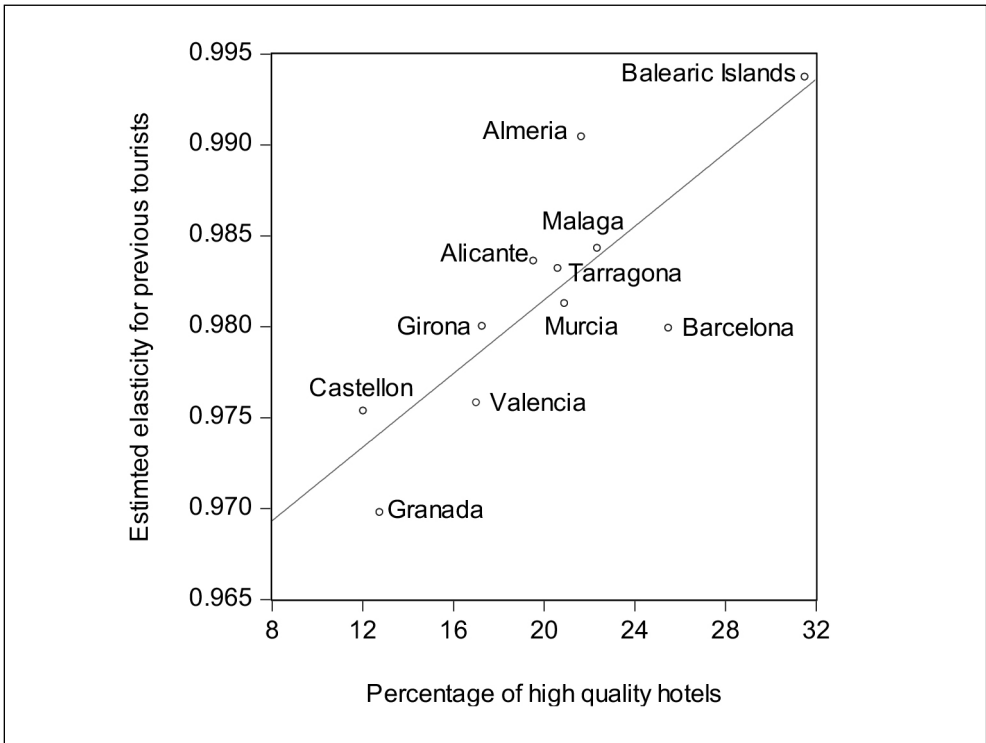
Source: own

Fig. 4 shows the scatterplot and regression line between estimated elasticity for the lagged dependent variable and percentage of luxury hotels in 2015, and Fig. 5 between the estimated elasticity and tourists-hotel beds ratio. Both figures graphically illustrate why the effect of previous tourists is greater or less in each province. As expected, Fig. 4 shows a positive relationship and Fig. 5 a negative one. On average, the higher the percentage of luxury hotels the greater the positive effect of the previous tourists on the current demand (see Fig. 4). The Balearic Islands are an example. However, there are provinces moving away from this average behavior. Almeria has a high estimated elasticity in relation to its percentage of luxury hotels. On the other hand, Barcelona has a low estimated elasticity in relation to its hotel quality, probably due to tourist congestion. Fig. 5 indicates that the lower the tourist congestion, the more beneficial the influence of previous tourists on the current demand. This is the reason why Almeria has a high elasticity.

It is the province with the lowest tourists-hotel beds ratio. Balearic Islands and Barcelona moving away from this average behavior showing a larger elasticity, because they are the provinces that offer the highest hotel quality. In contrast, Castellon, due to its low percentage of luxury hotels, has a lower estimated elasticity than that corresponding to its level of tourist congestion. Finally, looking at Fig. 4 and 5, it is easy to understand why the Balearic Islands and Granada are the provinces with greatest and lowest elasticity, respectively. The Balearic Islands have the highest quality hotels, as well as the second lowest ratio between tourists and hotel beds. In contrast, Granada (along with Castellon) has the lowest percentage of high-quality hotels, and the greatest tourist congestion (along with Barcelona).

To sum up, results from the GMM estimates imply that previous tourists have played an active role in the growth of tourism in the Spanish Mediterranean coasts. The significant positive effect of the previous tourists reveals

Fig. 4: Scatterplot between percentage of luxury hotels and estimated elasticity in 2015



Source: own

a strong persistence in tourism demand. This effect varies across the provinces depending on the quality of hotel services and tourist congestion. Additionally, the impact of previous tourists has not remained constant over time, but has increased in the Mediterranean provinces since 2005. The investments realized in quality and quantity of hotel services during this period have enhanced their reputation.

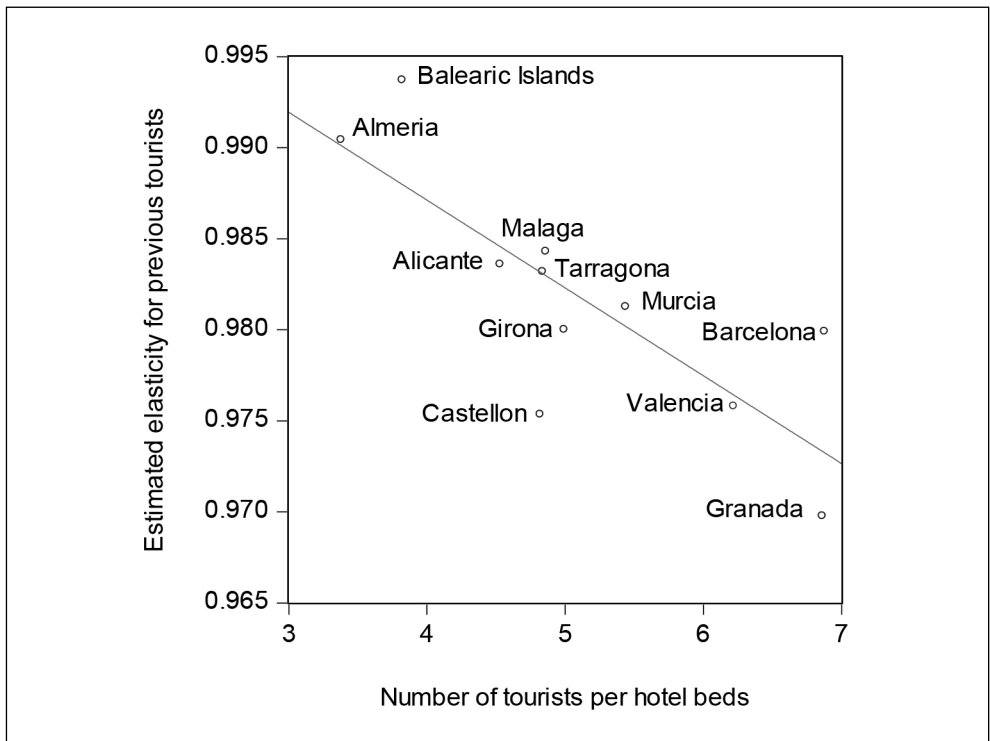
Conclusions

This paper uses a nonlinear dynamic specification to model international tourism demand on the Spanish Mediterranean coasts, and investigates how previous tourists can affect tourism demand decisions. The use of a dynamic specification is justified in the sense that past visitors influence current tourism demand. Tourism destination can become popular (or unpopular) as consequence of experiences of past tourists. Furthermore, the

nonlinear model adopted here allows the effect of past tourists to depend on the destination's features like the quality of tourism services or tourist congestion.

The proposed model is an extension of the standard dynamic equation for tourism demand. Our model includes interaction effects between previous tourists and two destination characteristics: tourism services quality and tourist congestion. Existing research mostly assumes that the effect of previous tourists on current demand is constant. In this paper, we allow this effect to vary with the characteristics of a tourism destination. The possibility of a non-constant effect is appropriate in destinations, such as the Spanish Mediterranean coasts, where tourism investment policies or the congestion caused by massive arrivals of tourists may have changed its attractiveness during the last years. In addition, since the Mediterranean provinces show important differences regarding number of

Fig. 5: Scatterplot between tourists-hotel beds ratio and estimated elasticity in 2015



Source: own

tourists and characteristics of tourism services offered, the influence of past tourists may also be different at each.

We estimate the model using a panel data set consisting of the 11 provinces which make up the Spanish Mediterranean coasts, and the 7 European countries which are the main origin markets, for the period 2005-2015. Our model includes traditional economic factors, such as income and relative prices, and a nonlinear term to capture the effect of previous tourists. This dynamic model allows the effect of the previous tourists not to be constant, but to depend on the quality of the tourism services, defined as the percentage of luxury hotels, and the tourist congestion, defined as the tourists-hotel beds ratio. The system GMM procedure is applied to estimate the econometric model. The empirical results show that previous tourists appear to have an important effect on current tourism demand decisions. Quality and congestion also

matter. The effect of past visitors is positively influenced by the percentage of luxury hotels, and negatively by the ratio between tourists and hotel beds. The policy implication of this finding for the tourism industry is that provision of high-quality services and an appropriate hotel capacity are crucial for earning a good reputation and attracting new and repeat tourists to the Spanish Mediterranean coasts.

The econometric analysis developed in this study suggests that the elasticity of previous tourists is not constant but varies across provinces and over time. In provinces with similar congestion, the effect is lower when the percentage of luxury hotels is fewer. This implies that quality is important. Tourists assess positively the quality of the services offered at destination hotels, allocating a better reputation to those provinces where tourism investment policies have taken into account quality of accommodations. Congestion has

the opposite effect on reputation. In provinces with a similar percentage of luxury hotels, the effect of past tourists is lower when the tourists-hotel places ratio is higher. This shows that tourist crowding is negatively perceived by tourists. A greater number of hotel beds could reduce this tourist congestion. According to our results, in 2015, the Balearic Islands is the province where the influence of past visitors is most positive. Barcelona is below the Balearic Islands because of congestion (both provinces have the highest number of international arrivals). Finally, regarding the temporal dynamics, all provinces show an increase in the estimated effect during the period 2005-2015. The tourist investments carried out during this period in the Spanish Mediterranean coasts have contributed to improve its tourism attractiveness, and consequently, the positive effect of the past tourists on the current tourism demand is stronger.

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A NONLINEAR DYNAMIC MODEL FOR INTERNATIONAL TOURISM DEMAND ON THE SPANISH MEDITERRANEAN COASTS

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Spanish Mediterranean coasts are a consolidated tourist destination and enjoy growing demand. These coasts receive the highest number of international arrivals in Spain. This paper has been developed to gain a better knowledge of the determinants of this international tourism demand. A nonlinear dynamic model that analyses how previous tourists can affect tourism demand decisions is proposed. This nonlinear dynamic specification extends the standard dynamic equation for tourism demand to include interaction effects between previous tourists and two destination characteristics: the quality of the tourism services and tourist congestion. Both characteristics are important to define the reputation or attractiveness of the destination.

We test the model using panel data from the 11 provinces which make up the Spanish Mediterranean coasts, and the 7 European countries which are the main origin markets for the period 2005-2015. The system GMM procedure is applied to estimate the econometric model.

The econometric results show evidence of strong persistence in international tourism demand. Previous tourists have an important positive and non-constant effect, and this effect is positively influenced by the quality of the tourism services, and negatively by tourist congestion. Therefore, the effect of previous tourists is not constant but varies across provinces and over time. This effect is stronger in provinces with high quality tourism services and lower congestion. Additionally, the impact of previous tourists has not remained constant over time, but has increased in the Mediterranean provinces since 2005. The investments realized in quality and quantity of hotel services during this period have enhanced their reputation.

Key Words: *International tourism demand, previous tourists effect, dynamic panel data, interaction effects, Spain.*

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